



## **Taxonomy and Distribution of Recent Benthic Foraminifera from Bir Ali Beach, Shabwah Governorate, Arabian Sea, Yemen**

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**Abstract:** One hundred and eleven benthic foraminiferal species belonging to 36 genera, 25 families, 16 superfamilies and 4 suborders were identified from twenty samples collected from Bir Ali beach on the Yemeni Arabian Sea coastline. The benthic foraminifera assemblages were dominated by species belonging to Miliolina suborder with 71 species and 17 genera, followed by Rotaliina with 29 species and 14 genera, Textulariina 9 species and 3 genera and Lagenina 2 species and 2 genera. The distribution of recent shallow-water benthic foraminifera in surface sediment samples is in various from sample to another. Higher abundance of genus *Quinqueloculina* is recorded in almost all the samples of the study area. The recorded assemblages show a high similarity to the foraminiferal assemblages of the Indo-Pacific region, East African coast and Red Sea.

**Key Words:** Arabian Sea, Bir Ali Beach, Recent benthic foraminifera, Shabwah, Yemen

### **INTRODUCTION**

The Arabian Sea represents a tropical region of high priority, as it is one of the richest marine biological areas of the world. It is a major contributor to global ocean productivity and biogenic carbonate burial; It is therefore currently under intensive study to understand its role in both modern and palaeoenvironmental global ocean/climate system (Sears, 2011). The Arabian Sea is known to harbour a wide range of benthic foraminiferal morphospecies (Brummer and Kroon, 1988). This sea is a classical region for investigations in foraminifera taxonomy. Numerous researchers

studied the foraminiferal diversity of the Arabian sea (i.e. Chapman, 1895; Hofker, 1927; Stubbings, 1939; Rao, 1970; Nigam et al., 1979; Setty and Nigam, 1980; Cherif et al., 1997; Kurbjewit et al., 2000; Erbacher and Nelskamp, 2006 and Sarkar and Gupta, 2009). The first study of benthic foraminifera in Arabian Sea goes back to the time of Chapman (1895) who reported 274 species of foraminifera from the Arabian Sea. This is followed by a monograph of foraminifera collected from the Arabian Sea published by Hofker (1927). Stubbings (1939) recorded about 300 species from the same area. Sarkar and Gupta

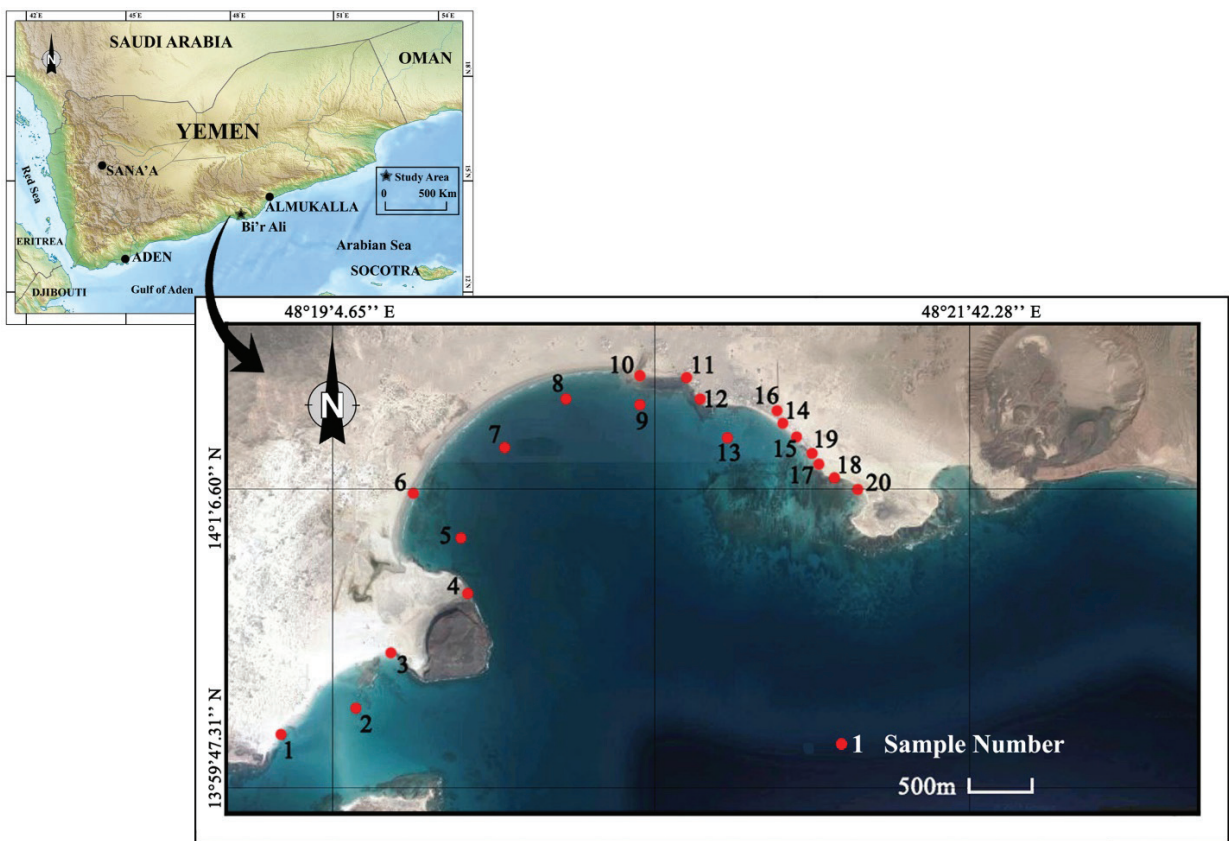
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(2009) recorded 201 benthic foraminifera species from southeastern Arabian Sea. Al-Wosabi et al. (2011) reported 86 foraminiferal species from Socotra Island, Indian Ocean, Yemen.

This study aims to introduce the classification of the benthic foraminifera assemblages and their surface distribution in the recent sediments from the Bir Ali beach, Yemeni Arabian Sea coastline (Figure 1).

### STUDY AREA

Bir Ali Beach is chosen for this study due to its important location as a port for oil and gas export. The study area is located in the south-east part of Yemen, between 14° 01'N and 48° 20'E (Figure 1). This area is covered by basaltic rocks of Neogene and Quaternary age and has been defined as “Aden Volcanic Series” (Beydoun, 1966). Several large volcanic cones composed of



**Figure 1.** Location map of collected samples (After Google Earth and <http://www.Maps-of-the-world.net/maps-of-asia/maps-of-yemen>, with modification)

light coloured and well-bedded basaltic tuffs align at the offshore parallel to the coastal sand of the land. The volcanic cones are restricted to the rift zone of the Gulf of Aden, characterized by a high volcanic activity. In the near coast areas, parts of the basaltic rocks are covered by thin sheets of blowing sand or by gritty-silty (tuff) weathering products, which may have considerably flattened the original rough surface. Parts of the cliff-coast are plain by abrasional processes of the sea and occurrences of beach rock, coral, or wave-cut platforms and small cliffs are frequent at levels of 5 to 7 meters above sea level (Fantozzi and Sgavetti, 1998).

The climate of the study area is tropic-arid. It is essentially affected by the monsoon winds of the Indian Ocean. The Arabian Sea is a unique marine environment since its circulation is completely reversed biannually by seasonally reversing monsoon winds. It is therefore subject to greater seasonal variability than any other ocean basin on the globe (Clemens et al., 1991). This area is characterized by low and irregular rainfall (less than 50 mm/y) where the drainage system consists of dry watercourses, of wadis, which flow only episodically in times of torrential runoff after heavy rains (Caton-Thompson and Gardner, 1939).

## **METHODOLOGY**

In the present study, twenty recent sediment samples were collected from the beach of Bir Ali area with depth ranging between 0.5 – 5 m (Figure 1). 100 grams of each sample were treated for extracting the foraminiferal tests. The sample immersed in water mixed with hydrogen peroxide (10% conc.), and were boiled for about 5 hours to remove the organic materials, the clay, silt, and fine sand from the foraminiferal tests. By sterring the material with salty water in a plastic container

and according to the difference in the density, the sediment sunk and the foraminiferal tests still suspended or floated for a short time. Repeating this method, most of the foraminiferal tests were separated from the other sample components, and then collected in a glass tubes. A binocular light microscope has been used to examine and identify the foraminiferal tests to the species level. These species are coated with gold using Blazer sputtering equipment (EMITECH, K550X sputter coater), and photographed using the scanning electron microscope (SEM) Model Philips XL 30, in the SEM Unit at the Egyptian mineral resources authority (Central Laboratories Sector), Geza - Egypt.

## **SYSTEMATIC PALEONTOLOGY**

Systematic classification of foraminiferal species has been accomplished according to their morphological features such as shell shape, wall composition and structure, chamber shape and numbers and other features. The systematic classification of the recorded foraminiferal assemblages here has been done according to Loeblich and Tappan, 1988; Kaminski, 2004 and Ellis and Messina, 1940 and their supplements as well as related publications in different scientific relevant journals. The distribution of the the species through the samples was determined and displayed in Table 1. In this paper, the description of species restricted to unknown species, whereas the description of identified species is similar to their identical type species. In case there are differences between present identified species and the type species, these differences will be shown in the remarks. All the illustrated specimens and sediment samples utilized for this study have been indexed and deposited in the repository of the Earth and Environmental Sciences Department, Faculty of Science, Sana'a University.

**Table 1.** Distribution of identified foraminifera species from the study area.

| No | Species                            | Stations |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|----|------------------------------------|----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
|    |                                    | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 1  | <i>Spiroplectinella sagittula</i>  |          | A |   |   | A |   |   |   | A |    |    |    |    |    |    |    |    |    |    |    |
| 2  | <i>S. sp.</i>                      |          |   |   |   | F |   |   |   |   |    | R  | F  |    | F  |    |    |    |    |    |    |
| 3  | <i>Gaudryina rudis</i>             |          | A | F |   | A |   |   |   |   |    |    | F  |    |    |    |    |    |    |    |    |
| 4  | <i>Textularia agglutinans</i>      |          | A | F |   | R |   |   | R | A |    |    | A  |    |    |    |    | A  |    |    |    |
| 5  | <i>T. candeiana</i>                |          |   | C | C |   |   |   |   | A |    |    |    | C  | A  |    |    |    |    |    |    |
| 6  | <i>T. conica</i>                   |          | F |   |   | F |   |   |   |   |    |    | F  | C  |    |    |    |    |    |    | C  |
| 7  | <i>T. gramen</i>                   |          | A |   |   | R |   | R |   |   |    |    | F  | R  |    |    |    |    |    | F  |    |
| 8  | <i>T. sp.1</i>                     | F        |   |   |   | F |   | R |   |   |    |    | F  | R  |    |    |    |    |    | F  |    |
| 9  | <i>T. sp.2</i>                     |          | A |   |   | A |   |   |   |   |    |    |    | C  |    |    |    |    |    |    |    |
| 10 | <i>Planispirinella exigua</i>      |          |   | C |   | C |   |   |   |   |    |    |    | C  |    |    |    |    |    |    |    |
| 11 | <i>Adelosina laevigata</i>         |          | C |   |   |   |   | C | C |   |    |    |    | C  |    |    |    |    |    |    |    |
| 12 | <i>A. mediterraneensis</i>         |          |   |   |   | F | F |   |   |   |    |    |    | F  |    |    |    |    |    |    | F  |
| 13 | <i>A. sp</i>                       |          |   |   |   | C |   |   | R |   |    |    |    | R  |    |    | C  |    |    |    | C  |
| 14 | <i>Cribrulinoides curta</i>        | C        | C |   |   | C |   |   |   | A |    |    |    |    |    |    |    |    |    |    |    |
| 15 | <i>Spiroloculina acutimargo</i>    | A        | F |   |   |   |   |   |   |   |    |    | F  | A  | A  |    |    |    |    |    |    |
| 16 | <i>S. aequa</i>                    |          | C |   |   | C |   |   |   |   |    |    |    | R  |    |    |    |    | C  | R  |    |
| 17 | <i>S. antillarum</i>               |          | A |   |   | F |   |   |   | F |    |    |    | A  | A  |    |    |    |    |    |    |
| 18 | <i>S. communis</i>                 | F        |   |   |   | F |   |   |   |   |    |    |    |    |    | F  |    |    |    |    |    |
| 19 | <i>S. depressa</i>                 |          | C |   |   | R |   |   |   | C |    | R  |    | C  |    |    |    |    |    |    | C  |
| 20 | <i>S. elegans</i>                  |          | F |   |   | F |   |   |   | F |    |    |    | R  |    |    |    |    | R  |    |    |
| 21 | <i>S. tenuiseptata</i>             |          | C |   |   |   |   |   |   | C |    |    |    | C  |    |    |    |    |    |    |    |
| 22 | <i>S. sp.1</i>                     | C        |   |   |   | C |   |   |   |   |    |    |    | C  |    |    |    |    |    | C  |    |
| 23 | <i>S. sp.2</i>                     |          |   |   |   | R |   |   |   |   | R  |    |    | F  |    |    |    |    |    |    | F  |
| 24 | <i>Siphonaperta agglutinans</i>    |          | A |   |   | F |   |   | F |   |    |    |    |    |    |    |    |    | A  |    | A  |
| 25 | <i>S. horrida</i>                  |          | A |   |   | C |   |   | C |   |    |    |    |    |    | C  |    |    |    |    | C  |
| 26 | <i>S. irregularis</i>              |          | A |   |   | R |   |   |   |   |    |    | A  | R  |    |    |    |    |    |    |    |
| 27 | <i>Hauerina diversa</i>            |          | A |   |   | R |   |   |   |   |    |    |    | A  |    |    | C  |    |    |    | C  |
| 28 | <i>Quinqueloculina agglutinata</i> | R        | A |   |   | A |   |   |   | A |    |    |    |    | R  |    |    |    | A  |    |    |
| 29 | <i>Q. bradyana</i>                 |          | C |   |   |   |   | C |   |   |    |    |    |    | C  |    |    |    |    |    |    |
| 30 | <i>Q. carinatastriata</i>          |          | A |   |   | A |   |   | A | R |    |    |    | A  | R  |    |    |    |    | A  |    |
| 31 | <i>Q. corrugate</i>                |          | C |   |   | A | C |   |   |   |    |    |    | A  |    |    |    |    | A  |    |    |
| 32 | <i>Q. debenayi</i>                 |          | F |   |   | A |   | F |   |   |    |    |    | A  |    |    |    |    |    | F  |    |
| 33 | <i>Q. granulocostata</i>           |          |   | A |   | C |   | A | C |   |    |    |    | A  | C  |    |    |    |    |    | A  |
| 34 | <i>Q. jugosa</i>                   |          | A |   |   | A |   |   |   | C |    |    |    |    | A  | C  |    |    |    |    |    |
| 35 | <i>Q. lamarckiana</i>              |          | A |   |   | R |   | A |   |   | A  |    |    |    |    | R  |    |    |    |    |    |
| 36 | <i>Q. lata</i>                     |          | C |   |   |   |   |   |   | C |    |    |    |    | C  |    |    |    |    |    | C  |
| 37 | <i>Q. multimarginata</i>           |          | A | F |   | A |   |   | F |   | A  |    |    | F  |    |    |    |    | A  |    |    |
| 38 | <i>Q. neapolitana</i>              |          | F |   |   | F |   |   |   |   | R  |    |    | R  |    |    |    |    |    |    |    |
| 39 | <i>Q. padana</i>                   |          | R |   |   | R |   | C |   | C |    |    |    |    | C  |    |    |    |    | C  |    |
| 40 | <i>Q. parkeri</i>                  |          | F | A |   | F |   |   |   |   |    | A  |    | F  |    |    |    |    | F  |    | A  |
| 41 | <i>Q. plicosa</i>                  |          | A |   |   | R |   |   |   |   | A  |    | R  |    | A  |    |    |    |    |    |    |

|    |                                      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|----|--------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | <i>Q. poeyana</i>                    |   | C |   |   | A |   |   | C |   |   | A |   | C |   |   |   |   |   |
| 43 | <i>Q. pseudoreticulata</i>           |   | A |   |   | R |   | A |   |   |   |   |   | R |   | A |   |   |   |
| 44 | <i>Q. cf. Q. rugosa</i>              |   | A |   |   | A |   |   |   |   |   |   |   | F |   |   |   | F |   |
| 45 | <i>Q. seminulum</i>                  |   | A |   |   | A | C |   |   | A | C |   |   | C |   |   |   | A | C |
| 46 | <i>Q. subpolygona</i>                | A | A |   |   | F |   | A |   |   | F |   |   | F |   |   |   | A |   |
| 47 | <i>Q. cf. Q. triangularis</i>        |   | R |   |   | R |   |   | C |   |   |   |   | C |   |   |   |   | C |
| 48 | <i>Q. triangula</i>                  |   | A |   |   | A |   |   |   | F |   |   | A | F |   |   | A |   |   |
| 49 | <i>Q. undulosecostata</i>            | A |   |   |   | R |   |   | A |   |   |   | A | R |   |   |   |   | R |
| 50 | <i>Q. vulgaris</i>                   |   | A |   |   | A |   | R |   |   |   |   |   | R |   | R |   | A |   |
| 51 | <i>Q. sp. 1</i>                      |   | A |   |   | A |   |   |   | F |   |   |   | F | F |   |   | A | F |
| 52 | <i>Q. sp.2</i>                       |   | A |   |   | A |   |   |   |   |   |   |   | R |   |   |   | R |   |
| 53 | <i>Miliolinella subrotunda</i>       |   | A |   |   | R |   | A |   | R |   |   |   | R |   |   |   |   |   |
| 54 | <i>M.sp.</i>                         |   | F |   |   | F |   |   |   |   | F |   |   | F |   |   |   |   |   |
| 55 | <i>Pseudomassilina pacificiensis</i> |   | R |   |   |   |   | R |   |   |   |   | R | R |   |   |   |   |   |
| 56 | <i>Pyrgo oblonga</i>                 |   | R |   |   | R |   |   |   |   |   |   |   | R |   |   |   |   | R |
| 57 | <i>P. sp.</i>                        |   | F |   |   | F |   |   |   |   |   |   |   | F |   |   |   | F |   |
| 58 | <i>Triloculina affinis</i>           |   |   |   |   | R |   | R |   |   |   |   |   | R |   |   |   |   | R |
| 59 | <i>T. brongniatiana</i>              |   | A |   |   | F |   |   |   | A |   |   |   | F |   |   |   |   | A |
| 60 | <i>T. elongotricarinata</i>          |   | A |   |   | R |   |   |   |   |   |   |   | A |   |   | R |   |   |
| 61 | <i>T. fichteliana</i>                |   | C |   | C | C |   |   |   |   |   |   |   | C |   |   |   |   |   |
| 62 | <i>T. insignis</i>                   |   | A |   |   | R | A |   |   |   |   |   | A | R |   |   |   | A |   |
| 63 | <i>T. marioni</i>                    |   |   |   |   | R |   |   | R |   |   |   |   | R |   |   |   |   |   |
| 64 | <i>T. oblonga</i>                    |   | A |   |   | F |   |   |   |   |   |   | A | F |   |   |   |   |   |
| 65 | <i>T. plicata</i>                    |   | R |   |   |   |   | R |   |   |   |   |   | R |   |   |   |   |   |
| 66 | <i>T. rotunda</i>                    |   | F |   |   | F |   |   |   |   |   |   |   |   |   |   |   | F |   |
| 67 | <i>T. terquemiana</i>                |   | R |   |   |   |   |   |   | R |   |   |   | R |   |   |   |   |   |
| 68 | <i>T. tricarinata</i>                |   | F |   |   |   |   |   |   |   | F |   |   | F |   |   |   |   | F |
| 69 | <i>T. trigonula</i>                  |   | A |   |   |   |   |   | A |   |   |   |   | R | A |   |   |   | R |
| 70 | <i>T. trihedral</i>                  |   | A | C |   | A |   |   |   | A |   |   |   | C |   |   |   | A |   |
| 71 | <i>Sigmoihauerina bradyi</i>         |   |   |   |   | F |   |   |   |   |   |   |   | F |   |   | F |   | F |
| 72 | <i>Rupertianella rupertiana</i>      |   | R |   |   | R |   |   |   |   |   |   | R | R |   |   |   |   |   |
| 73 | <i>Borelis schlumbergeri</i>         |   | A |   |   | C |   | A |   |   |   |   |   | C | A |   |   |   | A |
| 74 | <i>Coscinospira hemprichii</i>       | A | R |   |   |   | A |   |   |   | A | A |   | A |   |   |   |   |   |
| 75 | <i>Peneroplis arietinus</i>          |   | C |   |   | C |   |   | C |   |   |   |   | C |   |   |   |   |   |
| 76 | <i>P. bradyi</i>                     | R | A |   |   | R |   |   |   | A |   |   |   | A |   |   |   |   |   |
| 77 | <i>P. pertusus</i>                   |   | F |   |   | F |   |   |   |   |   |   |   | F |   |   |   | F |   |
| 78 | <i>P. planatus</i>                   |   |   |   |   | A |   |   |   |   | A | A |   | R |   |   | A |   | R |
| 79 | <i>Sorites marginalis</i>            |   | A |   |   | F |   |   |   |   |   |   |   | A |   | F |   |   |   |
| 80 | <i>S. orbiculus</i>                  |   | C |   |   | C |   |   |   |   |   |   | C | C |   |   |   |   |   |
| 81 | <i>Amphimorphina butonensis</i>      |   | R |   |   |   |   |   |   |   |   |   |   | R |   |   | R |   |   |
| 82 | <i>Fissurina sp.</i>                 |   | F |   |   |   |   |   |   |   | F |   |   | F |   |   |   |   | F |
| 83 | <i>Bolivina pseudoplicata</i>        |   | A |   |   | A |   |   | R |   |   |   |   |   | A |   |   |   |   |
| 84 | <i>B. pseudopunctata</i>             |   | C |   |   |   |   | C |   |   |   |   |   | C |   |   |   |   | C |

|     |                                      |   |   |  |   |   |   |   |   |   |   |  |   |  |  |  |  |   |   |
|-----|--------------------------------------|---|---|--|---|---|---|---|---|---|---|--|---|--|--|--|--|---|---|
| 85  | <i>B. variabilis</i>                 |   | F |  |   |   | F |   |   |   |   |  |   |  |  |  |  |   |   |
| 86  | <i>Sagrinella lobata</i>             |   | R |  | A |   | A |   |   |   | A |  | R |  |  |  |  | R |   |
| 87  | <i>Reussella spinulosa</i>           |   |   |  | F |   |   |   | F |   | F |  |   |  |  |  |  |   | F |
| 88  | <i>Eponides repandus</i>             |   | C |  |   |   | C |   |   |   | C |  |   |  |  |  |  |   |   |
| 89  | <i>Rosalina anomala</i>              | A | R |  | R |   | A |   |   | R | A |  |   |  |  |  |  |   |   |
| 90  | <i>R. bradyi</i>                     |   | F |  | A |   | A |   | F |   |   |  |   |  |  |  |  |   | F |
| 91  | <i>R. globularis</i>                 |   |   |  |   | C |   | C |   |   |   |  |   |  |  |  |  | C |   |
| 92  | <i>R. sp.</i>                        |   | R |  |   |   |   |   |   |   |   |  |   |  |  |  |  |   | R |
| 93  | <i>Hyalinea balthica</i>             | F |   |  |   | F |   |   |   |   |   |  |   |  |  |  |  |   | F |
| 94  | <i>Planorbulina mediterraneensis</i> |   |   |  |   |   |   |   | F |   |   |  |   |  |  |  |  |   | R |
| 95  | <i>Cymbaloporella tabellaeformis</i> |   | F |  |   | F |   |   |   |   | F |  |   |  |  |  |  |   | F |
| 96  | <i>Amphistegina lessonii</i>         |   | C |  |   | C |   |   |   |   |   |  |   |  |  |  |  |   | C |
| 97  | <i>A. lobifera</i>                   |   | R |  |   | R |   |   |   |   | R |  |   |  |  |  |  |   | R |
| 98  | <i>A. radiate</i>                    |   | F |  |   | F |   |   |   |   |   |  |   |  |  |  |  |   | F |
| 99  | <i>Nonion fabum</i>                  |   | C |  |   |   |   |   | C |   |   |  |   |  |  |  |  |   | C |
| 100 | <i>Neorotalia calcar</i>             |   | A |  |   |   |   |   | A |   |   |  |   |  |  |  |  |   | R |
| 101 | <i>Pararotalia cf. P. ozawai</i>     |   |   |  | R |   |   |   |   |   |   |  |   |  |  |  |  |   | R |
| 102 | <i>Ammonia aoteana</i>               |   |   |  | A | R |   |   | A |   |   |  |   |  |  |  |  |   | A |
| 103 | <i>A. beccarii</i>                   | F |   |  | A |   | F | C |   |   | A |  | C |  |  |  |  |   | A |
| 104 | <i>A. convexa</i>                    |   | R |  |   |   | R |   |   |   |   |  |   |  |  |  |  |   | R |
| 105 | <i>A. parkinsoniana</i>              |   | F |  |   |   | F |   |   |   |   |  |   |  |  |  |  |   | F |
| 106 | <i>Elphidium aculeatum</i>           |   |   |  | A |   |   |   | A |   |   |  |   |  |  |  |  |   | A |
| 107 | <i>E. advenum</i>                    |   |   |  |   |   | F |   |   |   | F |  |   |  |  |  |  |   | F |
| 108 | <i>E. crispum</i>                    |   | C |  |   |   | C |   |   |   |   |  |   |  |  |  |  |   | C |
| 109 | <i>E. macellum</i>                   |   |   |  | C |   |   |   | C |   |   |  |   |  |  |  |  |   | C |
| 110 | <i>E. margaritaceum</i>              |   | R |  |   |   |   |   | R |   |   |  |   |  |  |  |  |   | R |
| 111 | <i>E. gerthi</i>                     |   |   |  | F |   |   |   | F |   |   |  |   |  |  |  |  |   | F |

A: Abundant: more than 15; C: Common: 10-15; F: Frequent: 5-10; R: Rare: less than 5.

Order: Foraminiferida Eichwald, 1830

Suborder: Textulariina Delage and Herouard, 1896

Superfamily: Spiroplectamminoidae Cushman, 1927

Family: Spiroplectamminidae Cushman, 1927

Subfamily: Spiroplectammininae Cushman, 1927

Genus: *Spiroplectinella* Kisel'man, 1972

*Spiroplectinella sagittula* DeFrance, 1824

(Figure 2. 1-2)

1824 *Textularia sagittula* (DEFRANCE):  
177.

2009 *Spiroplectinella sagittula* DEFRANCE;  
Milker et al.: 215, pl. 1, figs. 7-9.

Material: This species is identified as an abundant form in samples 2, 5, and 9, and as a common in sample 13.

Geographical distribution: *Textularia sagittula* (DEFRANCE) was recorded in the Gulf of Iskenderun by (Ofiaz, 2006) and from western Mediterranean Sea (Milker et al., 2009 and Milker and Schmiedl, 2012).

*Spiroplectinella* sp.

(Figure 2. 3-4)



Description: Wall agglutinated; test triangular to subtriangular; chambers biserially arranged, laterally compressed and rapidly increasing in size as added; sutures depressed and slightly curved; periphery acute; aperture low arch at the base of the apertural face.

Material: It is recorded as frequent in samples 5, 13, and 15, and as a rare in samples 8 and 12.

Superfamily: Verneuilinoidea Cushman, 1911

Family: Verneulinidae Cushman, 1911

Subfamily: Verneulininae Cushman, 1911

Genus: *Gaudryina* d'Orbigny, 1839

*Gaudryina rudis* Wright, 1900

(Figure 2. 5-8)

1900 *Gaudryina rudis* WRIGHT: 53, pl. 2, fig. 1.

2009 *Connemarella rudis* (WRIGHT); Milker et al.: 215, pl. 1, fig. 15.

Material: This species is recorded as an abundant form in samples 2, 5, and as a frequent form in samples 3 and 13.

Geographical distribution: *Connemarella rudis* Wright, was recorded in Hebridean shelf, west of Scotland (Murray, 2003), New Caledonia, Southwestern Pacific (Debenay, 2012) and from western Mediterranean Sea (Milker et al., 2012).

Superfamily: Textularoidea Ehrenberg, 1838

Family: Textularidae Ehrenberg, 1838

Subfamily: Textulariinae Ehrenberg, 1838

Genus: *Textularia* DeFrance, 1824

*Textularia agglutinans* d'Orbigny, 1839

(Figure 2. 9-11)

1839 *Textularia agglutinans* D'ORBIGNY: 144, pl. 1, figs. 17-18, 32-34.

2006 *Textularia agglutinans* D'ORBIGNY; Hussain et al.: 1660, figs. 3-6; 1661, figs. 4-11; 1662, figs. 1-5.

Material: *Textularia agglutinans* d'Orbigny is identified as an abundant form in samples 2, 9, 13 and 17, and as a rare form in samples 5, and 8.

Geographical distribution: This species was recorded from several areas worldwide such as southern Thailand (Jumnonngthai, 1980), Spain (Ariza, 1988), southern Norway (Alve, 1995), Bermuda islands (Javaux, et al., 2003), the central Adriatic Sea (Sabbatini et al., 2005), Central east coast of India (Rana, 2009), the Dardanelles Strait (Meriç et al., 2009), western Mediterranean Sea (Milker et al., 2012), Indonesia (Suhartati and Muchlisin, 2012), coast of Iligan Bay, Mindanao, Philippines (Lacuna, et al., 2013) and the Egyptian Red Sea (Madkour, 2013).

*Textularia candeiiana* d'Orbigny, 1839

(Figure 2. 12-13)

1839 *Textularia candeiiana* D'ORBIGNY: 143, pl. 1, figs. 25-27.

2009 *Textularia candeiiana* D'ORBIGNY; Parker: 44, figs. 34a-f.

Material: This species is found as an abundant form in samples 9 and 14, and as a common form in samples 2, 3, and 13.

Remarks: The recorded form differs from type species by its slightly narrow early portion, much compressed and later ones enlarging rapidly, and the final chamber is semi-inflated.

Geographical distribution: This species was identified from several areas such as the North American Atlantic Coast (Culver and Buzas, 1980 and Culver, 1986), the Caribbean Region (Culver and Buzas, 1982), and Western Australia (Parker, 2009).

*Textularia conica* d'Orbigny, 1839

(Figure 2. 14-16)

1839 *Textularia conica* D'ORBIGNY: 143, pl. 1, figs. 19-20.

2009 *Textularia conica* D'ORBIGNY; Sarkar and Gupta: 44, pl. 10, fig 7.

Material: This species is recorded as frequent in samples 2, 5, and 12, and as a common form in samples 13 and 20.

Geographical distribution: This species was recorded from Bermuda islands (Javaux and Scott, 2003), Eastern Mediterranean (Oflaz, 2006), Northern Adriatic Sea (Sabbatini et al., 2005), and western Mediterranean Sea (Milker et al., 2012).

*Textularia gramen* d'Orbigny, 1846

(Figure 2. 17-19)

1846 *Textularia gramen* D'ORBIGNY: 248, table 1, figs. 4-6.

2009 *Textularia bocki* HOEGLUND; Avsar et al.: 134, pl. 1, figs. 9-10.

Material: In the present study, *Textularia gramen* d'Orbigny occurs in samples 2, 5, and 12 as an abundant form, and as a rare in samples 2, 5, 13 and 14.

Geographical distribution: This species was recorded from several areas such as the Caribbean Region (Culver and Buzas, 1982), Spain (Ariza, 1988), northern Argentina (Mercau et al., 2011) and western Mediterranean Sea (Milker and schmidl, 2012).

*Textularia* sp.1

(Figure 2. 20-22)

Description: Test biserial throughout, subtriangular in side view, ovate in end view; periphery rounded throughout; chambers wider than high, increasing gradually in width slightly inflated; wall coarsely agglutinated; sutures slightly depressed, nearly horizontal; aperture an elongate slit a low broad opening at the base of the inner margin of the final chamber, with a distinct flaplike lip bordering the opening.

Material: This form is recorded as frequent in samples 1, 5, 12 and 18, and as a rare form in samples 7 and 13.

*Textularia* sp.2

(Figure 2. 23-24)

Description: Test characterized by a subtriangular shape in outline; initial end narrowly rounded, rapidly widening toward the apertural end; periphery subacute in the early portion, later thickening; the wall is coarsely agglutinated; chambers are triserially arranged, laterally compressed and rapidly increasing in size as added; sutures indistinct by slightly depressed; nearly horizontal; three apertures distinct with suboval to subcircular shape.

Material: This species is identified from samples 2, and 5 as abundant form, and as a common form in sample 13.

Suborder: Miliolina Delage and Herouard, 1896

Superfamily: Cornuspiroidea Schultze, 1854

Family: Fischerinidae Millett, 1898

Subfamily: Fischerininae Millett, 1898

Genus: *Planispirinella* Wiesner, 1931

*Planispirinella exigua* (Brady), 1879

(Figure 2. 25 and Figure 3. 1)

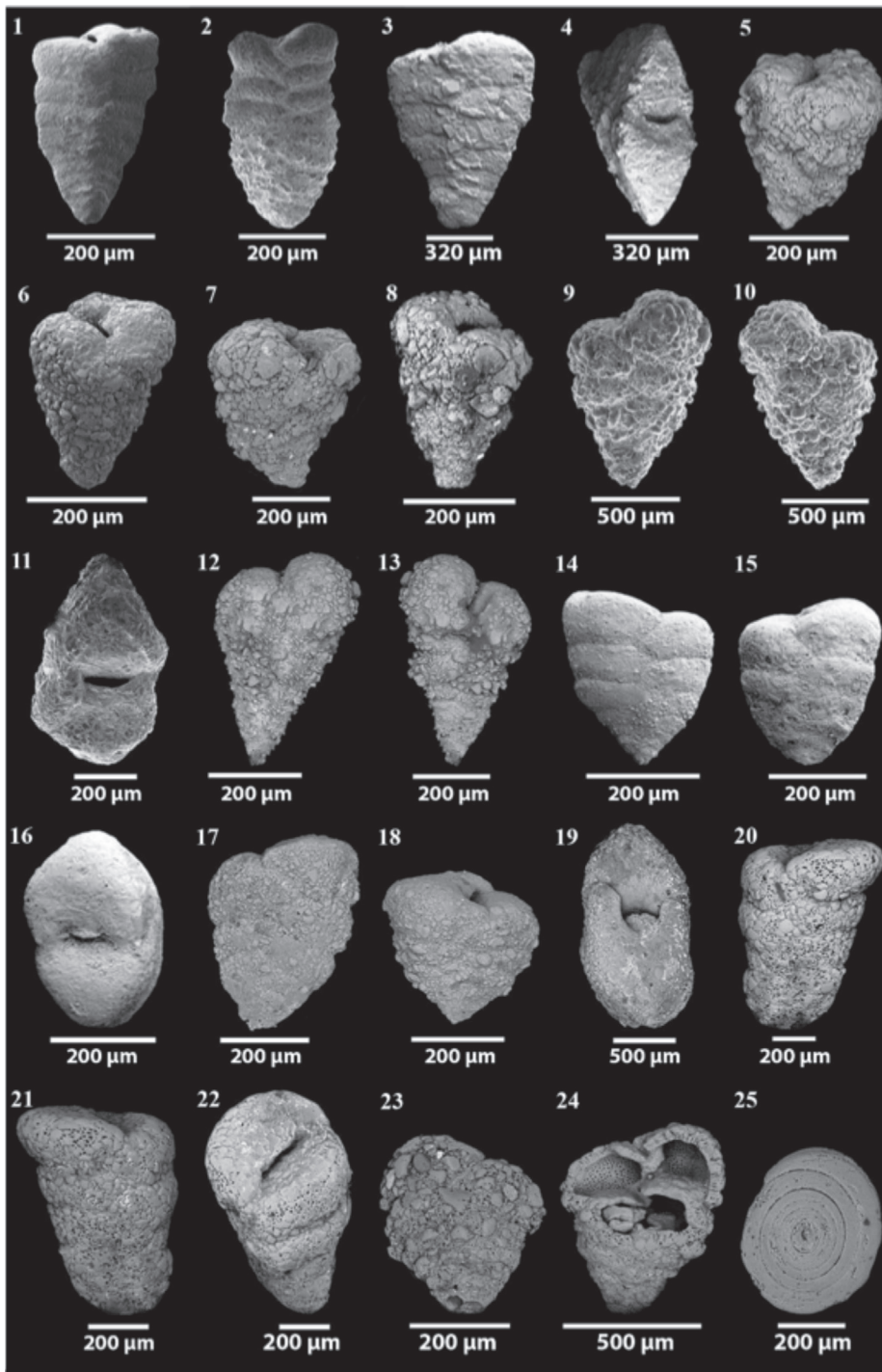
1879 *Hauerina exigua* BRADY: 27.

2009 *Planispirinella exigua* (BRADY); Parker: 157, figs. 110a-k.

Material: In the present study, *Planispirinella exigua* Brady occurs as a common form in samples 3, 5 and 13.

Geographical distribution: This form was identified from the Red Sea (Brady, 1879) and from Ningaloo Reef, Western Australia (Parker, 2009).





**Figure 2.** 1-2. *Spiroplectinella sagittula* DeFrance, side views. 3-4; *Spiroplectinella* sp., lateral view and apertural view. 5-8. *Gaudryina rudis* Wright, 5, 7. Side views; 6, 8. Lateral views; 9-11. *Textularia agglutinans* d'Orbigny, 9-10. Side views, 11. Apertural view; 12-13. *Textularia candeiana* d'Orbigny, side views; 14-16. *Textularia conica* d'Orbigny, 14-15. Side views, 16. Apertural view; 17-19. *Textularia gramen* d'Orbigny, 18-19. Side views, 19. Apertural view; 20-22. *Textularia* sp.1, 20-21. Side views, 22. Apertural view; 23-24. *Textularia* sp. 2, side views; 25. *Planispirinella exigua*, Brady, side view.

Superfamily: Milioloidea Ehrenberg, 1839

Family: Spiroloculinidae Wiesner, 1920

Genus: *Adelosina* d'Orbigny, 1826

*Adelosina laevigata* d'Orbigny, 1826

(Figure 3. 2-3)

1826 *Adelosina laevigata* D'ORBIGNY: 304, fig.1.

1988 *Adelosina laevigata* D'ORBIGNY; Loeblich and Tappan: 90, pl. 337, figs. 5-12.

Material: In the present study, *Adelosina laevigata* d'Orbigny occurs as a common form in samples 2, 7, and 8 as a rare form in samples 13, and 16.

Geographical distribution: *Adelosina laevigata* d'Orbigny was identified from the Neogene of Mediterranean by d'Orbigny, 1826 and 1846.

*Adelosina mediterraneensis* (Le Calvez and Le Calvez), 1958

(Figure 3. 4-5)

1958 *Quinqueloculina mediterraneensis* LE CALVEZ and LE CALVEZ: 177, pl. 4, figs. 29-31.

1991 *Adelosina mediterraneensis* (LE CALVEZ and LE CALVEZ); Cimerman and Langer: 28, pl. 19, figs. 1-16.

2009 *Adelosina mediterraneensis* (LE CALVEZ and LE CALVEZ); Milker et al.: 215, pl. 1, fig. 16.

Material: In the present study, this species is reported frequently from samples 5, 6, 13 and 20.

Geographical distribution: *Adelosina mediterraneensis* Le Calvez and Le Calvez was recorded from several regions such as Gulf of Naples, Italy (Sgarrella and Moncharmont Zei, 1993), Kallithea Bay, Greece (Rasmussen, 2005), West Turkey (Avsar et al., 2009), Western Mediterranean Sea (Milker et al., 2009) and Southwestern Pacific (Debenay, 2012).

*Adelosina* sp.

(Figure 3. 6-7)

Description: Wall porcelaneous; proloculus followed by an embracing, planispirally enrolled second chamber; periphery angular; aperture rounded on a neck; test surface partly ornamented with costae.

Material: This species is identify from samples 5, 16 and 19 as a common form and as a rare form from samples 8 and 13.

Genus: *Cribrolinoidea* Cushman and LeRoy, 1939

*Cribrolinoidea curta* Cushman, 1917

(Figure 3. 8-9)

1917 *Quinqueloculina disparilis* D'ORBIGNY var. *curta* – CUSHMAN: 49; pl. 14, fig. 2, text-fig. 30.

1951 *Cribrolinoidea curta* CUSHMAN; Asano: 9, pl. 6, figs. 63-64.

2009 *Quinqueloculina* cf. *Q. curta* CUSHMAN; Parker: 193, figs. 136a-e.

Material: *This species* is recorded presently as an abundant form in samples 5 and 9 and as a common form in samples 1 and 2.

Geographical distribution: *Cribrolinoidea curta* Cushman was recorded in the North Pacific Ocean (Cushman, 1917), Tokyo (Asano, 1951), northern Great Barrier Reef, Australia (Baccaert, 1987) and Ningaloo Reef, Western Australia (Parker, 2009).

Genus: *Spiroloculina* d'Orbigny, 1826

*Spiroloculina acutimargo* Brady, 1884

(Figure 3. 10-12)

1884 *Spiroloculina acutimargo* BRADY: 154, pl. 10, figs. 12-15.

1994 *Spiroloculina acutimargo* BRADY; Jones: 26, pl. 10, fig. 13.

Material: In the present study, this species is distinguished from samples 1, 13 and 14 as an

abundant form and as a frequent form in Samples 2 and 12.

Geographical distribution: This species was recorded from several areas worldwide such as Caribbean region (Culver and Buzas, 1982), southeastern Arabian Sea (Sarkar and Gupta, 2009), Green Bay Cave on Bermuda (Scott and Hengstum, 2011) and Southwestern Pacific (Debenay, 2012).

*Spiroloculina aequa* Cushman, 1932

(Figure 3. 13-15)

1932 *Spiroloculina aequa*, CUSHMAN: 38, pl.9, figs. 13a-b.

2009 *Spiroloculina aequa*, CUSHMAN; Devi and Rajashekhar: 23, fig. 1.

Material: In the present study, *Spiroloculina aequa* Cushman occurs as a common form in samples 2, 5 and 17 and as a rare form in samples 13 and 18.

Geographical distribution: This species was recorded from several Indian coastlines such as Karwar, central west coast by Khare, 1992 and Devi and Rajashekhar, 2009.

*Spiroloculina antillarum* d'Orbigny, 1839

(Figure 3. 16-17)

1839 *Spiroloculina antillarum* D'ORBIGNY: 166, pl. 7, figs. 3-4.

2009 *Spiroloculina antillarum* D'ORBIGNY; Parker: 341, figs. 246a-l; 247a-l.

Material: *Spiroloculina antillarum* d'Orbigny is recorded here as an abundant form in samples 2, 13, and 14 and as a frequent form in samples 5 and 9.

Geographical distribution: This species was recorded from the Caribbean Region (Culver and Buzas, 1982), the northwestern Mediterranean coast of Egypt (Samir et al., 2003), the Dardanelles Strait, Turkey (Meriç et al., 2009) and from the Egyptian Red Sea (Madkour, 2013).

*Spiroloculina communis* Cushman and Todd, 1944

(Figure 3. 18-20)

1944 *Spiroloculina communis* CUSHMAN and TODD: 63, pl. 9, fig. 4-5, 7- 8.

1990 *Spiroloculina communis* CUSHMAN and TODD; Kumar et al.: 57, pl. 1, fig. 5, table 1.

Material: In the present study, this species is recorded as frequent in samples 1, 5 and 15.

Geographical distribution: This cosmopolitan species was recorded from different Arabian Sea areas by (Gandhi et al., 2002; Schumacher et al., 2007 and Sarkar and Gupta 2009) and from Tambelan Islands of Indonesia. (Natsir and Muchlisin, 2012) and coast of Iligan Bay, Mindanao, Philippines (Lacuna, et al., 2013).

*Spiroloculina depressa* d'Orbigny, 1826

(Figure 3. 21-23)

1826 *Spiroloculina depressa* D'ORBIGNY: 298.

2009 *Spiroloculina depressa* D'ORBIGNY; Devi and Rajashekhar: 24, image 2. fig. d.

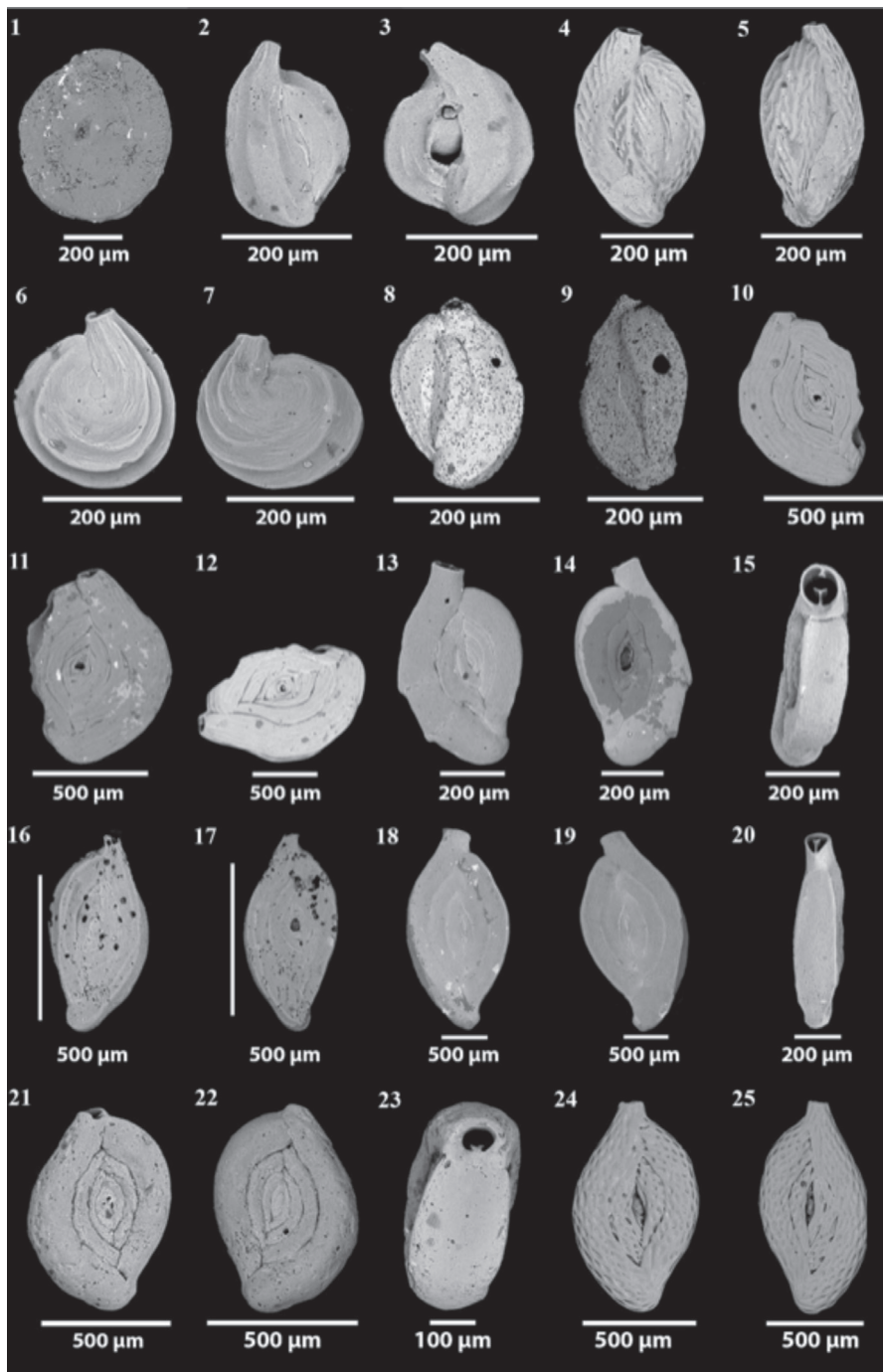
Material: In the present study, *Spiroloculina depressa* d.Orbigny is recorded as a common in samples 2, 9, 13 and 20, and as a rare form in samples 5 and 11.

Geographical distribution: This species was recorded from several areas worldwide such as Florida (Buzas and Severin, 1982), Karwar, central west coast of India (Khare, 1992), France (Debenay et al., 2001), Gulf of Iskenderun, Eastern Mediterranean (Ofiaz, 2006), Thailand Gulf (Melis and Violanti, 2006), the Dardanelles Strait, Turkey (Meriç et al., 2009), Indian coast (Devi and Rajashekhar, 2009) and coast of Iligan Bay, Mindanao, Philippines (Lacuna et al., 2013).

*Spiroloculina elegans* Cushman, 1917

(Figure 3. 24-25; Figure 4. 1)

1917 *Spiroloculina elegans* CUSHMAN: p. 29.



**Figure 3.1.** 1. *Planispirinella exigua*, Brady, side view; 2-3. *Adelosina laevigata* d'Orbigny, side views; 4-5. *Adelosina mediterraneensis* Le Calvez and Le Calvez, side views; 6-7. *Adelosina* sp., side views; 8-9. *Cribrolinooides curta* Cushman, side views; 10-12. *Spiroloculina acutimargo* Brady, 10-11. Side views, 12. Oblique view; 13-15. *Spiroloculina aequa* Cushman, 13-14. Side views, 15. Apertural view; 16-17. *Spiroloculina antillarum* d'Orbigny, side views; 18-20. *Spiroloculina communis* Cushman and Todd, 18-19. Side views, 20. Apertural view; 21-23. *Spiroloculina depressa* d.Orbigny, 21-22. Side views, 23. Apertural view; 24-25. *Spiroloculina elegans* Cushman, side views.



Material: In the present study, *Spiroloculina elegans* Cushman, is identified as a frequent form in samples 2, 5, and 9, and as a rare form in Samples 13 and 17.

Geographical distribution: Cushman (1917) recorded this species from the recent sediments of Pacific Ocean.

*Spiroloculina tenuiseptata* Brady, 1884

(Figure 4. 8-9)

1884 *Spiroloculina tenuiseptata* BRADY: 153, pl. 10, figs. 5-6.

2005 *Spiroloculina tenuiseptata* BRADY; Rasmussen: 61, pl. 3, fig. 12.

Material: In the present study, *Spiroloculina tenuiseptata* Brady is detected as a common form in samples 2, 9 and 13.

Geographical distribution: This species was recorded from several regions such as Gulf of Iskenderun (Ofiaz, 2006), Maldives Ridge, southeastern Arabian Sea (Sarkar and Gupta, 2009), Dardanelles Strait in Turkey (Meriç et al., 2009) and Western Mediterranean (Milker and Schmiedl, 2012).

*Spiroloculina* sp.1

(Figure 4. 2-4)

Description: Test subcircular, slightly longer than broad in lateral view; with slightly rounded peripheral margins; wall porcelaneous and imperforate; chambers U-shaped in transverse section, with a rounded margin; surface covered with costae that are arranged with an angle to the chamber margin so that they are not continuous from the basal end to the apertural end; aperture rounded at the end of a distinct neck covered with costae.

Material: This species is recognized from samples 1, 5, 13, and 18 as a common.

*Spiroloculina* sp.2

(Figure 4. 5-7)

Description: Test fusiform in shape, slightly longer than broad in lateral view and strongly biconcave in end view; wall is porcelaneous; chambers arranged in "spiroloculine form, leading to a raised some portions; later chambers broad, planispirally arranged, each chamber one-half coil in length; aperture subcircular at the end of a short cylindrical neck.

Material: In the present study, this form is recorded as frequent in samples 13 and 19, and as a rare form in samples 5 and 10.

Family: Hauerinidae Schwager, 1876

Subfamily: Siphonapertinae Saidova, 1975

Genus: *Siphonaperta* Vella, 1957

*Siphonaperta agglutinans* (d'Orbigny), 1839

(Figure 4. 10-11)

1839 *Quinqueloculina agglutinans* D'ORBIGNY: 195, pl. 12, figs. 11-13.

1993 *Siphonaperta agglutinans* (D'ORBIGNY); Hottinger et al.: 62, pl. 61, figs. 10, 11; pl. 62, figs. 1-3.

2004 *Siphonaperta agglutinans* (D'ORBIGNY); Meriç et al.: 60, pl. 7, fig. 8.

Material: *Siphonaperta agglutinans* (d'Orbigny) is recorded here as abundant form in samples 2, 17 and 20, and as a frequently from samples 5 and 8.

Geographical distribution: This species was recorded from several areas worldwide such as Atlantic Ocean (Cushman, 1929), the Gulf of Aqaba, Red Sea (Hottinger et al., 1993), Aegean Sea (Turkey) (Meriç et al., 2004), the western Mediterranean Sea (Milker and Schmiedl, 2012) and Philippines (Lacuna, et al., 2013).

*Siphonaperta horrida* (Cushman), 1947

(Figure 4. 12)

1947 *Quinqueloculina horrida* CUSHMAN: 88, pl. 19, fig. 1.

1993 *Siphonaperta horrida* (CUSHMAN); Hottinger et al.: 63, pl. 63, figs. 7-12.

Material: *Siphonaperta horrida* (Cushman) is identified as an abundant in samples 2, and 9, and as a rare form in samples 5, 15 and 19.

Geographical distribution: This species was recorded from northwest Gulf of Mexico (Phleger, et al., 1951), northern Gulf of Mexico (Leroy et al., 1974), the Gulf of Aqaba, Red Sea (Hottinger et al., 1993) and Central east coast of India (Rana, 2009).

*Siphonaperta irregularis* (d'Orbigny), 1826

(Figure 4. 13-14)

1826 *Quinqueloculina irregularis*  
D'ORBIGNY: 302, no. 25.

1958 *Quinqueloculina irregularis*  
D'ORBIGNY; Le Calvez and Le Calvez: 166, pl. 3, figs. 1-2.

1991 *Siphonaperta irregularis*  
(D'ORBIGNY); Cimerman and Langer: 32, pl. 26, figs. 4-6.

Material: The present species is recorded now as an abundant form in samples 2 and 12, and as a rare form in samples 5 and 13.

Geographical distribution: This species was recorded from France (Debenay et al., 2001), Turkey (Meriç et al., 2009) and Western Mediterranean (Milker and Schmiedl, 2012).

Subfamily: Hauerininae Schwager 1876

Genus: *Hauerina* d'Orbigny 1839

*Hauerina diversa* Cushman, 1946

(Figure 4. 15-16)

1946 *Hauerina diversa* CUSHMAN: 11, pl. 2, figs. 16-19.

1993 *Hauerina diversa* CUSHMAN; Hottinger et al.: 50, pl. 36, figs. 1-7.

Material: In the present study, *Hauerina diversa* Cushman is recorded as an abundant form in samples 5 and 13, and as a common form in samples 2, 16 and 20.

Geographical distribution: This species was recorded from several areas such as Atlantic Ocean (Baccaert, 1987), Southern Ryukyu Island Arc, Northwestern Pacific (Hatta and Ujiie, 1992), Gulf of Aqaba and north of Red Sea (Said, 1949 and Hottinger et al., 1993) and Haifa Bay (Yanko, 1995).

Genus: *Quinqueloculina* d'Orbigny, 1826

*Quinqueloculina agglutinata* d'Orbigny, 1839

(Figure 4. 17-18)

1839 *Quinqueloculina agglutinata*  
D'ORBIGNY: 195, p1. 12, figs. 11-13.

1987 *Quinqueloculina agglutinata*  
D'ORBIGNY; Rao et al.: 164, p1. 1, figs. 22-24.

Material: In the present study, this form is found as abundant form in samples 2, 5, 9 and 17 and as a rare form in samples 1 and 14.

Geographical distribution: The present species was described from North Pacific Ocean (Cushman, 1917). Later, it was recorded from the north of the Red Sea (Said, 1949), Denmark (Haman, 1966), the Atlantic continental shelf of the U.S.A. (Murray, 1969), Newfoundland (Sen Gupta, 1971), Biscayne Bay, Florida (Ishman et al., 1997) and East coast of India (Gandhi et al., 2002).

*Quinqueloculina bradyana* Cushman, 1910

(Figure 4. 19-20)

1910 *Quinqueloculina bradyana* CUSHMAN: 52; pl. 18, fig. 2.

1995 *Quinqueloculina bradyana* CUSHMAN; Yassini and Jones: 83; figs. 14-15.

Material: This form is recorded as a common form in samples 2, 7 and 13.



Geographical distribution: This species was recorded from Bermuda island in the northwest Atlantic Ocean (Javaux et al., 2003), Maldives Ridge, southeastern Arabian Sea (Sarkar, et al, 2009) and New Caledonia, Southwestern Pacific (Debenay, 2012).

*Quinqueloculina carinatastriata* (Wiesner), 1923  
(Figure 4. 21-23)

1923 *Adelosina milletti* WIESNER var. *carinatastriata* Wiesner: 76; pl. 14, figs. 190-191.

1988 *Quinqueloculina carinatastriata* (WIESNER); Haig: 233, pl. 5, figs. 6-10.

2009 *Quinqueloculina carinatastriata* (WIESNER); Parker: 188, figs. 133a-h, 134a-h.

Material: In the present study, this species is identified as an abundant in samples 2, 5, 8, and 12, and as a rare form in samples 9 and 13.

Geographical distribution: This species was recorded off Palk Strait, India (Gandhi et al., 2002), Southwestern Pacific (Debenay, 2012) and from the coastal plains of the Aegean Sea (Greece) (Koukousioura et al., 2012).

*Quinqueloculina corrugate* (Collins), 1958  
(Figure 4. 24-25)

1958 *Massilina corrugata* COLLINS: 362; pl. 2, figs. 11, 12.

1988 *Quinqueloculina corrugata* (COLLINS), Haig: 233, pl. 5, figs. 15-17.

Material: The present species occurs as an abundant form in samples 5, 13 and 17 and as a common form in samples 2 and 6.

Geographical distribution: This species was identified from the recent sediments of Great Barriers by Collins, 1958 and then by Haig, 1988 from the Papuan Lagoon.

*Quinqueloculina debenayi* Langer, 1992  
(Figure 5. 1)

1992 *Quinqueloculina debenayi* LANGER: 90, pl. 2, figs. 7-8.

Material: In the present study, this species recorded as abundant form in samples 5 and 13, and as a frequent form in samples 2, 7, and 18.

Geographical distribution: *Quinqueloculina debenayi* Langer, 1992 identified this species from the lagoon recent sediments at Madang, Papua New Guinea.

*Quinqueloculina granulocostata* Germeraad, 1946  
(Figure 5. 2-3)

1946 *Quinqueloculina granulocostata*, GERMERAAD: 63, pl. 7, figs. 11, pl. 8, fig. 11.

2009 *Quinqueloculina granulocostata* GERMERAAD; Parker: 211, figs. 150a-k; 151a-h.

Material: In the present study, this species is recorded as an abundant in samples 3, 7, 12 and 20 and as a common form in samples 5, 8 and 13.

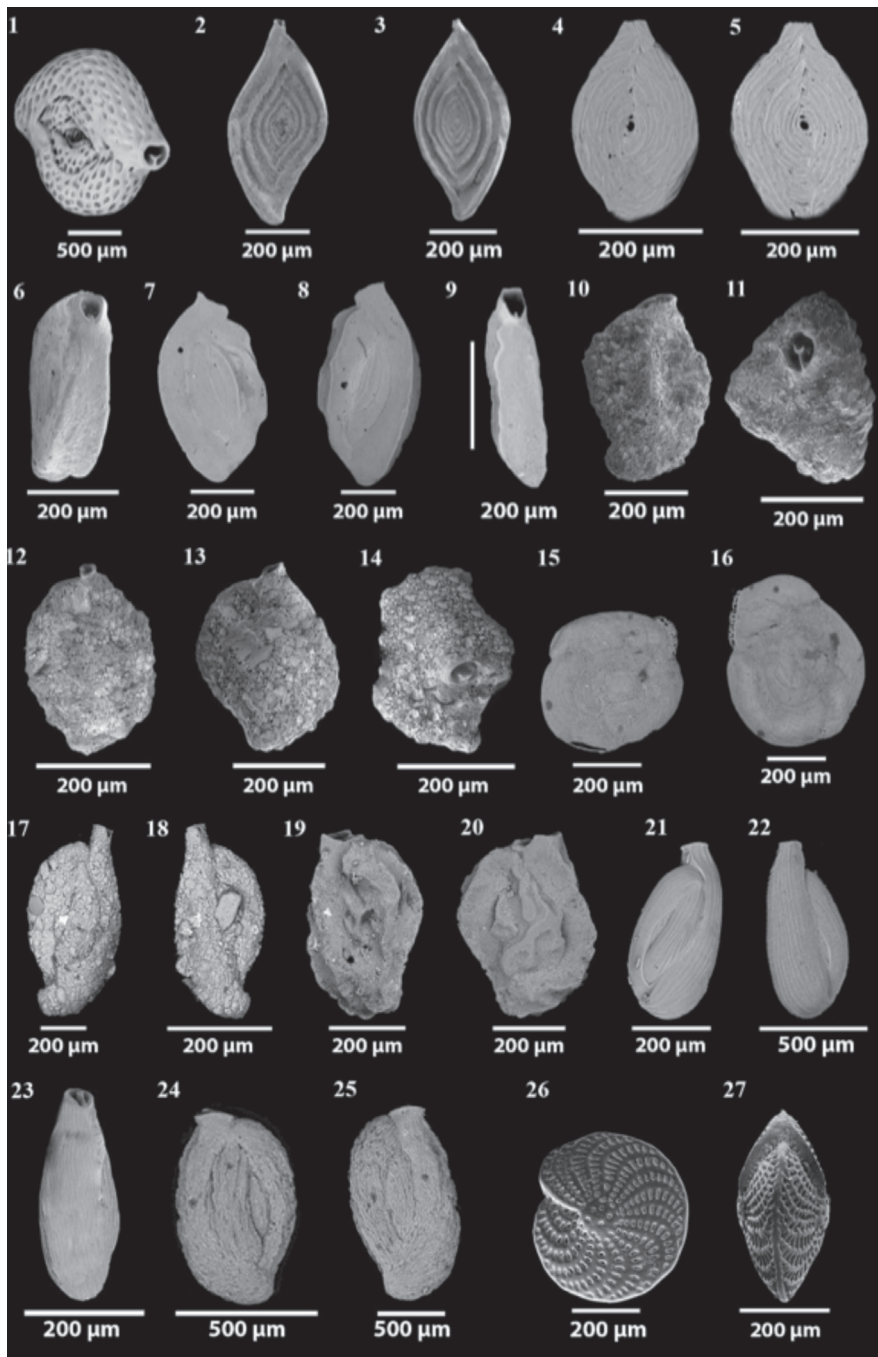
Geographical distribution: The present species was described from Indonesia (Germeraad, 1946), the southeast Australian coast (Yassini and Jones, 1995), east coast of India (Gandhi et al., 2002) and Tambelan Archipelago, Indonesia (Suhartati and Muchlisin, 2012).

*Quinqueloculina jugosa* Cushman, 1944  
(Figure 5. 4-5)

1944 *Quinqueloculina seminulum* LINNÉ var. *jugosa* Cushman: 13, pl. 2, fig. 5.

2005 *Quinqueloculina jugosa* CUSHMAN; Debenay et al.: 332, pl. 1, fig. 16.

Material: In the present study, this form is distinguished as abundant form in samples 2, 5 and 13 and as a common form in samples 9 and 14.



**Figure 4.** 1- *Spiroloculina elegans* Cushman, 1. Apertural view; 2. Side view; 3-4. *Spiroloculina* sp.1, 3. Side view; 4. Apertural view; 5-7. *Spiroloculina* sp.2, 5-6. Side views, 7. Apertural view; 8-9. *Spiroloculina tenuiseptata* Brady, Side views; 10-11. *Siphonaperta agglutinans* d'Orbigny, 10. Side view, 11. Apertural view; 12. *Siphonaperta horrida* Cushman, side view; 13-14. *Siphonaperta irregularis* d'Orbigny, 13. Side view, 14. Apertural view; 15-16. *Hauerina diversa* Cushman, side views; 17-18. *Quinqueloculina agglutinata* D'orbiony side views; 19-20. *Quinqueloculina bradyana*, Cushman, side views; 21-23. *Quinqueloculina carinatastriata* Wiesner, 21-22. Side views, 23. Apertural view; 24-25. *Quinqueloculina corrugata* Collins, side views; 26-27. *Elphidium crispum* (Linné), 26. Side view, 27. Apertural view.

Geographical distribution: Cushman (1944) described this species from the recent deposits of the New England coast. It was later recorded from northern Carolina (Miller, 1953), the Dardanelles Strait in Turkey (Meriç et al., 2009) and Southwestern Pacific (Debenay, 2012).

*Quinqueloculina lamarckiana* d'Orbigny, 1839

(Figure 5. 6-7)

1839 *Quinqueloculina lamarckiana*  
D'ORBIGNY: 189, pl. 11, figs. 14-15.

1990 *Quinqueloculina lamarckiana*  
D'ORBIGNY; Kaladhar et al.: 72, table 1.

Material: In the present study, this species is identified as abundant in samples 2, 7 and 10, and as a rare form in samples 5 and 13.

Geographical distribution: This cosmopolitan species was described from the recent deposits of Jamaica (d'Orbigny, 1839). It was later recorded from different areas such as California (Bandy, 1953), Carolina (Miller, 1953), India (Bhatia, 1956 and Gandhi et al., 2002), the Atlantic continental shelf of U.S.A. (Murray, 1969), western North America (Lankford and Phleger, 1973), Bermuda islands in the northwest Atlantic Ocean (Javaux et al., 2003), the Dardanelles Strait (Meriç et al., 2009) and Maldives Ridge, southeastern Arabian Sea (Sarkar and Gupta, 2009).

*Quinqueloculina lata* Terquem, 1876

(Figure 5. 8-9)

1876 *Quinqueloculina lata* TERQUEM: 82, pl. 11, figs. 8a-c.

2003 *Quinqueloculina lata* TERQUEM;  
Murray: 17, fig. 4: 9-10

Material: In the present study, it is recorded as a common form in samples 2, 9, 13 and 20.

Geographical distribution: This species was recorded from several areas worldwide such as France (Terquem 1876 and Levy et al., 1975),

the Atlantic continental shelf of U.S.A (Murray, 1969), the English Channel (Murray, 1970), Indian coast (Devi and Rajashekhar, 2009) and western Mediterranean Sea (Milker and Schmiedl, 2012).

*Quinqueloculina multimarginata* Said, 1949

(Figure 5. 10-11)

1949 *Quinqueloculina multimarginata* SAID: 10, pl. 1, fig. 34.

Material: In the present study, *Quinqueloculina multimarginata* Said occurs as an abundant form in samples 2, 5, 10 and 17 and as a frequent form in samples 8 and 13.

Geographical distribution: It was described from the recent deposits of northern Red Sea (Said, 1949).

*Quinqueloculina neapolitana* Sgarrella and  
Moncharmont Zei, 1993

(Figure 5. 12-14)

1993 *Quinqueloculina neapolitana*  
SGARRELLA AND MONCHARMONT ZEI: 173, pl. 5, figs. 10-12

Material: In the present study, it is recorded as a frequent form in samples 2 and 5, and as a rare form in samples 10 and 13.

Geographical distribution: Sgarrella and Moncharmont Zei (1993) identified this species from the Gulf of Naples (Italy).

*Quinqueloculina padana* Perconig, 1954

(Figure 5. 15-17)

1954 *Quinqueloculina padana* PERCONIG: 95, 97, figs. 1-4.

2009 *Quinqueloculina padana* PERCONIG;  
Frezza and Carboni: 55, pl. 1, fig. 9.

Material: In the present study, this species recorded as a common in samples 7, 9, 13 and 18, and as a rare form in samples 2 and 5.

Geographical distribution: *Quinqueloculina padana* Perconig was recorded from the Aegean

Sea (Greece) (Koukousioura et al., 2012) and western Mediterranean Sea (Milker et al., 2012).

*Quinqueloculina parkeri* Brady, 1881

(Figure 5. 18-19)

1881 *Miliolina parkeri* BRADY: 177; pl. 7, figs. 14a-c.

2009 *Quinqueloculina parkeri* Brady; Parker: 233, figs. 167a-g; 168a-j.

Material: In the present study, *Quinqueloculina parkeri* Brady occurs as an abundant form in samples 3, 11 and 20, and as a frequent form in samples 2, 5, 13 and 17.

Geographical distribution: This species was recorded from several areas such as Hawaii Islands (Brady, 1881), northern Red Sea (Said, 1950), Solomon Islands (Hughes, 1977), East coast of India (Gandhi et al., 2002), southeastern Arabian Sea (Sarkar and Gupta, 2009) and Southwestern Pacific (Debenay, 2012).

*Quinqueloculina plicosa* Costa, 1856

(Figure 5. 20-22)

1856 *Quinqueloculina plicosa* COSTA: 322, pl. 25, fig. 2, 5, 7.

2000 *Quinqueloculina plicosa* COSTA; Al-Hitmi: 168, fig.2.

Material: In the present study, this species recorded as an abundant in samples 2, 9 and 13 and as a rare form in samples 5 and 11.

Geographical distribution: It was recorded from Nepal by Costa, 1856 and from the coastline of Qatar Peninsula by Al-Hitmi (2000).

*Quinqueloculina poeyana* d'Orbigny, 1839

(Figure 5. 23-25)

1839 *Quinqueloculina poeyana* D'ORBIGNY: 191, pl. 11, figs. 25-27.

2010 *Quinqueloculina poeyana* D'ORBIGNY; Issa: 6, pl. 1, fig. 5.

Material: The present species recorded as abundant in samples 5 and 11 and as a rare form in samples 2, 8 and 13.

Geographical distribution: *Quinqueloculina poeyana* D'ORBIGNY was recorded from the recent deposits of Cuba (d'Orbigny, 1839), North Carolina (Miller, 1953), California (Bandy, 1961), the Atlantic continental shelf of U.S.A. (Murray, 1969). Later it is recorded from Bahama West of Andros Island (Todd and low, 1971), Florida (Buzas and Severin, 1982), Bermuda islands (Javaux et al, 2003), coast of Iligan Bay, Mindanao, Philippines (Lacuna, et al., 2013) and from Yemen (El-Nakhal, 1980).

*Quinqueloculina pseudoreticulata* Parr, 1941

(Figure 6. 2-4)

1941 *Quinqueloculina pseudoreticulata* PARR: 177, pl. 9, figs. 2-3.

2009 *Quinqueloculina pseudoreticulata* PARR; Parker: 243, figs. 174a-j; 175a-h.

Material: In the present study, it is found as an abundant form in samples 2, 7 and 15, and as a rare form in samples 5 and 13.

Geographical distribution: Parr, 1994 described *Quinqueloculina pseudoreticulata* from the Australian coastlines, then it was described as cosmopolitan species by different authors such as Rocha and Ubaldo, 1964 from Australia; Bahafzallah, 1979 from Saudi Red Sea coastline; Bhalla and Nigam, 1979 and Ragothaman and Kumar, 1985 from Indian coastlines; and Parker, 2009 from Ningaloo Reef, Western Australia.

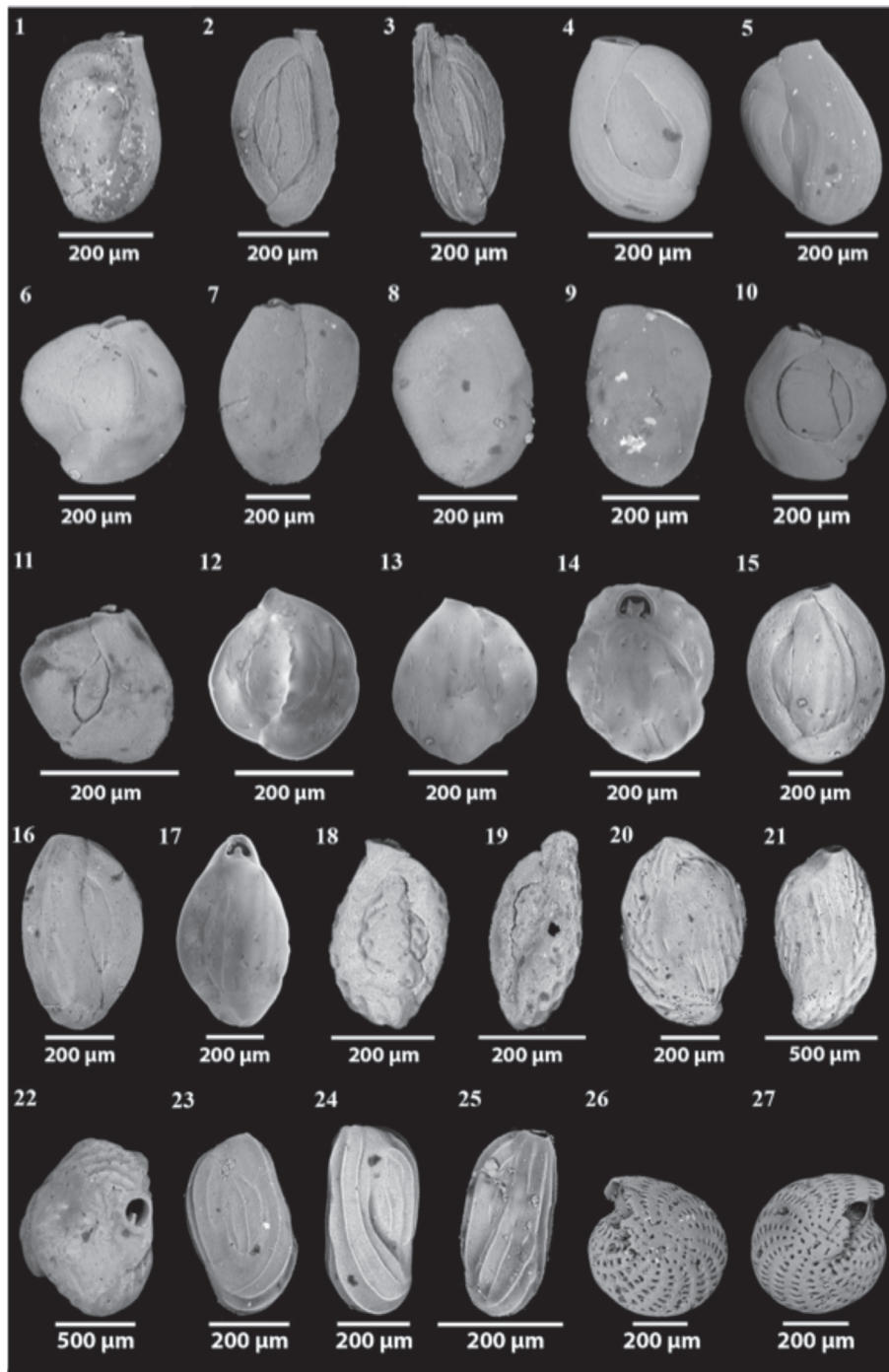
*Quinqueloculina* cf. *Q. rugosa* d'Orbigny, 1826

(Figure 6. 5-7)

1826 *Quinqueloculina rugosa* D'ORBIGNY: 302; no. 24.

1988 *Quinqueloculina* cf. *Q. rugosa* D'ORBIGNY; Haig: 234, pl. 8, figs. 1- 5.





**Figure 5.** 1- *Quinqueloculina debenayi* Langer, side view; 2-3. *Quinqueloculina granulocostata* Germeraad, side views; 4-5. *Quinqueloculina jugosa* Cushman, side views; 6-7. *Quinqueloculina lamarckiana* d'Orbigny, side views; 8-9. *Quinqueloculina lata* Terquem, side views; 10-11. *Quinqueloculina multimarginata* Said, side views; 12-14. *Quinqueloculina neapolitana* Sgarrella and Moncharmont Zei, 12-13. Side views; 14. Apertural view; 15-17. *Quinqueloculina padana* Perconig, 15-16. Side views; 17. Apertural view; 18-19. *Quinqueloculina parkeri* Brady, side views; 20-22. *Quinqueloculina plicosa* Costa, 20-21. Side views; 22. Apertural view; 23-25. *Quinqueloculina poeyana* d'Orbigny, 23. Side view, 24-25. Oblique views; 26-27. *Elphidium advenum* Cushman, side views.

Material: In the present study, *Quinqueloculina* cf. *Q. rugosa* occurs as an abundant form in samples 2 and 5, and as a frequent form in samples 13 and 18.

Geographical distribution: This species was recorded from the North Pacific Ocean (Cushman, 1917) and Papuan Lagoon (Haig, 1988).

*Quinqueloculina seminulum* (Linné), 1758

(Figure 6. 8-10)

1758 *Serpula seminula* LINNÉ: 786. fig. 1 a-c.

2009 *Quinqueloculina seminula* (LINNAEUS); Parker: 251, figs. 180a-l; 181a-j; 182a-f.

Material: In the present study, this species recorded as an abundant in samples 2, 5, 9 and 18, and as a common form in samples 6, 10, 13 and 20.

Geographical distribution: This cosmopolitan species was originally described from the recent deposits of the Adriatic Sea (Linné 1758), it was later recorded from numerous localities such as Carolina (Miller, 1953), India (Bhatia, 1956, and Rao and Rao, 1974), Denmark (Haman, 1966), The Atlantic continental shelf of U.S.A. (Murray, 1969), Newfoundland (Sen Gupta, 1971), Solomon islands, Pacific Ocean (Hughes, 1977), France (Debenay et al., 2001), Hebridean shelf, west of Scotland (Murray, 2003), Eastern Mediterranean (Ofiaz, 2006) and Southwestern Pacific (Debenay, 2012).

*Quinqueloculina subpolygona* Parr, 1945

(Figure 6. 20-22)

1945 *Quinqueloculina subpolygona* PARR: 196: 12, figs. 2a-c.

2009 *Quinqueloculina subpolygona* PARR; Parker: 262, figs. 191a-j; 192a-l.

Material: In the present study, *Quinqueloculina subpolygona* occurs as an abundant form in

samples 1, 2, 7 and 18, and as a frequent form in samples 5, 10 and 13.

Geographical distribution: This species was recorded from New Zealand (Hayward et al., 1999) and Southwestern Pacific (Debenay, 2012).

*Quinqueloculina* cf. *Q. triangularis* d'Orbigny, 1846

(Figure 6. 23-26)

1846 *Quinqueloculina* cf. *Q. triangularis* D'ORBIGNY: 312.

2005 *Quinqueloculina* cf. *Quinqueloculina triangularis* D'ORBIGNY; Toefy et al.: 5, fig. 2F.

Material: In the present study, this species recorded as a common in samples 8, 13 and 20, and as a rare form in samples 2 and 5.

*Quinqueloculina trigonula* Terquem, 1876

(Figure 6. 27-28)

1876 *Quinqueloculina trigonula* TERQUEM: 84, pl. 12, fig. 4.

1975 *Quinqueloculina trigonula* TERQUEM; Levy et al.: 172. pl, figs. 10-15.

Material: In the present study, *Quinqueloculina trigonula* Terquem occurs as an abundant form in samples 2, 5, 13 and 16, and as a frequent form in samples 9 and 13.

Geographical distribution: This species was described from the northern shores of France (Terquem, 1876 and Levy et al., 1975).

*Quinqueloculina undulosecostata* Terquem, 1882

(Figure 7. 2-3)

1882 *Quinqueloculina undulosecostata* TERQUEM: 185, pl. 20. figs. 18-19.

1956 *Quinqueloculina undulosecostata* TERQUEM; Bhatia: 17, pl. 2, fig. 8.

Material: In the present study, this species recorded as an abundant in samples 1, 8 and 12 and as a rare form in samples 5, 8, 13 and 20.



Geographical distribution: *Quinqueloculina undulosecostata* Terquem was originally described from the Eocene of Paris (Terquem, 1882). It was later recorded from the recent deposits of the western shores of India (Bhatia, 1956).

*Quinqueloculina vulgaris* d'Orbigny, 1826

(Figure 6. 29; Figure 7. 1)

1826 *Quinqueloculina vulgaris* D'ORBIGNY, 302, fig. 33.

1980 *Quinqueloculina vulgaris* D'ORBIGNY; Steinker: 136, pl. 6, fig. 4.

Material: The presentspecies is recorded as an abundant form in samples 2, 5 and 18, and as a rare form in samples 7, 13 and 15.

Geographical distribution: This species was recorded from several regions such as the central west coast of India (Khare, 1992), Bermuda islands in the northwest Atlantic Ocean (Javaux et al., 2003) and Indian coast (Devi and Rajashekhar, 2009).

*Quinqueloculina* sp.1

(Figure 6. 11-13)

Description: Test quinqueloculine, subrectangular in lateral view; periphery and sides broadly rectangular to sub acute; chambers acutely angled, quadrangular in cross section; wall ornamented with numerous, slightly elliptical shallow pits evenly distributed over the surface of the test; sutures slightly depressed; aperture terminal, quadrangular, produced on short a neck, provided with long simple tooth.

Material: In the present study, this species recorded as an abundant form in samples 2, 5 and 17, and as a frequent in samples 9, 13, 14 and 19.

*Quinqueloculina* sp.2

(Figure 6. 17-19)

Description: Test elongate about two and a half longer than broad, somewhat triangular in end view, with five chambers visible in the adult;

chambers narrow with bicarinate margin; the two carinae merge towards the apertural end, giving a single high carina; oral end truncated and slightly produced, aboral end rounded and produced; sutures slightly depressed; wall finely striate, roughly finished; aperture terminal with a tall oval shape, with thickened peristomal lip; long thin tooth thickened at the tip.

Material: In the present study, it is recorded as an abundant form in samples 2 and 5 and as a rare form in samples 13 and 17.

Subfamily: Miliolinellinae Vella, 1957

Genus: *Miliolinella* Wiesner, 1931

*Miliolinella subrotunda* (Montagu), 1803

(Figure 7. 4-5)

1803 *Vermiculum subrotundum* MONTAGU: 521.

1929 *Quinqueloculina subrotunda* (MONTAGU); Cushman: 25, pl. 2, fig. 4.

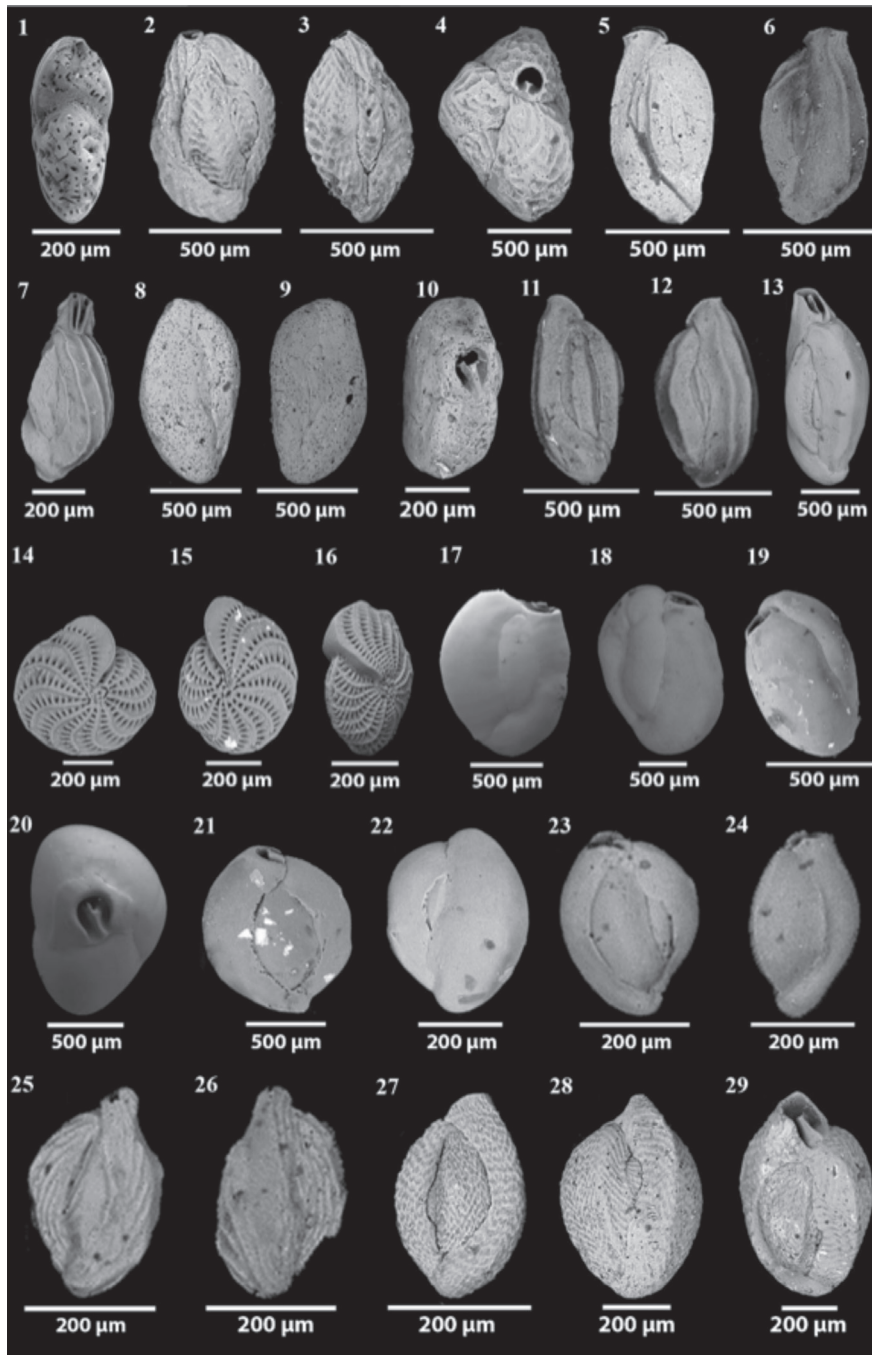
2009 *Miliolinella subrotunda* (MONTAGU); Parker: 124, figs. 88a-j; 89a- g.

Material: In the present study, *Miliolinella subrotunda* (Montagu) occurs as an abundant form in samples 2 and 7 and as a rare form in samples 5, 9 and 13.

Geographical distribution: This species was recorded in Bahama West of Andros Island (Todd and low, 1971), France (Debenay et al., 2001), Bermuda islands (Javaux, et al., 2003), the Gulf of Iskenderun (Ofiaz, 2006), Indian coast (Devi and Rajashekhar, 2009), Maldives Ridge, southeastern Arabian Sea (Sarkar and Gupta, 2009), Southwestern Pacific (Debenay, 2012), western Mediterranean Sea (Milker Schmiedl, 2012) and the Egyptian Red Sea coast (Madkour, 2013).

*Miliolinella* sp.

(Figure 7. 6-7)



**Figure 6.** 1- *Elphidium advenum* Cushman, apertural view; 2-4. *Quinqueloculina pseudoreticulata* Parr, 2-3. Side views, 4. Apertural view; 5-7. *Quinqueloculina* cf. *Q. rugosa* d'Orbigny, 5-6. Side views; 7. Apertural view; 8-10. *Quinqueloculina seminulum* Linné, 8-9. Side views; 10. Apertural view; 11-13. *Quinqueloculina* sp.1, 11-12. Side views, 13. Apertural view; 14-16. *Elphidium macellum* Fichtel and Moll, 14-15. Side views; 16. Apertural view; 17-19. *Quinqueloculina* sp.2, 17-18. Side views, 19. Apertural view; 20-22. *Quinqueloculina subpolygona* Parr, 20-21. Side views; 22. Apertural view; 23-26. *Quinqueloculina* cf. *Q. triangularis* (d'Orbigny), 23. Side view, 24-25. Oblique view, 26. Apertural view; 27-28. *Quinqueloculina trigonula* Terquem, side views; 29. *Quinqueloculina vulgaris* d'Ortigny, side view.

Description: Test elliptical to circular in lateral view, flattened; early stage quinqueloculine, latter planispiral with two to three chambers per whorl, slowly increasing in width; wall smooth; aperture terminal, rectangular, compressed, at end of the last chamber.

Material: In the present study, this species recorded as frequent in samples 2, 5, 10 and 13.

Genus: *Pseudomassilina* Lacroix, 1938

*Pseudomassilina pacificiensis* Cushman, 1924

(Figure 7. 8-10)

1924 *Pseudomassilina pacificiensis*  
CUSHMAN: 66, pl. 24, figs. 1-2.

1993 *Pseudomassilina pacificiensis*  
CUSHMAN; Hottinger et al.: 54, pl. 42, figs. 1-4.

Material: In the present study, this species recorded as a rare form in samples 2, 7, 12 and 13.

Geographical distribution: This species was recorded from the Gulf of Aqaba, Red Sea (Hottinger et al., 1993) and from New Caledonia, Southwestern Pacific (Debenay, 2012).

Genus: *Pyrgo* (Defrance), 1824

*Pyrgo oblonga* (d'Orbigny), 1839

(Figure 7. 11)

1839 *Biloculina oblonga* D'ORBIGNY: 163, pl. 8, figs. 21-23.

1993 *Pyrgo oblonga* (D'ORBIGNY);  
Hottinger et al.: 57, pl. 50, figs. 1-6.

Material: In the present study, *Pyrgo oblonga* (d'Orbigny) occurs as a rare form in samples 2, 5, 13 and 20.

Geographical distribution: This species was recorded from several areas worldwide such as the central Adriatic Sea (Morigi et al., 2005), Western Mediterranean shelf (Milker, 2010) and Southwestern Pacific (Debenay, 2012).

*Pyrgo* sp.

(Figure 7. 12-13)

Description: Test ovate in outline, slightly produced towards the aperture, inflated and subcircular in cross section; periphery obtusely angled to subrounded; wall smooth; chambers highly inflated and rotund with longitudinal two grooves elongates from base of test to the end of the last chamber, aperture subcircular provided with T-shaped tooth with a thin base.

Material: In the present study, this species recorded as frequent in samples 2, 5, 13 and 17.

Genus: *Triloculina* d'Orbigny, 1826

*Triloculina affinis* d'Orbigny, 1826

(Figure 7. 14)

1826 *Triloculina affinis* D'ORBIGNY: 299, pl. 2, figs. 9-10.

1993 *Triloculina affinis* D'ORBIGNY;  
Hottinger et al.: 64, pl. 65, figs. 7-10; pl. 66, figs. 1-3.

Material: In the present study, *Triloculina affinis* d'Orbigny occurs as a rare form in samples 5, 7, 13 and 19.

Geographical distribution: This species was originally described from the Tertiary of France d'Orbigny (1826). It was later recorded from the recent deposits of Solomon Islands (Hughes, 1977), Southwestern Pacific (Debenay, 2012) and Red Sea (Madkour, 2013).

*Triloculina brongniatiana* D'Orbigny, 1826

(Figure 7. 15-17)

1826 *Triloculina Brongniatiana*  
D'ORBIGNY: 300.

1973 *Triloculina Brongniatiana*  
D'ORBIGNY; Brooks: 406, pl. 6, figs. 3-4.

Material: In the present study, it is recorded as an abundant form in samples 2, 9 and 18, and as a frequent form in samples 5 and 13.

Geographical distribution: D'Orbigny (1826) described *Triloculina Brongniartiana* from the recent deposits of Italy. It was recorded later from the southern coast of Puerto Rico (Brooks, 1973).

*Triloculina elongotricarinata* Debenay, 2013

(Figure 7. 18-19)

2013 *Triloculina elongotricarinata* DEBENAY: 136, 352, 379.

Material: In the present study, *Triloculina elongotricarinata* Debenay occurs as an abundant form in samples 2 and 13, and as a rare form in samples 5 and 16.

Geographical Distribution: This species was identified by Debenay, 2013 from the Southwestern Pacific New Caledonia, records this species.

*Triloculina fichteliana* d'Orbigny, 1839

(Figure 7. 20-21)

1839 *Triloculina fichteliana* D'ORBIGNY, 171, pl. 9, figs. 8-10.

1993 *Triloculina fichteliana* D'ORBIGNY; Hottinger et al.: 65, pl. 66, figs. 10-15.

Material: This species is recorded here as a common in samples 2, 4, 5 and 13.

Geographical distribution: This species was recorded from Eastern Pacific (Graham and Militante 1959), Western shore of Andros Island (Todd and low, 1971), Red Sea (Hottinger et al., 1993), southwestern coasts of Turkey (Meriç et al., 2009) and Southwestern Pacific (Debenay, 2012).

*Triloculina insignis* Brady 1884

(Figure 7. 22-23)

1884 *Triloculina insignis* BRADY: 165, p1.4, figs. 8-10.

1988 *Triloculina insignis* BRADY; Shareef and Venkatachalapathy: 434, p1. 2, figs. 7a-b.

Material: *Triloculina insignis* Brady is recorded as an abundant form in samples 2, 6, 12, and 18, and as a rare form in samples 5 and 13.

Geographical distribution: This species was identified from several regions areas in India (Khare, 1992 and Rana, 2009) and from New Zealand (Cameron, 1995).

*Triloculina marioni* Schlumberger, 1893

(Figure 7. 24)

1893 *Triloculinamarioni* SCHLUMBERGER: 204, pl. 1, figs. 38-41.

2004 *Triloculinamarioni* SCHLUMBERGER; Meriç et al.: 101, pl. 15, figs. 3-5.

Material: In the present study, this species recorded as a rare in samples 5, 8 and 13.

Geographical distribution: This species was recorded from several areas worldwide such as eastern Mediterranean, (Ofiaz, 2006), the Dardanelles Strait in Turkey (Meriç et al., 2009) and western Mediterranean Sea (Milker and Schmiedl, 2012).

*Triloculina oblonga* (Montagu), 1803

(Figure 7. 25; Figure 8. 1-2)

1803 *Vermiculum oblongum* (MONTAGU): 522, pl. 14, fig. 9.

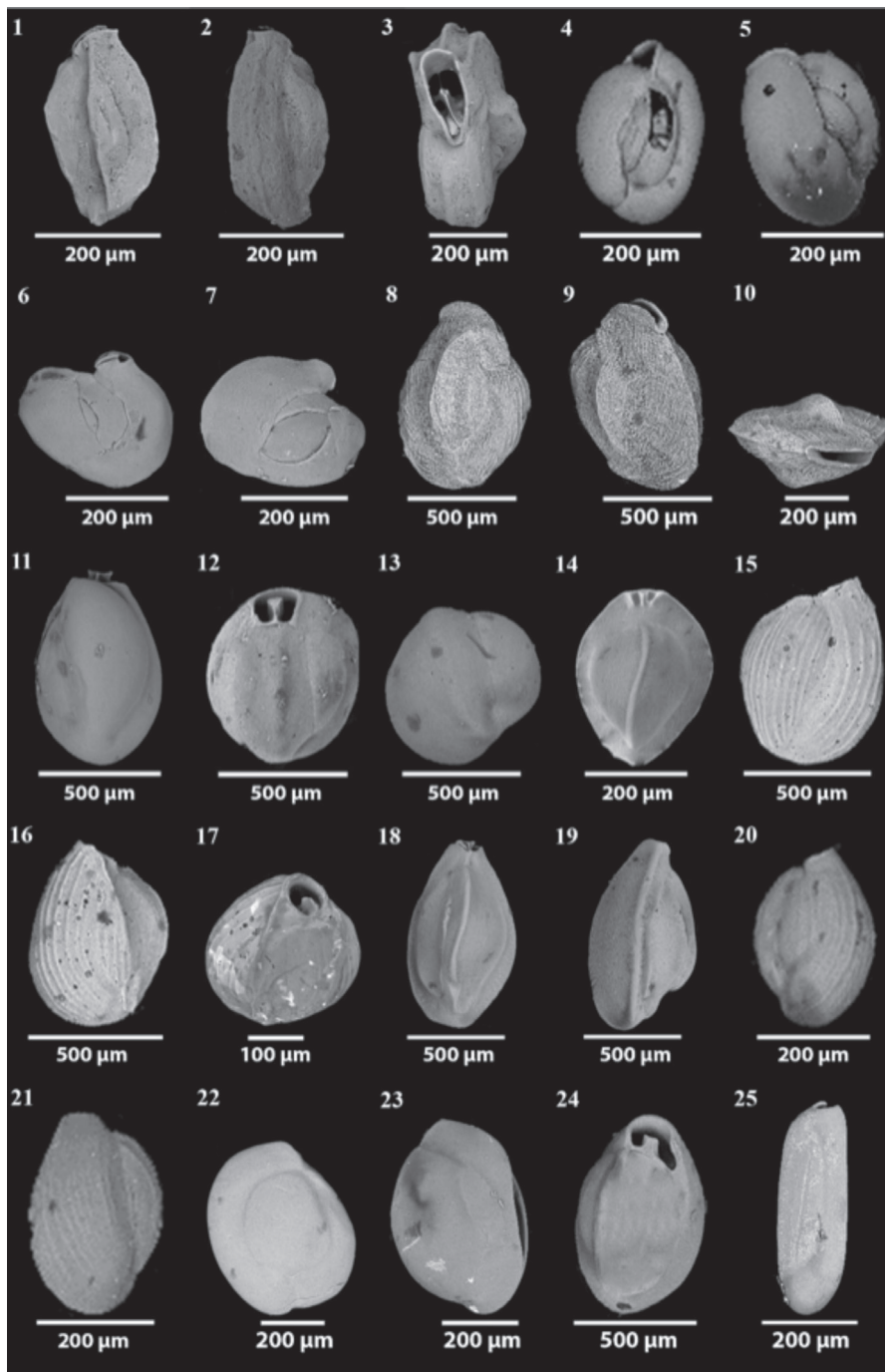
1839 *Triloculina oblonga* (Montagu); d'Orbigny, p. 175, pi. 10, figs. 3-5.

2009 *Triloculina oblonga* MONTAGU; Avsar et al.: 134, pl. 1, fig. 24.

Material: In the present study, *Triloculina oblonga* (Montagu) occurs as an abundant form in samples 2 and 12, and as a frequent form in samples 5 and 13.

Geographical distribution: This species was described from the recent deposits of Devonshire, England (Montagu, 1803). It was later recorded from Bahama West of Andros Island (Todd and low, 1971), Mukha area, Red Sea (El-Nakhal, 1984), Karwar, central west coast of India (Khare, 1992), Bermuda islands (Javaux et al., 2003), Eastern Mediterranean (Ofiaz, 2006) and Turkey (Meriç et al., 2009).





**Figure 7.** 1- *Quinqueloculina vulgaris* d'Ortign, side view; 2-3. *Quinqueloculina undulosecostata* Terquem, side views; 4-5. *Miliolinella subrotunda* Montagu, side views; 6-7. *Miliolinella* sp., side views; 8-10. *Pseudomassilina pacificiensis* Cushman, 8-9. Side views, 10. Apertural view; 11. *Pyrgo oblonga* d'Orbigny, side view; 12-13. *Pyrgo* sp., side views; 14. *Triloculina affinis* d'Orbigny, side view; 15-17. *Triloculina brongniatiana* D'Orbigny, 15-16. Side views, 17. Apertural view; 18-19. *Triloculina elongotricarinata* D'Orbigny, side views; 20-21. *Triloculina fichteliana* d'Orbigny, side views; 22-23. *Triloculina insignis* Brady, side views; 24. *Triloculina marioni* Schlumberger, side view; 25. *Triloculina oblonga* Montagu, side view.

*Triloculina plicata* Terquem, 1876

(Figure 8. 3-4)

1876 *Triloculina plicata* TERQUEM: 61, pl. 6, fig. 2.

2005 *Triloculina plicata* TERQUEM; Rasmussen: 67, pl. 5, fig. 5.

Material: In the present study, this species recorded as frequent in samples 2, 7 and 13.

Geographical distribution: This species was recorded from several areas such as Eastern Mediterranean (Ofiaz, 2006), the Dardanelles Strait in Turkey (Meriç et al., 2009) and western Mediterranean Sea (Milker and Schmiedl, 2012).

*Triloculina rotunda* d'Orbigny, 1826

(Figure 8. 5-6)

1826 *Triloculina rotunda* D'ORBIGNY: 299, fig. 4.

1977 *Triloculina rotunda* D'ORBIGNY; Lagoe: 106, 129.

Material: In the present study, this form is recorded frequently in samples 2, 5 and 17.

Geographical distribution: *Triloculina rotunda* d'Orbigny was originally described from the recent deposits the Adriatic Sea, Italy (d'Orbigny, 1826 and 1839). It was later recorded from the shore sands of western India (Bhatia, 1956), the coast of Puerto Rico (Brooks, 1973), the Central Arctic Ocean (Lagoe, 1977), Bermuda islands (Javaux et al., 2003), Indian coast (Devi and Rajashekhar, 2009) and New Caledonia, Southwestern Pacific (Debenay, 2012).

*Triloculina terquemiana* (Brady), 1884

(Figure 8. 7-9)

1884 *Miliolina terquemiana* BRADY: 166, pl. 114, fig. 1.

2009 *Triloculina barnardi* RASHEED; Parker: 358, figs. 260a-m.

Material: In the present study, it is recorded as a rare form in samples 2, 9 and 13.

Geographical distribution: Brady, 1984, described *Triloculina terquemiana* from the shallow water of Ceylon and Madagascar. It was later recorded from the shore sands of western India (Bhatia, 1956), Indian coasts (Rana, 2009 and Devi et al., 2009) and Southwestern Pacific (Debenay, 2012).

*Triloculina tricarinata* d'Orbigny, 1826

(Figure 8. 10-12)

1826 *Triloculina tricarinata* D'ORBIGNY: 299, pl. 1, fig. 8.

2005 *Triloculina tricarinata* D'ORBIGNY; Rasmussen: 67, pl. 5, fig. 6.

Material: In the present study, *Triloculina tricarinata* d'Orbigny occurs as a frequent form in samples 2, 11, 13 and 20.

Geographical distribution: This species was recorded from central Adriatic Sea (Morigi et al., 2005), Eastern Mediterranean (Ofiaz, 2006), Central east coast of India (Rana, 2009), southeastern Arabian Sea (Sarkar and Gupta, 2009), Indonesia (Suhartati and Muchlisin, 2012), Aegean Sea (Koukousioura et al., 2012) and Red Sea (Madkour, 2013).

*Triloculina trigonula* (Lamarck), 1804

(Figure 8. 13-14)

1804 *Miliolites trigonula* LAMARCK: 35, pl. 17, fig. 4.

2009 *Triloculina trigonula* (LAMARCK); Parker: 366, figs. 266a-k; 267a- k.

Material: In the present study, it is recorded as an abundant form in samples 2. 8 and 14, and as a rare form in samples 13 and 19.

Geographical distribution: This cosmopolitan species was described from the Eocene of France (Lamarck, 1804). It was later recorded from



the recent deposits of several parts of the world such as the Gulf of California (Bandy, 1961), the Atlantic Continental Shelf, U.S.A. (Murray, 1969), Bahama West of Andros Island (Todd and low, 1971), Mediterranean coast of Egypt (Samir et al., 2003), Indian coast (Devi and Rajashekhar, 2009), Aegean Sea (Koukousioura et al., 2012) and coast of Iligan Bay, Mindanao, Philippines (Lacuna, et al., 2013).

*Triloculina trihedra* Loeblich and Tappan, 1953

(Figure 8. 15-16)

1953 *Triloculina trihedra* LOEBLICH and TAPPAN: 45, pl. 4. fig. 10.

1980 *Triloculina trihedra* LOEBLICH and TAPPAN; El-Nakhal: 44, pl. 3, figs. 4- 6.

Material: In the present study, it is found as abundant form in samples 2, 5, 9 and 18 and as a common form in samples 3 and 13.

Geographical distribution: *Triloculina trihedra* Loeblich and Tappan was described from the recent deposits of the Arctic Ocean, north Alaska and Greenland by Loeblich and Tappan (1953) and Lago (1977) and from the Red Sea coastline of Yemen (El-Nakhal, 1980, 1984).

Subfamily: Sigmolinitinae Luczkowska, 1974

Genus: *Sigmohauerina* Zheng, 1979

*Sigmohauerina bradyi* (Cushman), 1917

(Figure 8. 17-19)

1917 *Hauerina bradyi* CUSHMAN; p. 62, Pl. 23, Figure 2.

1994 *Sigmohauerina bradyi* (CUSHMAN); Jones: 27, pl. 11, figs. 12-13.

Material: In the present study, it is recorded as a frequent form in samples 5, 13, 16 and 20.

Geographical distribution: This form was recorded by Cushman, 1917 from the North Pacific Ocean and from the Gulf of Aqaba by Hottinger et al., 1993.

Family: Miliolidae Ehrenberg, 1839

Subfamily: Miliolinae Ehrenberg, 1839

Genus: *Rupertlanella* Loeblich and Tappan, 1985

*Rupertianella rupertiana* Brady, 1884

(Figure 8. 20-21)

1884 *Rupertianella rupertiana* BRADY, 354.

Material: In the present study, *Rupertianella rupertiana* Brady occurs as an abundant form in samples 2, 5, 12 and 13.

Geographical distribution: It was recorded from Palk Strait, India (Gandhi et al., 2002).

Super family: Alveolinoidea Ehrenberg, 1839

Family: Alveolinidae Ehrenberg, 1839

Genus: *Borelis* de Montfort, 1808

*Borelis schlumbergeri* Reichel, 1937

(Figure 8. 24)

1937 *Neoalveolina pygmaea* (Hanzawa) schlumbergeri – REICHEL: 110, pl. 10, figs. 1-3.

1979 *Borelis schlumbergeri* REICHEL; Bahafzallah: 182, pl. 15, figs. 11-12.

1997 *Borelis schlumbergeri* REICHEL; Haig: 270, fig. 3.

Material: In the present study, it is recorded as an abundant form in samples 2, 7, 14 and 19 and as a common form in samples 5 and 13.

Geographical distribution: This species was originally described by Reichel (1937) from Madagascar. It has been recorded from different areas along the Red Sea coastline (Said, 1949, Bahafzallah, 1979, Hottinger et al., 1993 and Madkour, 2013) and from Exmouth Gulf, Western Australia (Haig, 1997).

Superfamily: Soritoidea Ehrenberg, 1839

Family: Peneroplidae Schultze, 1854

Genus: *Coscinospira* (Ehrenberg, 1839)

*Coscinospira hemprichii* Ehrenberg, 1839

(Figure 8. 25-27; Figure 9. 1)

1839 *Coscinospira hemprichii* EHRENBERG: 131 pl. 2, fig. 2.

2006 *Coscinospira hemprichii* EHRENBERG; Yalcin et al.: 38, pl. 3, figs. 1-2.

Material: In the present study, *Coscinospira hemprichii* Ehrenberg occurs as an abundant form in samples 1, 6, 10 and 13, and as a rare form in samples 2 and 11.

Geographical distribution: This species was recorded from Yemen (El-Nakhal, 1993), Western Australia (Haig, 1997), Turkey (Yalcin et al., 2006) and New Caledonia, Southwestern Pacific (Debenay, 2012).

Geographical distribution: *Peneroplis pertusus* (Forsk.) was originally described by Forskal (1775) as *Nautilus pertusus*. It was later recorded from Florida (Buzas and Severin, 1982), Eastern Mediterranean (Ofiaz, 2006), Central east coast of India (Rana, 2009), the Dardanelles Strait in Turkey (Meriç et al., 2009), Indonesia (Suhartati and Muchlisin, 2012), Aegean Sea (Koukousioura et al., 2012), the Egyptian Red Sea coast (Madkour, 2013) and from the Philippines (Lacuna, et al., 2013).

*Peneroplis planatus* (Fichtel and Moll) 1798  
(Figure 9. 10-11)

1798 *Nautilus planatus* FICHTEL AND MOLL: 91-94, pl. 16, figs. a-h.

1988 *Peneroplis planatus* (FICHTEL AND MOLL); Loeblich and Tappan: 371, pl. 391, figs. 7-8.

2002 *Peneroplis planatus* (FICHTEL AND MOLL); Hyams et al.: 174, pl. 1, fig. 13.

Material: In the present study, *Peneroplis planatus* (FICHTEL AND MOLL) occurs as an abundant form in samples 5, 10, 11 and 16, and as a rare form in samples 13 and 20.

Geographical distribution: This cosmopolitan species was originally described

from the coast of Italy by (Fichtel and Moll, 1798). It was later recorded from southern Thailand (Jumnongthai, 1980), East Coast of India (Gandhi and Rajamanickam, 2002), eastern Mediterranean, (Ofiaz, 2006) and Philippines (Lacuna, et al., 2013).

Family: Soritidae Ehrenberg, 1839

Subfamily: Soritinae Ehrenberg, 1839

Genus: *Sorites* Ehrenberg, 1839

*Sorites marginalis* Lamarck, 1816

(Figure 9. 12-13)

1816 *Sorites marginalis* LAMARCK: 196.

1994 *Sorites marginalis* LAMARCK; Loeblich and Tappan: 62, pl. 112, figs. 1-5.

Material: In the present study, this species is recorded as abundant in samples 2 and 13 and as a frequent form in samples 5 and 15.

Geographical distribution: This species has been recorded from the Red Sea by (Said, 1949 and Madkour, 2013).

*Sorites orbiculus* (Forsk.), 1775

(Figure 9. 14-15)

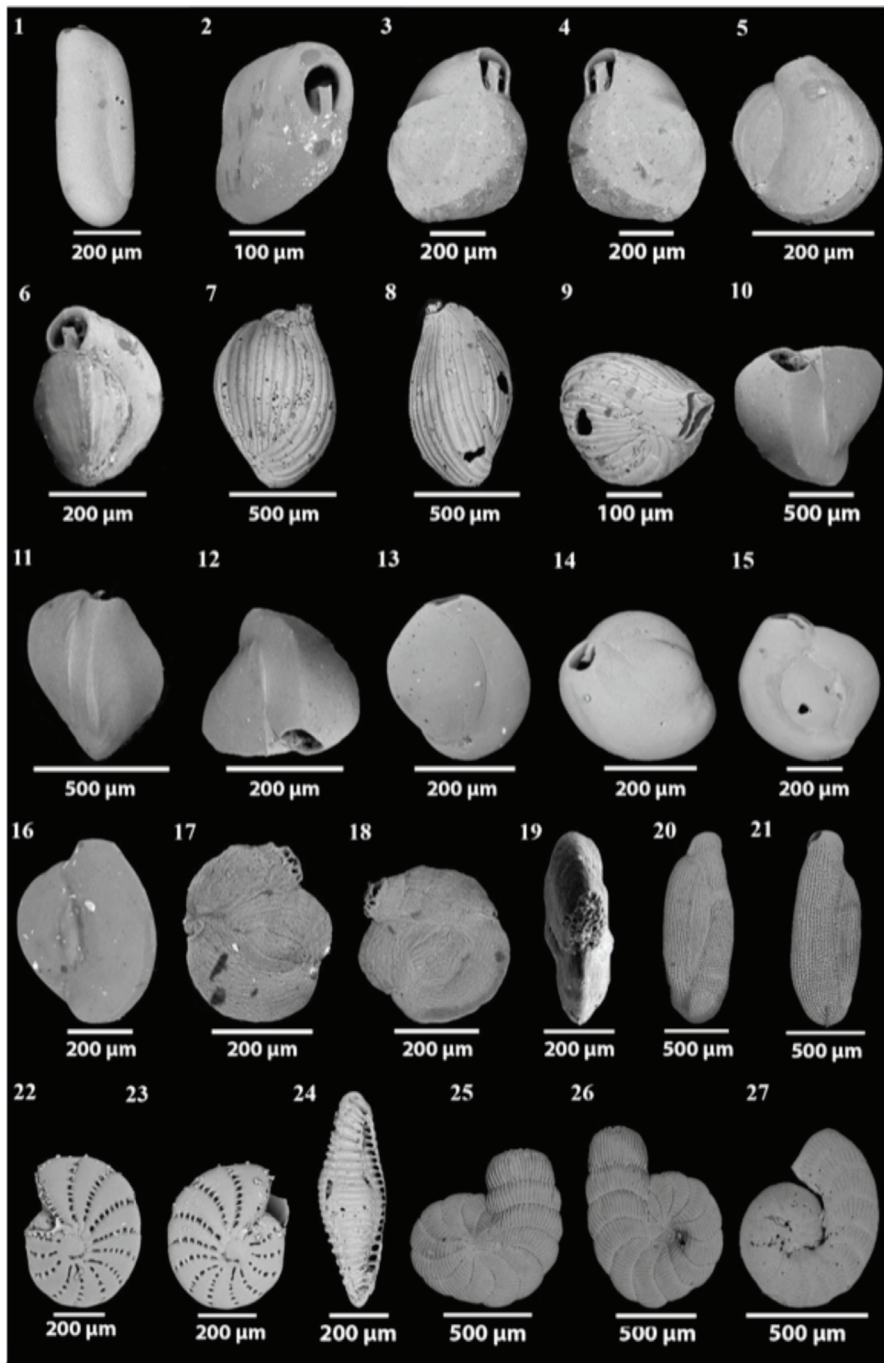
1775 *Nautilus orbiculus* FORSKAL: 125.

1987 *Sorites orbiculus* (FORSKAL); Baccaert: 70, pl. 27, fig. 2; pl. 28, figs. 1-2; pl. 29, fig. 1.

2009 *Sorites orbiculus* (FORSKAL); Parker: 336, figs. 244a-g; 245a-h.

Material: In the present study, *Sorites orbiculus* (Forsk.) occurs as a common form in samples 2, 5, 12 and 13.

Geographical distribution: The present species was recorded from several areas worldwide such as Yemeni Red Sea coastline (El-Nakhal, 1980 and 1993), Egyptian Mediterranean coast (Samir et al., 2003), Eastern Mediterranean (Ofiaz, 2006), Central east coast of India (Rana, 2009), the Dardanelles Strait in Turkey (Meriç et al., 2009) and Southwestern Pacific (Debenay, 2012).



**Figure 8.** 1-2. *Triloculina oblonga* Montagu, 1. Side view; 2. Apertural view; 3-4. *Triloculina plicata* Terquem, side views; 5-6. *Triloculina rotunda* d'Orbigny, 5. Side views, 6. Apertural view; 7-9. *Triloculina terquemiana* Brady, 7-8. Side views; 9. Apertural view; 10-12. *Triloculina tricarinata* d'Orbigny, 10-11. Side views; 12. Apertural view; 13-14. *Triloculina trigonula* Lamarck, 13. Side view, 14. Apertural view; 15-16. *Triloculina trihedra* Loeblich and Tappan, side views; 17-19. *Sigmoihauerina bradyi* Cushman, 17-18. Side views, 19. Apertural view; 20-21. *Repertianella rupertiana* Brady, side views; 22-23. *Elphidium gerthi* Van Voorthuysen, side views; 24. *Borelis schlumbergeri* Reichel, side view; 25-27. *Coscinospira hemprichii* Ehrenberg, side views.

Genus: *Peneroplis* de Montfort, 1808

*Peneroplis arietinus* (Batsch) 1791

(Figure 9. 2-4)

1791 *Nautilus arietinus* BATSCH: 3, pl. VI, figs. 15d-f.

1988 *Peneroplis arietinus* (BATSCH); Loeblich and Tappan: 371, pl. 391, figs. 11-12.

1994 *Peneroplis arietinus* (BATSCH); Gudmundsson: 113, text-Figs 21-22; pl. 2, fig. 3; pl. 3, fig. 2.

Material: In the present study, it is recorded as a common form in samples 2, 5, 8 and 13.

Geographical distribution: *Peneroplis arietinus* (Batsch) was originally described by Batsch (1791) from recent sand of Italy. It was later recorded from Northeast of Australia (Baccaert, 1987), Southeastern China Sea (Hatta and Ujiie, 1992), eastern Mediterranean, (Oflaz, 2006) and from the Egyptian Red Sea coast (Madkour, 2013).

*Peneroplis bradyi* Cushman, 1930

(Figure 9. 5-6)

1930 *Peneroplis bradyi* CUSHMAN: 40, pl. 14, figs. 8-10.

1971 *Peneroplis bradyi* CUSHMAN; Bock: 33, pl. 13, fig. 8.

Material: In the present study, it is found as abundant form in samples 2, 9 and 13 and as a rare form in samples 1 and 5.

Geographical distribution: This form was described from Montego Bay, Jamaica, (Cushman, 1930), and from the Bahama West of Andros Island (Todd and Low, 1971).

*Peneroplis pertusus* (Forsk), 1775

(Figure 9. 7-9)

1775 *Nautilus pertusus* FORSKAL: 125.

1917 *Peneroplis pertusus* (FORSKAL); Cushman: 86, pl. 37, figs. 1-2, 6.

2009 *Peneroplis pertusus* (FORSKAL); Parker: 152, figs. 108a-h, 109i-l.

Material: In the present study, it is recorded as a frequent form in samples 3, 5, 13 and 17.

Suborder: Lagenina Delage and Herouard, 1896

Superfamily: Nodosaroidea Ehrenberg, 1838

Family: Nodosariidae Ehrenberg, 1838

Subfamily: Plectofrondiculariinae Cushman, 1927

Genus: *Amphimorphina* Neugeboren, 1850

*Amphimorphina butonensis* Keyzer, 1953

(Figure 9. 16-17)

1998 *Amphimorphina butonensis* KEYZER; Loeblich and Tappan: 114, pl. 44, figs. 12-14.

1999 *Amphimorphina butonensis* KEYZER; Eagle et al.: 59, fig. 10.

Material: In the present study, *Amphimorphina butonensis* Keyzer is recorded as a rare form in samples 2, 13 and 16.

Geographical distribution: This species was recorded from Buton Island, Indonesia by Keyzer, 1953 and then from the Mathesons Bay, Auckland by Eagle et al., 1999.

Family: Ellipsolagenidae Silvestri, 1923

Subfamily: Ellipsolageninae Silvestri, 1923

Genus: *Fissurina* Reuss, 1850

*Fissurina* sp.

(Figure 9. 18)

Description: Test is subrounded outline and ovate in section. Wall calcareous, coarser perforations, surface coarsely with a rounded margin; the aperture is terminal at the end of a short neck.

Material: This form is recorded here as a frequent manner in samples 2, 10, 13 and 19.



Suborder: Rotaliina Delage and Herouard, 1896

Superfamily: Bolivinoidea Glaessner, 1937

Family: Bolivinidae Glaessner, 1937

Genus: *Bolivina* d'Orbigny, 1839

*Bolivina pseudoplicata* Heron-Allen and Earland, 1930

(Figure 9. 19-21)

1930 *Bolivina pseudoplicata* HERON-ALLEN and EARLAND: 81, pl. 3, figs. 36-40.

2005 *Bolivina pseudoplicata* HERON-ALLEN and EARLAND; Rasmussen: 80, pl. 9, figs. 16-17.

Material: In the present study, *Bolivina pseudoplicata* Heron-Allen and Earland occurs as an abundant form in samples 2, 5 and 14 and as a rare form in samples 8.

Geographical distribution: This species was recorded from several areas such as Northern New Zealand (Hayward et al., 1999), North American Pacific coast from California (Culver and Buzas, 1986), France (Debenay et al., 2001) and from the western Mediterranean Sea (Milker et al., 2012).

*Bolivina pseudopunctata* Höglund, 1947

(Figure 9. 22-24)

1947 *Bolivina pseudopunctata* HÖGLUND: 273, pl. 24, fig. 5a; pl. 32, figs. 23-24.

2006 *Bolivina pseudopunctata* HÖGLUND; LLOYD: 323, pl. 2, fig.c.

Material: This species is recorded here as a common in samples 2, 6, 13 and 19.

Geographical distribution: *Bolivina pseudopunctata* Höglund was recorded from the Caribbean Region (Culver and Buzas, 1982), Hebridean shelf, west of Scotland (Murray, 2003), King George Island, West Antarctica (Majewski, 2007), West Greenland (Lloyd, 2006)

and Maldives Ridge, southeastern Arabian Sea (Sarkar, and Gupta, 2009).

*Bolivina variabilis* (Williamson), 1858)

(Figure 9. 25; Figure 10. 2)

1858 *Textularia variabilis* WILLIAMSON: 76, pl. 6, figs. 162-163.

1965 *Bolivina variabilis* (WILLIAMSON); Phleger: 51, pl. 1, fig 8.

2005 *Bolivina variabilis* (WILLIAMSON); Debenay et al.: 336, pl. 3, fig. 4.

Material: In the present study, *Bolivina variabilis* (Williamson) occurs as a frequent form in samples 2 and 7.

Geographical distribution: This species was recorded by Culver and Buzas, 1980, 1982 and 1986 from the North American Atlantic Coast, Caribbean Region and North American Pacific Coast from California respectively. It was recorded also from France (Debenay et al., 2001), Bermuda islands (Javaux, et al., 2003) and Indian coast (Devi and Rajashekhar., 2009).

Superfamily: Buliminoidea Jones, 1875

Family: Siphogenerinoidea Saidova, 1981

Subfamily: Siphogenerinoidea Saidova, 1981

Genus: *Sagrinella* Saidova, 1975

*Sagrinella lobata* Brady, 1881

(Figure 10. 3-5)

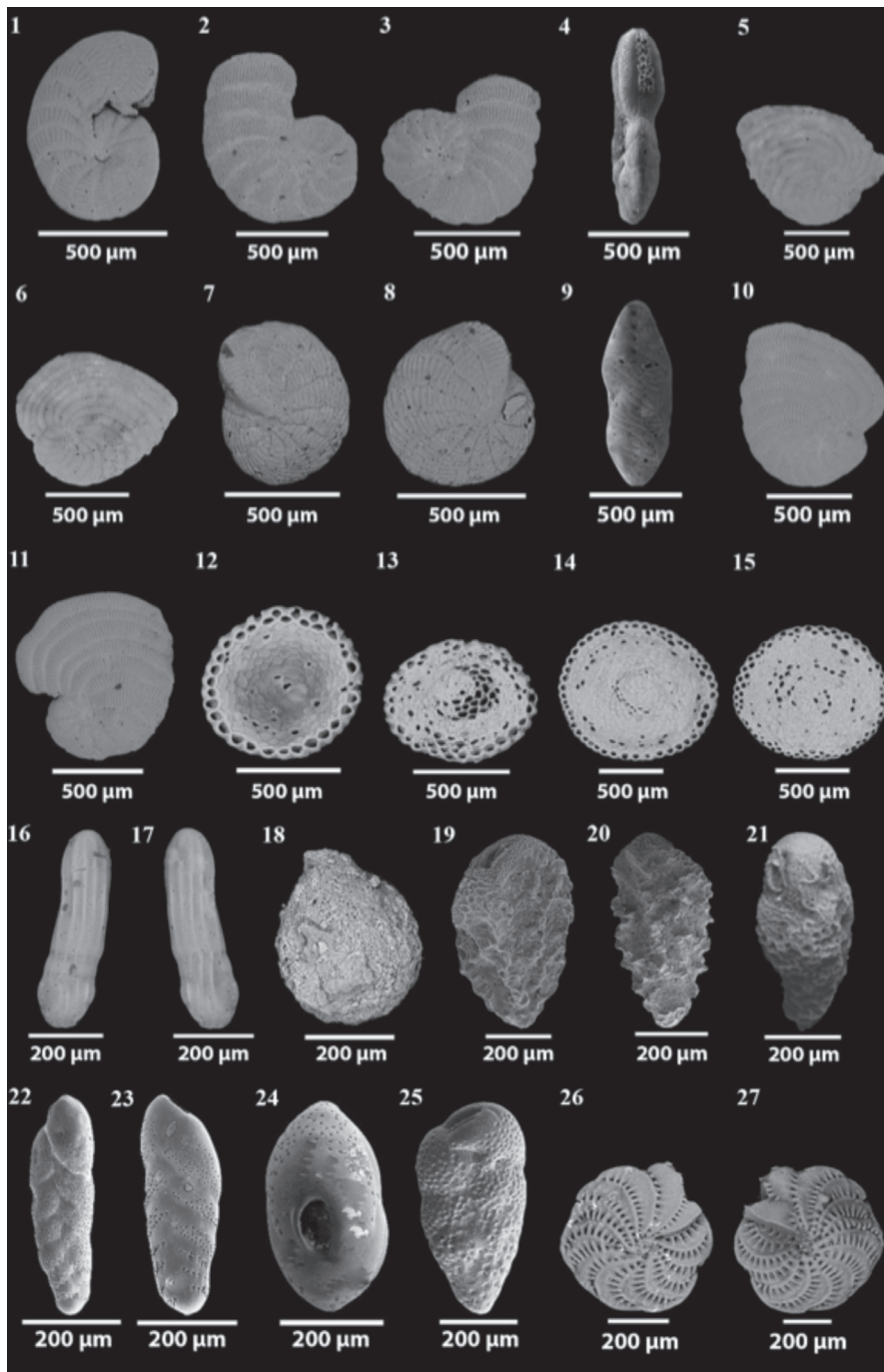
1881 *Sagrinella lobata* BRADY: 58.

1993 *Sagrinella lobata* BRADY; El-Nakhal: 271.

Material: In the present study, *Sagrinella lobata* occurs as an abundant form in samples 5, 8 and 13, and as a rare form in samples 2, 15 and 19.

Geographical distribution: Brady (1881) described *Sagrinella lobata* from the Pacific Ocean and then it was recorded from Salif coast in Yemen, by El- Nakhal, 1993.





**Figure 9.** 1- *Coscinospira hemprichii* Ehrenberg, side view; 2-4. *Peneroplis arietinus* Batsch, 2-3. Side views, 4. Apertural view; 5-6. *Peneroplis bradyi* Cushman, side views; 7-9. *Peneroplis pertusus* Forskal, 7-8. Side views; 9. Apertural view; 10-11. *Peneroplis planatus* Fichtel and Moll, side views; 12-13. *Sorites marginalis* Lamarck, side views; 14-15. *Sorites orbiculus* Forskal, side views; 16-17. *Amphimorphina butonensis* Keyzer, side views; 18. *Fissurina* sp., side view; 19-21. *Bolivina pseudoplicata* Heron- Allen and Earland, 19-20. Side view; 21. Edge view; 22--24. *Bolivina pseudopunctata* Høglund, 22-23. Side views, 24. Apertural view; 25. *Bolivina variabilis* Williamson, side view; 26-27. *Elphidium margaritaceum* Cushman, side views.

Family: Reussellidae Cushman, 1933

Genus: *Reussella* Galloway, 1933

*Reussella spinulosa* (Reuss) 1850

(Figure 10. 6-7)

1850 *Verneuilina spinulosa* REUSS: 347, pl. 47, fig. 12a-c.

2009 *Reussella spinulosa* (REUSS); Milker et al.: 218, pl. 3, figs. 4-5.

Material: In the present study, this species recorded as frequent in samples 5, 10, 13, and 20.

Geographical distribution: This species was recorded from several areas worldwide such as the North American Atlantic Coast, the Caribbean Region and (Culver and Buzas, 1980 and 1982), east coast of India (Gandhi and Rajamanickam, 2002), the Pakistan continental margin, Arabian Sea (Schumacher et al., 2007) and from Philippines (Lacuna, et al., 2013).

Super Family: Discorboidea Ehrenberg, 1838

Family: Eponididae Hofker, 1951

Subfamily: Eponidinae Hofker, 1951

Genus: *Eponides* de Montfort, 1808

*Eponides repandus* (Fichtel and Moll), 1798

(Figure 10. 8-9)

1798 *Nautilus repandus* FICHTEL and MOLL: 35, pl. 3, figs. a-d.

2009 *Eponides repandus* (FICHTEL and MOLL); Parker: 603, figs. 429a-f.

Material: In the present study, *Eponides repandus* Fichtel and Moll occurs as a common form in samples 2, 7 and 13.

Geographical distribution: This species was recorded from several regions such as Karwar, central west coast of India bordering the Arabian Sea (Khare, 1992) and from New Caledonia, Southwestern Pacific (Debenay, 2012).

Family Rosalinidae Reiss, 1963

Genus: *Rosalina* d'Orbigny, 1826

*Rosalina anomala* Terquem, 1875

(Figure 10. 10-11)

1973 *Rosalina anomala* TERQUEM; Haynes: 150, pl. 17, figs. 1-3; pl. 19, fig. 2; text-fig. 28.

2009 *Rosalina floridensis* CUSHMAN; Milker et al.: 218, pl. 3, figs. 18-19.

Material: In this study, it is recorded as an abundant form in samples 1, 7 and 13, and as a rare form in samples 2, 5 and 11.

Geographical distribution: This species was recorded from several areas such as the Atlantic Ocean (Cushman, 1931), the Hebridean shelf, west of Scotland (Murray, 2003), Kosterfjord, south west Sweden (Wisshak et al., 2006) and from the Western Mediterranean Sea (Milker et al., 2009).

*Rosalina bradyi* Cushman, 1915

(Figure 10. 12-15)

1991 *Rosalina bradyi* CUSHMAN; CIMERMAN and LANGER: 66, pl. 71, figs. 1-5.

2008 *Rosalina bradyi* CUSHMAN; Abu-Zied et al.: 52, pl. 2, figs. 28-29.

Material: *Rosalina bradyi* Cushman occurs as an abundant form in samples 4 and 6, and as a frequent form in samples 2, 8 and 13.

Geographical distribution: This species was recorded from several areas worldwide such as Port Joinville Harbor, France (Debenay et al., 2001), Australia (Nobes and Uthicke, 2008), eastern Mediterranean (Abu-Zied et al., 2008), the Dardanelles Strait in Turkey (Meriç et al., 2009) and Indian coast (Devi and Rajashekhar, 2009).

*Rosalina globularis* d'Orbigny, 1826

(Figure 10. 16-17)

1826 *Rosalina globularis* D'ORBIGNY: 271, pl. 13, figs. 1-4.

2009 *Rosalina globularis* D'ORBIGNY; Parker: 718; figs. 504a-l.

Material: The present species is recorded as a common from samples 5, 7, 13 and 18.

Geographical distribution: *Rosalina globularis* D'ORBIGNY was recorded from France (Debenay et al., 2001), Hebridean shelf, west of Scotland (Murray, 2003), southeastern Arabian Sea (Sarkar and Gupta, 2009), Turkey (Meriç et al., 2009) and coastal plains in the Aegean Sea (Koukousioura et al., 2012).

*Rosalina* sp.

(Figure 10. 18-19)

Description: Test trochospiral, ovate and convex on the spiral side, peripheral margin broadly rounded; the wall is calcareous, hyaline and perforate; sutures are depressed and backward curved on the spiral side; the first chamber is very big, ovate, convex, and finely perforate, later chambers can be coarsely perforate, About five inflated chambers are visible in the final whorl on the spiral side; umbilical side is evolute with triangular and perforate chambers, umbilicus is open; aperture is an interiomarginal, extraumbilical arched slit, extending from the periphery to the umbilicus.

Material: In the present study, this species recorded as a rare in samples 2 and 13.

Superfamily: Planorbuloidea Schwager, 1877

Family: Planulinidae Bermúdez, 1952

Genus: *Hyalinea* Hofker, 1951

*Hyalinea balthica* (Schroeter), 1783

(Figure 10. 20-21)

1783 *Nautilus balthicus* SCHROETER: 20, pl. 1, fig. 2.

1988 *Hyalinea balthica* (SCHROETER); Loeblich and Tappan: 167, pl. 632, figs. 5-8.

2009 *Hyalinea balthica* (SCHROETER); Frezza and Carboni: 57, pl. 2, fig. 18.

Material: In the present study, *Hyalinea balthica* Schroeter occurs as a frequent form in samples 1, 5 and 13.

Geographical distribution: This species was recorded from several areas such as Eastern Mediterranean (Parker, 1958), Marmara Sea (Kaminski et al., 2002), the Hebridean shelf, west of Scotland (Murray, 2003), Kallithea Bay, Greece (Rasmussen, 2005) and Northern Tyrrhenian Sea, Italy (Frezza and Carboni, 2009).

Family: Planorbulinidae Schwager, 1877

Subfamily: Planorbulinae Schwager, 1877

Genus: *Planorbulina* d'Orbigny, 1826

*Planorbulina mediterraneensis* d'Orbigny, 1826

(Figure 10. 22-23)

1826 *Planorbulina mediterraneensis* D'ORBIGNY: 280, pl. 15, figs. 4-6.

2010 *Planorbulina mediterraneensis* D'ORBIGNY; Dias et al.: 844, fig. 2, image 7.

Material: In the present study, this species recorded as a rare in samples 8 and 13.

Geographical distribution: The present form was recorded from several areas worldwide such as the Caribbean Region (Culver and Buzas, 1982), France (Debenay et al., 2001), Bermuda islands (Javaux and Scott, 2003) and the Dardanelles Strait in Turkey (Meriç et al., 2009).

Family: Cymaloporidae Cushman, 1927

Subfamily: Cymbaloporinae Cushman, 1927

Genus: *Cymbaloporella* Cushman, 1927

*Cymbaloporella tabellaeformis* Brady, 1884

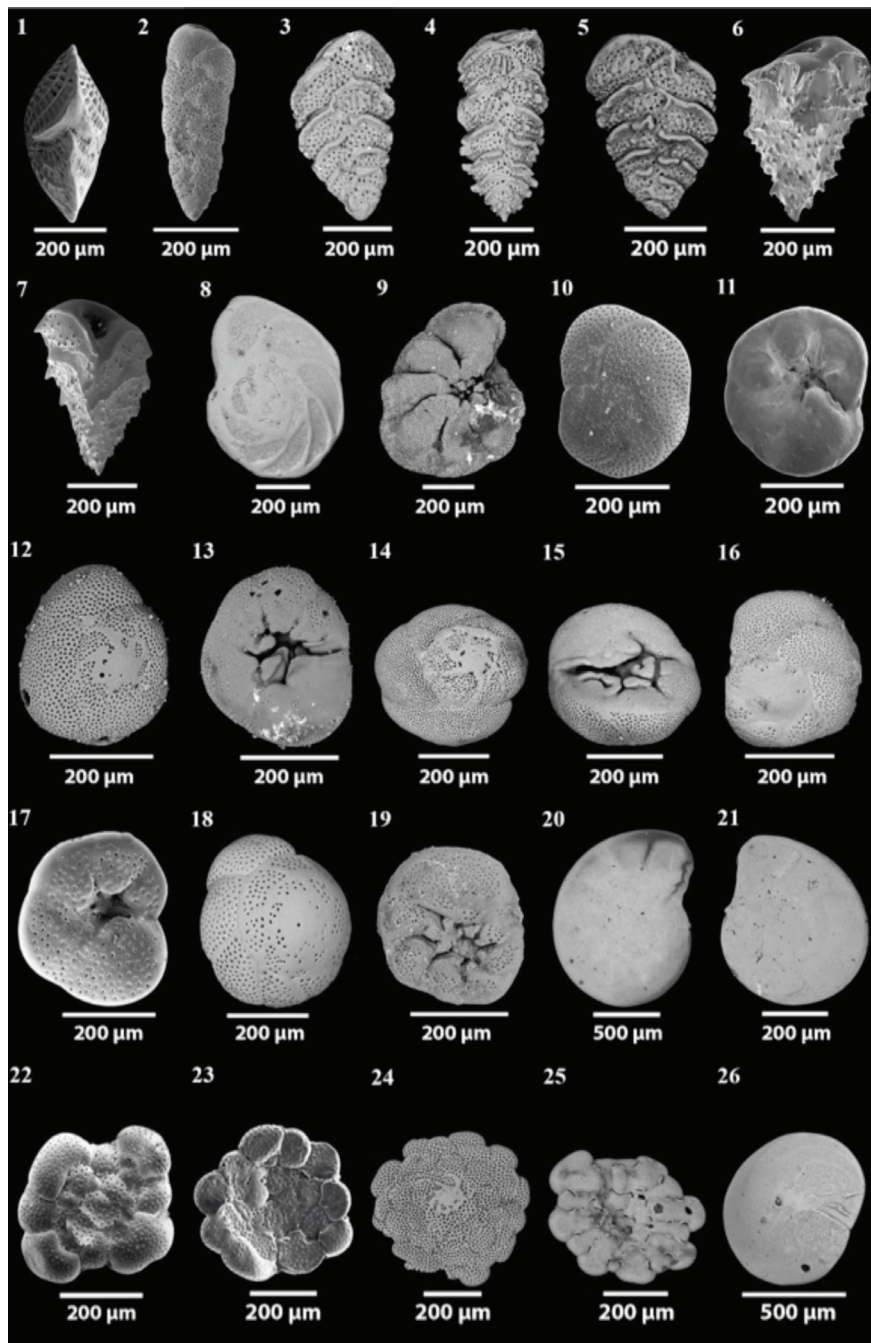
(Figure 10. 24-25)

1884 *Cymbaloporella tabellaeformis* BRADY: 637, pl. 102, figs. 15-18.

2009 *Cymbaloporella tabellaeformis* BRADY; Sarkar and Gupta: 30, pl. 3, Figure 17.

Material: In the present study, it is found as a frequent form in samples 2, 5, 10, and 19.

Geographical distribution: This species was identified from Maldives Ridge in southeastern Arabian Sea (Sarkar and Gupta, 2009).



**Figure 10.** 1- *Elphidium margaritaceum* Cushman, apertural view; 2. *Bolivina variabilis* Williamson, side view; 3-5. *Sagrinella lobata* Brady, side views; 6-7. *Reussella spinulosa* Reuss, side views; 8-9. *Eponides repandus* Fichtel and Moll, 8. Spiral side, 9. Umbilical side; 10-11. *Rosalina anomala* Terquem, 10. Spiral view; 11. Umbilical view; 12-15. *Rosalina bradyi* Cushman, 12, 14. Spiral side views, 13, 15. Umbilical views; 16-17. *Rosalina globularis* d'Orbigny, 16. Spiral view, 17. Umbilical view; 18-19. *Rosalina* sp., 18. Spiral view, 19. Umbilical view; 20-21. *Hyalinea balthica* Schroeter, 20. Spiral view, 21. Umbilical view; 22-23. *Planorbulina mediterraneensis* d'Orbigny, 22. Spiral view, 23. Umbilical view; 24-25. *Cymbaloporella tabellaformis* Brady, 24. Side view, 25. Spiral view; 26. *Amphistegina lessonii* d'Orbigny, spiral view.



Superfamily: Asterigerinoidea d'Orbigny, 1839

Family: Amphisteginidae Cushman, 1927

Genus: *Amphistegina* d'Orbigny, 1826

*Amphistegina lessonii* d'Orbigny, 1826

(Figure 10. 26; Figure 11. 1)

1826 *Amphistegina lessonii* D'ORBIGNY: 304.

2009 *Amphistegina lessonii* D'ORBIGNY; Parker: 498, figs. 355a-d.

Material: In the present study, *Amphistegina lessonii* d'Orbigny occurs as a common form in samples 2, 5 and 13.

Geographical distribution: This species was recorded from north American Atlantic Coast and the Caribbean Region by Culver and Buzas (1980, 1982), Bermuda islands (Javaux et al., 2003), the central Great Barrier Reef of Australia (Horton et al., 2007) and Red Sea coast (Madkour, 2013).

*Amphistegina lobifera* Larsen, 1976

(Figure 11. 2-3)

1976 *Amphistegina lobifera* LARSEN: 4-6, pl. 3, figs. 1-5; pl. 7, fig. 3; pl. 8, fig. 3.

2009 *Amphistegina lobifera* LARSEN; Parker: 498, figs. 355: e-o.

Material: In the present study, it is found as a rare form in samples 2, 5, 10 and 13.

Geographical distribution: This species was recorded from Haifa Bay (Yanko et al. 1993), Arabian Gulf (Cherif et al., 1997) and Southwestern Pacific (Debenay, 2012).

*Amphistegina radiata* (Fichtel and Moll), 1798

(Figure 11. 4-5)

1798 *Nautilus radiata* FICHTEL and MOLL: 58, pl. 8, figs. a-d.

2009 *Amphistegina radiata* (FICHTEL and MOLL); Parker: 499, fig. 356: a-j.

Material: In the present study, this species recorded as frequent in samples 2, 5 and 16.

Geographical distribution: This species was recorded from several regions such as India (Khare, 1992 and Gandhi and Rajamanickam, 2002), New Guinea (McCloskey, 2009) and Southwestern Pacific (Debenay, 2012).

Super family: Nonionioidea Schultze, 1854

Family: Nonionidae Schultze, 1854

Sub family: Nonioninae Schultze, 1854

Genus: *Nonion* de Montfort, 1808

*Nonion fabum* (Fichtel and Moll), 1798

(Figure 11. 6-8)

1798 *Nautilus faba* FICHTEL and MOLL: 103, pl. 19: b-c.

1988 *Nonion fabum* (FICHTEL and MOLL); Loeblich and Tappan: 179, pl. 690, figs. 1-7.

2005 *Nonion fabum* (FICHTEL AND MOLL); Rasmussen: 102, pl. 16, fig. 5.

Material: In the present study, *Nonion fabum* (Fichtel and Moll) occurs as a common form in samples 2, 7 and 13.

Geographical distribution: This species was recorded from The Guadiana shelf, Southwestern Iberia (Mendes et al., 2004), Kallithea Bay, Greece (Rasmussen, 2005), Namibia (Leiter, 2008) and western Mediterranean Sea (Milker et al., 2009).

Superfamily Rotalioidea Ehrenberg, 1839

Family Rotaliidae Ehrenberg, 1839

Subfamily Pararotaliinae Reiss, 1963

Genus: *Neorotalia* Bermúdez 1912

*Neorotalia calcar* d'Orbigny, 1839

(Figure 11. 9-11)

1993 *Neorotalia calcar* D'ORBIGNY; Hottinger et al.: 140, pl. 199, figs. 1-10.



2009 *Neorotalia calcar* D'ORBIGNY; Devi and Rajashekhar: 33, fig. 11f.

Material: In the present study, *Neorotalia calcar* d'Orbigny occurs as an abundant form in samples 2 and 8, and as a rare form in samples 13.

Geographical distribution: This species was recorded from several areas such as the Caribbean Region (Culver and Buzas, 1982), Indonesia (Renema, 2003), Indian coast (Devi and Rajashekhar, 2009) and Southwestern Pacific (Debenay, 2012).

Genus: *Pararotalia* le Calvez, 1949

*Pararotalia* cf. *P. ozawai* (Asano), 1951

(Figure 11. 12-13)

1951 *Rotalia ozawai* ASANO: 15, figs. 115-117.

1965 *Pararotalia ozawai* (ASANO); Todd: 29, pl. 9, fig. 1: a-c.

Material: In the present study, this species recorded as a rare in samples 3 and 13.

Geographical distribution: Asano, 1951 described *Pararotalia ozawai* from Japan then it was recorded from the tropical Pacific by Todd, 1965.

Subfamily: Ammoniinae Saidova, 1981

Genus: *Ammonia* Bruennich, 1772

*Ammonia aoteana* (Finlay), 1940

(Figure 11. 14-15)

1940 *Streblus aoteanus* FINLAY: 461.

2004 *Ammonia aoteana* (FINLAY); Hayward et al.: pl. 2, fig. T5; pl. 3, fig. T5; pl. 4, fig. T5.

2009 *Ammonia aoteana* (FINLAY); Parker: 480, fig. 344: a-h.

Material: In the present study, *Ammonia aoteana* (Finlay) occurs as an abundant form in samples 3, 7 and 13 and as a rare form in samples 4 and 18.

Geographical distribution: This species was recorded from the central Great Barrier Reef of Australia (Horton et al., 2007) and New Caledonia, Southwestern Pacific (Debenay, 2012).

*Ammonia beccarii* (Linné), 1758

(Figure 11. 16-19)

1758 *Nautilus beccarii* LINNÉ: 710.

2005 *Ammonia beccarii* (LINNÉ); Debenay et al.: 334, pl. 2, fig. 17

2010 *Ammonia beccarii* (LINNÉ); Issa: 6, pl. 1, fig. 10.

Material: *Ammonia beccarii* (LINNÉ) is recorded with different forms in samples 1, 3, 5, 9, 13, 14, 16, 19 and 20.

Geographical distribution: This species was recorded by Culver and Buzas (1980 and 1982) from the North American Atlantic Coast and the Caribbean region. Also it was identified from North American Pacific Coast from California (Culver, 1986), Red Sea coastlines (El-Nakhal, 1993 and Madkour, 2013), west of Scotland (Murray, 2003) and from the Guadiana shelf, southwestern Iberia (Mendes et al., 2004).

*Ammonia convexa* (Collins), 1958

(Figure 11. 20-21)

1958 *Streblus convexus* COLLINS: 414, pl. 5, figs. 10: a-c.

1987 *Ammonia convexa* (COLLINS); Baccaert: 232, pl. 94, fig. 6.

2008 *Ammonia convexa* (COLLINS); Nobes and Uthicke: 31, fig. 35.

Material: In the present study, it is found as a rare form in samples 2, 5 and 13.

Geographical distribution: *Ammonia convexa* recorded from the Great Barrier Reef, Australian (Nobes and Uthicke, 2008) and Southwestern Pacific (Debenay, 2012).

*Ammonia parkinsoniana* (d'Orbigny), 1839

(Figure 11. 22-23)

1839 *Rosalina parkinsoniana* D'ORBIGNY: 99, pl. 4, figs. 25-27.

1993 *Ammonia parkinsoniana* (D'ORBIGNY); Sgarrella and Moncharmont Zei: 228, pl. 20, figs. 3-4.

2006 *Ammonia parkinsoniana* (D'ORBIGNY); Avsar et al.: 133, pl. 3, figs. 15-16.

Material: *Ammonia parkinsoniana* (d'Orbigny) occurs here as a frequent form in samples 2, 5 and 13.

Geographical distribution: This species was recorded from several areas such as the Caribbean Region (Culver and Buzas, 1982), Biscayne Bay in Florida from Atlantic ocean (Ishman, et al., 1997), the central Adriatic Sea (Morigi et al., 2005), Aegean Sea (Koukousioura et al., 2012).

Family: Elphidiidae Galloway, 1933

Subfamily: Elphidiinae Galloway, 1933

Genus: *Elphidium* de Montfort, 1808

*Elphidium aculeatum* (d'Orbigny), 1846

(Figure 11. 24-25)

1846 *Polystomella aculeata* D'ORBIGNY: 131, pl. 6, figs. 27-28.

1991 *Elphidium aculeatum* (D'ORBIGNY); Cimerman and Langer: 77, pl. 89, figs. 1-4.

2005 *Elphidium aculeatum* (D'ORBIGNY); Rasmussen: 108, pl. 18, fig.12.

Material: In the present study, this species recorded as an abundant in samples 3, 5 and 13, and as a rare form in samples 17.

Geographical distribution: *Elphidium aculeatum* (D'ORBIGNY) was recorded from Kallithea Bay Greece (Rasmussen. 2005), the Dardanelles Strait in Turkey (Meriç et al, 2009)

and western Mediterranean Sea (Milker et al., 2012).

*Elphidium advenum* (Cushman), 1922

(Figure 6. 1; Figure 5. 26-27)

1922 *Polystomella advena* CUSHMAN: 56, pl. 9, figs. 11-12.

1933 *Elphidium advenum* (CUSHMAN); Cushman: 50, pl. 12, figs. 1-3.

2005 *Elphidium advenum* (CUSHMAN); Rasmussen: 108, pl. 18, figs. 13-15.

Material: In the present study, it is recorded as a frequent form in samples 5, 8 and 13.

Geographical distribution: This species was originally described by Cushman (1922) from southern Florida. It has been recorded from the Red Sea (Said, 1949 and Madkour, 2013), Caribbean Region (Culver and Buzas, 1982), east coast of India (Gandhi and Rajamanickam, 2002), Southern Iraq (Al-Ali et al., 2010) and Aegean Sea (Greece) (Koukousioura et al., 2012).

*Elphidium crispum* (Linné), 1758

(Figure 4. 26-27)

1758 *Nautilus crispum* LINNÉ: 709.

1933 *Elphidium crispum* (LINNÉ); Cushman: 47, pl. 11, fig. 4.

2009 *Elphidium crispum* (LINNÉ); Frezza and Carboni: 55, pl. 1, fig. 16.

Material: *Elphidium crispum* (Linné) occurs as a common form in samples 2, 5 and 13.

Geographical distribution: This species was recorded from several areas Worldwide such as France (Debenay et al., 2001), southwestern Iberia (Mendes et al., 2004), the central Adriatic Sea (Morigi et al., 2005), southwestern coasts of Turkey (Meriç et al., 2009) and Mindanao, Philippines (Lacuna, et al., 2013).

*Elphidium gerthi* Van Voorthuysen, 1957

(Figure 8. 22-23)

1957 *Elphidium gerthi* VAN  
VOORTHUYSEN: 32, pl. 23, fig. 12: a-b.

2003 *Elphidium gerthi* VAN  
VOORTHUYSEN; Murray: 21, figs. 7-8.

Material: In the present study, it is found as a frequent form in samples 3, 5 and 16.

Geographical distribution: This species was recorded in Marmara Sea (Kaminski et al., 2002), Hebridean shelf, west of Scotland (Murray, 2003), and Indian coast (Devi and Rajashekhar, 2009).

*Elphidium macellum* (Fichtel and Moll), 1798  
(Figure 6. 14-16)

1798 *Nautilus macellus* FICHTEL AND  
MOLL: 66, pl. 10, figs. e-g.

1988 *Elphidium macellum* (FICHTEL AND  
MOLL); Loeblich and Tappan: 199, pl. 789, figs.  
1-5.

2009 *Elphidium macellum* (FICHTEL AND  
MOLL); Devi and Rajashekhar: 35, figs. b-c.

Material: This species is recorded as a common in samples 3, 5 and 15.

Geographical distribution: This species was recorded from several areas such as the north American Atlantic coast (Culver and Buzas, 1980), Marmara sea (Kaminski et al., 2002), Italy (Fiorini, 2004), Greece (Rasmussen, 2005), southwestern coasts of Turkey (Meriç et al., 2009) and Indian coast (Devi et al., 2009).

*Elphidium margaritaceum* Cushman, 1930  
(Figure 9. 26-27; Figure 10. 1)

1930 *Elphidium advenum* CUSHMAN var.  
*margaritaceum* Cushman: 25, pl. 10, fig. 3.

Material: In the present study, *Elphidium margaritaceum* Cushman occurs as a rare form in samples 2, 7 and 13.

Geographical distribution: This species was recorded from Atlantic Ocean (Cushman, 1930), the Caribbean region (Culver and Buzas, 1982), the gulf of Naples (Italy) (Sgarrella and Moncharmont Zei, 1993), the Gulf of Kalloni, Greece (Debenay et al., 2005), Central east coast of India (Rana, 2009) and the western Mediterranean (Milker, 2009).

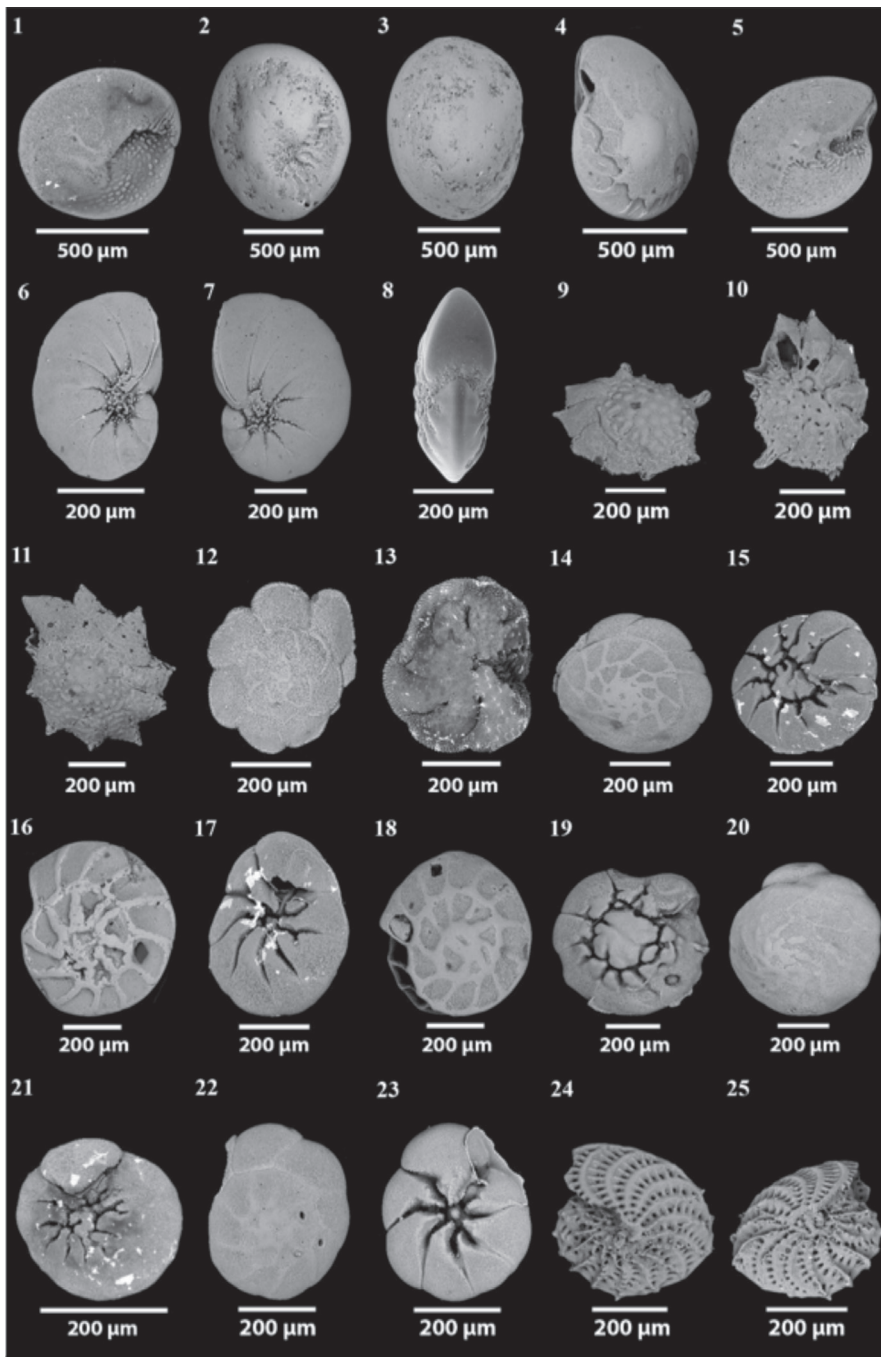
## CONCLUSION

Twenty beach sand samples have been collected from the Bir Ali Beach, Yemeni Arabian Sea coastline to identify the benthic foraminiferal species in this area. The systematic position of recorded foraminiferal species is applied to identify one hundred and eleven benthic foraminiferal species.

The recorded species are distributed with different percentages on the foraminifera suborders with a noticeable ratio of Miliolina suborder in particular the genus *Quinqueloculina*. The foraminiferal assemblage of the study area reflected a remarkable similarity with the species identified in previous studies from the Arabian Sea, the Indian Ocean, the Red Sea and the Mediterranean Sea.

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**Figure 11.** 1- *Amphistegina lessonii* d'Orbigny, umbilical side; 2-3. *Amphistegina lobifera* Larsen, 2. Spiral side, 3. Umbilical view; 4-5. *Amphistegina radiata* Fichtel and Moll, 4. Spiral view, 5. Umbilical view; 6-8. *Nonion fabum* Fichtel and Moll, 6. Spiral view, 7. Umbilical view, 8. Apertural view; 9-11. *Neorotalia calcar* d'Orbigny, 9, 11. Spiral view, 10. Umbilical view; 12-13. *Pararotalia* cf. *P. ozawai* Asano, 12. Spiral view, 13. Umbilical view; 14-15. *Ammonia aoteana* Finlay, 14. Spiral view, 15. Umbilical view; 16-19. *Ammonia beccarii* Linné, 16-18. Spiral views; 19. Umbilical views; 20-21. *Ammonia convexa* Collins, 20. Spiral side, 21. Umbilical view; 22-23. *Ammonia parkinsoniana* d'Orbigny, 22. Spiral view, 23. Umbilical view; 24-25. *Elphidium aculeatum* d'Orbigny, side views.



## REFERENCES

- Abu-Zied, R.H., Rohling, E.J., Jorissen, F.J., Fontanier, C., Casford, J.S.L. and Cooke, S., 2008. Benthic foraminiferal response to changes in bottom-water oxygenation and organic carbon flux in the eastern Mediterranean during LGM to Recent times. *Journal of Marine Micropaleontology*, 67, 46-68.
- Al-Ali, R. A., Al- Shaikhly, S. S., and Al- Marsoumi, A. M. H., 2010. Study of foraminiferal species in recent sediments in Shatt Al- Arab banks, the coast Khor Abdullah and Khor Al-Zubair, Southern - Iraqi Journal Basrah Research, 36 (4).
- Al-Hitmi, H. H., 2000. Recent benthic foraminifera from the local water of Qatar, Arabian Gulf. *Qatar University, Science Journal*, 20, 167- 179.
- Al-Wosabi, M. A., Mohammed, M. A. and Al-Kadasi, W. M., 2011. Recent Foraminifera from Socotra Island, Indian Ocean, Yemen. *Journal of Natural and Applied Sciences*, Tamar University, Yemen, 4, 01-32.
- Ariza, M. S., 1988. Study of agglutinated foraminifera from the motril-nerja littoral region, Spain. *Abh. Geol*, 41, 301-305.
- Asano, K., 1951. Illustrated catalogue of Japanese Tertiary smaller foraminifera. Petroleum Branch, Natural Resources Section, Supreme Commander for the Allied Powers, Tokyo, 183.
- Avsar, N., Aksu, A. and Dincer, F., 2006. Benthic foraminiferal assemblage of Erdek Bay (SW Marmara Sea). *Yerbilimleri* 27 (3), 125-141.
- Avsar, N., Meric, E., Cevik, M.G. and Dincer, F., 2009. Recent benthic foraminiferal assemblages on the continental shelf off the Büyük Menderes river delta (W Turkey). *Yerbilimleri*, 30, 127-144.
- Baccaert, J., 1987. Distribution patterns and taxonomy of benthic foraminifera in the Lizard Island Reef Complex, northern Great Barrier Reef, Australia. Unpublished PhD Thesis, University of Liège, 3 vols, 109pls.
- Bahafzallah, A. A. K., 1979. Distribution, Ecology and systematics of recent benthic foraminifera from Jeddah Bay, Red Sea. PhD Thesis, University of Bristol.
- Bandy, O. L., 1953. Ecology and paleoecology of some California Foraminifera. Part I. The frequency distribution of recent Foraminifera of California. *Journal of Paleontology*, 27 (2), 161-182.
- Bandy, O. L., 1961. Distribution of Foraminifera, Radiolaria and diatoms in sediments of the Gulf of California. *Journal of Micropaleontology*, 7, 1-26.
- Batsch, A.I.G.C., 1791. Sechs Kupfertafeln mit Conchylien des Seesandes. Gezeichnet und gestochen von A. J. G. K. Batsch, Jena, 6pls, 3, 5.
- Bermudez, P. J., 1952. Estudio sistematico de los foraminiferos rptaliformes. *Bulletin de Geologia Venezuela*, 2(4), 1-230.
- Beydoun, Z, R., 1966. Eastern Aden Protectorate and part of Dhufar In: *Geology of the Arabian Peninsula*. United State Geological Survey Professional Paper 560-H, Washington, 1-49.
- Bhalla, S.N. and Nigam, R., 1979. A note on recent foraminifera from Calongute beach sands. Goa. *Bulletin Indian Geologists Association*, 12 (2): 239- 240.
- Bhatia, S.B., 1956. Recent foraminifera from shore sands of western India. *Contribution from the Cushman Laboratory for Foraminiferal Research*, 7, 15-24.
- Bock, W.D., 1971. A handbook of the benthonic foraminifera of Florida Bay and adjacent waters. *Miami Geological Society, Memoir* 1, 1-92.
- Brady, H.B., 1879. Notes on some Retieularian Rhizopoda of the «Challenger» expedition. Part II. Additions to the knowledge of porcellanous and hyaline types. *Quaternary Journal of the Microscopical Science*, 19 (new Series), 261-299.
- Brady, H. B., 1881. Notes on some reticularian Rhizopoda of the «Challenger» expedition, Part 3. *Quaternary Journal of the Microscopical Science*, 21 (new series), 31-71.
- Brady, H. B., 1884. Report on the foraminifera dredged by H. M. S. Challenger, during the years 1873-1876, in Report on the Scientific Results of the Voyage of the H. M. S. Challenger during the years 1873-1876. *Zoology*, 9.
- Brooks, W., 1973. Distribution of Recent foraminifera from the southern coast of Puerto Rico. *Micropaleontology*, 20, 236-244.
- Bruennich, M. T., 1771. *M. T. Brunnich zoologiae fundamenta*. Hafninae et Lipsiae: Grunde I dyeloeren.



- Brummer, G. J. A. and Kroon, D., 1988. Planktonic foraminifera as tracers of ocean climate history. Free University Press, Amsterdam, 6-346.
- Buzas, M. A. and Severin, K. P., 1982. Distribution and Systematics of foraminifera in the Indian River, Florida. Smithsonian contributions to the marine sciences, 16(i-iii), 1-73.
- Cameron, A. A., 1995. Recent foraminifera from the continental shelf and slope off kaikoura, New Zealand. New Zealand Natural Sciences, 22, 27-42.
- Caton-Thompson, G. and Gardner, E. W., 1939. Climate, irrigation, and early man in Hadhramaut. Geographical Journal, 93, 18-35.
- Chapman, F., 1895. On some foraminifera obtained by the Royal Indian Marine Surveys (Investigator) from the Arabian Sea, near Laccadive Islands. Proceeding of Zoological Society, London, 1, 1-55.
- Cherif, O. H., AL-Ghadban, A. and Al-Rifaiy, I. A., 1997. Distribution of foraminifera in the Arabian Gulf. Micropaleontology, 43(3), 253-280.
- Cimernan, F. and Langer, M. R., 1991. Mediterranean foraminifera. Ljubljana, Slovenska Akademija Znanosti in Umetnosti, 118pp.
- Clemens, S., Prell, W. D., Murray, D., Shimmiel, G. and Weedon, G., 1991. Forcing mechanisms of the Indian Ocean monsoon. Nature, 353, 720-725.
- Collins, A. C., 1958. Foraminifera, Great Barrier Reef Expedition (1928- 29). Scientific Report, 6, 335-437.
- Costa, O.G., 1856. Paleontologia del regno di Napoli, Parte II. Atti dell Accademia Pontaniana Napoli, 7(2), 113-378.
- Culver, S. J. and Buzas, M. A., 1980. Distribution of Recent Benthic Foraminifera off the North American Atlantic Coast. Smithsonian Contributions to the Marine Sciences, 6, 512.
- Culver, S. J. and Buzas, M. A., 1982. Distribution of Recent Benthic Foraminifera in the Caribbean Region. Smithsonian institution press, Washington, 382.
- Culver, S. J. and Buzas, M. A., 1986. Distribution of Recent Benthic Foraminifera off the North American Pacific Coast from California to Baja. Smithsonian contributions to the marine sciences 26, 234.
- Cushman, J. A., 1910. A monograph of the foraminifera of the North Pacific Ocean, Part 1: Astrorhizidae and Lituolidae. Bulletin of the United States National Museum, 71 (1), 1-134.
- Cushman, J. A., 1911. A monograph of the foraminifera of the North Pacific Ocean. Pt. 2. Textulariidae. Bulletin of the United States National Museum, 71 (2), 1-108.
- Cushman, J. A., 1915. A monograph of the foraminifera of the North Pacific Ocean. Part 5, Rotaliidae. Bulletin of the United States National Museum, 71 (5), 1-87.
- Cushman, J. A., 1917. A monograph of the foraminifera of the North Pacific Ocean, Part 6, Miliolidae. Bulletin of the United States National Museum, 71 (6), 1-108.
- Cushman, J. A., 1922. Shallow-water foraminifera of the Tortugas Region. Publications of the Carnegie Institution Washington, 311, Department of Marine Biology, 17, 1-85.
- Cushman, J. A., 1924. Samoan Foraminifera. Carnegie Institution of Washington, No. 342, Department of Marine Biology, 21, 1-75.
- Cushman, J. A., 1927. An outline of a re-classification of the foraminifera. Contribution from the Cushman Laboratory for Foraminiferal Research, 3, 1-105.
- Cushman, J. A., 1929. The foraminifera of the Atlantic Ocean, Part 6: Miliolidae, Ophthalmitidae, Fischerinidae. Bulletin of the United States National Museum, 104 (6), 1-129.
- Cushman, J.A., 1930. The foraminifera of the Atlantic Ocean. Bulletin of the United States National Museum, 104 (7), 1-79.
- Cushman, J. A., 1931. The foraminifera of the Atlantic Ocean, Part 8: Rotaliidae, Amphisteginidae, Calcarinidae, Cymbaloporettidae, Globorotallidae, Anomaliniidae, Planorbulinidae, Pupertiidae and Homotremidae. Bulletin of the United States National Museum, 104 (8), 1-179.
- Cushman, J. A., 1932. The foraminifera of the tropical Pacific collections of the "Albatross" 1899-1900, Part 1: Astrorhizidae to Trochamminidae. Bulletin of the United States National Museum, 161, 1-88.

- Cushman, J. A., 1933. The foraminifera of the tropical Pacific collections of the «Albatross» 1899-1900, Part 2: Lagenida to Alveolinellidae. Bulletin of the United States National Museum, 161, 1-79.
- Cushman, J. A., 1944. Foraminifera from the shaloo water of the New England coast. Special Publications Cushman Laboratory for Foraminiferal Research, 12, 1-37.
- Cushman, J. A., 1946. The Genus *Hauerina* and its species. Contributions from the Cushman Laboratory for Foraminiferal Research, 22, 2-15.
- Cushman, J. A., 1947. New species and varieties of foraminifera from off the southeastern coast of the United States. Contributions from the Cushman Laboratory for Foraminiferal Research, 23, 86-92.
- Cushman, J. A., and LeRoy, L. W., 1939. *Cribrolinoides*, a new genus of the foraminifera, its development and relationships. Contributions from the Cushman Laboratory for Foraminiferal Research, 15, 15-19.
- Cushman, J. A. and Todd, R., 1944. The genus *Spiroloculina* and its species. Cushman Laboratory for Foraminiferal Research, Special Publication 1, 1-82.
- Debenay, J. P., 2012. A guide to 1,000 Foraminifera from Southwestern Pacific: New Caledonia. Publications Scientifiques du Muséum, Paris, 378.
- Debenay, J. P., 2013. A guide to 1,000 Foraminifera from the Southwestern Pacific New Caledonia. IRD Editions. Publication Scientifique du Muséum, CP41, 383.
- Debenay, J. P., Millet, B. and Angelidis, M. O. 2005. Relationships between foraminiferal assemblages and hydrodynamics in the Gulf of Kalloni, Greece. Journal of Foraminiferal Research, 35, 327-343.
- Debenay J. P., Tsakiridis E., Soulard r. and GrosseL H., 2001. Factors determining the distribution of foraminiferal assemblages in Port Joinville Harbor (île d'Yeu, France): the influence of pollution. Marine Micropaleontology, 43, 75-118.
- Defrance, J. L. M., 1824. Dictionnaire des Sciences Naturelles, Vol. 32, moll-morf. Strasbourg: F. G. Levrault 567pp.
- Delage, Y. and Herouard, E., 1896. Tarite de Zoologie Concrete, Vol. 1, La Cellule et les Protozoaires, Paris: Schlecher Freres.
- Devi, G. S. and Rajashekhar, K. P., 2009. Intertidal foraminifera of Indian coast. A scanning electron photomicrograph illustrated catalogue, Journal of Threatened Taxa, 1(1), 17-36.
- Dias, B. B., Hart, M. B., Smart, C.W. and Hall-Spencer, J. M., 2010. Modern seawater acidification: the response of foraminifera to high-CO<sub>2</sub> conditions in the Mediterranean Sea. Journal of the Geological Society, London, 167, 843-846.
- Eagle, M. K., Hayward, B. W., Grant-Mackie, J. A. and Gregory, M. R., 1999. Fossil communities in an early Miocene transgressive sequence, Mathesons Bay, Leigh, Auckland. Tane, 37, 43-68.
- Ehrenberg, C. G., 1838. Über dem blossen Auge unsichtbare kalkthierchen und Kieselhierchen als Hauptbestandtheile der Kreidegebirge, Bericht über die zu Bekanntmachung geeigneten Verhandlungen der Königlichen Preussischen Akademie der Wissenschaften zu Berlin, 1838, 192-200.
- Ehrenberg, C. G., 1839. Über die Bildung der Kreidefelsen und des Kreidemergels durch unsichtbare Organismen. Physikalische Abhandlungen der Koniglichen Akademie der Wissenschaften zu Berlin, 59-147.
- Eichwald, C.E. von, 1830. Zoologia specialis. Vol. 2. Vilnae: D. E. Eichwaldus, 1-323.
- Ellis, B. F. and Messina, A. R., 1940. Catalogue of foraminifera. American Museum of National History. Special Publication (New York), with supplements.
- El-Nakhal, H. A., 1980. Recent foraminifera from the seashores of Yemen Arab Republic, part 2, the genus *Quinqueloculina*. Journal of College of Science, Riyadh University, 2. 147-170.
- El-Nakhal, H. A., 1984. Recent foraminiferida from the sea shores of Yemen Arab Republic Part 1, the genus *Quinqueloculina*. Journal of College of Science, Riyadh University, 25 (1/2), 45-58.
- El-Nakhal, H. A., 1993. Recent foraminiferida from the sea shores of Yemen Arab Republic Part 3, the remaining genera. Dirasat Yamanyyah, 49, 302-368.
- Erbacher, J. and Nelskamp, S., 2006. Comparison of benthic foraminifera inside and outside a sulphur-oxidizing bacterial mat from the present

- oxygen-minimum zone off Pakistan (NE Arabian Sea): Deep Sea Research, Part I: Oceanographic Research Papers, 53, 751-775.
- Fantozzi, P. L. and Sgavetti, M., 1998. Tectonic and sedimentary evolution of the eastern Gulf of Aden margins: new structural and stratigraphic data from Somalia and Yemen. In: Purser, B. H., and Bosence, D. W. J. (ed.) Sedimentation and tectonics in rift basins, Red Sea–Gulf of Aden. London, Chapman and Hall, 56–76.
- Fichtel, L. and Moll, J. P., 1798. Testacea microscopica aliaqueminuta generibus Argonauta et Nautilus, Wien, Osterreich, Camesina (Reprinted, 1803).
- Finlay, H. J., 1940. New Zealand foraminifera; Key species in stratigraphy-No 4. Transactions and Proceedings of the Royal Society of New Zealand, 69, 448-472.
- Fiorini, F., 2004. Benthic foraminiferal associations from upper Quaternary deposits of southeastern plain, Italy. Micropaleontology, 50, 45-58.
- Forskal, P., 1775. Descriptiones animalium. *Hauniae*. Carsten Niebuhr, Copenhagen.
- Frezza, V. and Carboni, M. G., 2009. Distribution of recent foraminiferal assemblages near the Ombrone River mouth (Northern Tyrrhenian Sea, Italy). Revue de micropaleontology, 52, 43-66.
- Galloway, J. J., 1933. A Manual of Foraminifera, Bloomington: Principal Press. (In Loeblich and Tappan, 1988).
- Gandhi, S., Rajamanickam, G. V. M. and Nigam, R., 2002. Taxonomy and distribution of benthic foraminifera from the sediments off Palk Strait, Tamil Nadu, East Coast of India. Journal of the paleontological Society of India, 47, 47-64.
- Germeraad, J. H., 1946. Geology of central Seran, in L. Rutten, and W. Hotz. Geological, Petrographical and Paleontological Results of Explorations Carried Out from September 1917 till 1919 in the Island of Cerma, ser. 3 (Geology), no. 2. Amsterdam: J. H. de Bussy, 7-135.
- Glaessner, M. F., 1937. Die Entfaltung der Foraminiferenfamilie Buliminidae, Problemy Paleontologii. Paleontologicheskaya Laboratoriya Moskovskogo Gosudarstvennogo Universiteta, 2-3, 411-422.
- Graham, J. and Militante, P., 1959. Recent foraminifera from the Puerto Galera area, northern Mindoro, Philippines. Stanford University Publications, (Geological), 6 (2), 1-170.
- Gudmundsson, G., 1994. Phylogeny, ontogeny and systematics of recent Soritacea Ehrenberg 1839 (Foraminiferida). Micropaleontology, 40 (2), 101-155.
- Haig, D. W., 1988. Miliolid foraminifera from inner neritic and mud facies of the Papuan Lagoon. Journal of Foraminiferal Research, 18, 203-236.
- Haig, D. W., 1997. Foraminifera from Exmouth Gulf, Western Australia. Journal of the Royal Society of Western Australia, 80, 263-280.
- Haman, D., 1966. On some recent foraminifera from the Faeroe Island. Denmark. Contribution from the Cushman Laboratory for Foraminiferal Research, 17(2), 67 - 70.
- Hatta, A. and Ujiie, H., 1992. Benthic foraminifera from Coral Seas between Ishigaki and Iriomote Islands. Southern Ryukyu Island Arc, Northwestern Pacific. Bulletin of the College of Science, University of Ryukyus, 53, 49-119.
- Haynes, J. R., 1973. Cardigan Bay recent foraminifera. Bulletin of the British Museum Natural History (Zoology), Supplement 4, 1-245.
- Hayward, B. W., Grenfell, H. R., Ried, C. M. and Hayward, A. 1999. Recent New Zealand shallow-water benthic foraminifera: taxonomy, ecologic distribution, biogeography, and use in paleoenvironmental assessment. Institute of Geological and Nuclear Sciences monographs, 21, 1-264.
- Hayward, B. W., Holzmann, M., Grenfell, H. R., Pawlowski J. and Triggs, C. M. 2004. Morphological distinction of molecular types in *Ammonia* - towards a taxonomic revision of the world's most commonly misidentified foraminifera. Marine Micropaleontology, 50, 237-271.
- Heron-Allen, E. and Earland, A., 1930. The foraminifera of the Plymouth District. Journal of the Royal Microscopical Society, 50 (3), 46-84.
- Hofker, J., 1927. Foraminifera of the Siboga Expedition. Part 1, Siboga Exped. Monogr. 4, 1-78.

- Hofker, J., 1951. The Foraminifera of the Siboga expedition. Part III. Siboga-Expeditie. Monographie Va. Leiden: E. J. Brill. 1-513.
- Höglund, H., 1947. Foraminifera in the Gullmar Fjord and the Skagerak. Zoologiska Bidrag från Uppsala, 2: 1-328.
- Horton, B.P., Culver, S.J., Hardbattle, M.I.J., Larcombe, P., Milne, G.A., Morigi, C., Whittaker, J.E. and Woodroffe, S. A., 2007. Reconstructing Holocene sea-level change for the central Great Barrier Reef (Australia) using subtidal foraminifera. Journal of Foraminiferal Research, 37, 327-343.
- Hottinger, L., Halicz, E. and Reiss, Z., 1993. Recent foraminifera from the Gulf of Aqaba, Red Sea. Slovenska Akademija Znanosti in Umetnosti, Ljubljana, 33.
- Hughes, G. W., 1977. Recent Foraminifera from the Honiara Bay area, Salomon Islands. Journal of Foraminiferal Research, 7, 45-57.
- Hussain, S.M., Krishnamurthy, R. Gandhi, M. S., Ilayaraja, K. Ganesan, P. and Mohan, S. P., 2006. Micropaleontological investigations of tsunami sediments of Tamilnadu and Andaman Islands. Current Science. 91 (12), 1655- 1667.
- Hyams, O., Almogi-Labin, A. and Benjamini, C., 2002. Larger foraminifera of the southeastern Mediterranean shallow continental shelf off Israel. Israel Journal of Earth Science, 51, 169-179.
- Ishman, S. E., Graham, L. and D'Ambrosio, J., 1997. Modern Benthic Foraminifer Distributions in Biscayne Bay: Analogs for Historical Reconstructions. United State Geological Survey, Reston, File Report, 97-34.
- Issa, B. M., 2010. Depositional environments and Biofacies of Selected Sediments, North Basrah. Jour. Basrah Research, Science, 36 (5), 1-14.
- Javaux, E. J. and Scott, D. B., 2003. Illustration of modern benthic foraminifer from Bermuda and remarks on distribution in other subtropical/tropical areas. Palaeontologia Electronica, 6(1), 1-29.
- Jones, R.W., 1994. The Challenger Foraminifera. Journal of Evolutionary Biology, 9(1), 124-124
- Jorissen, F.J., 1987. The distribution of benthic foraminifera in the Adriatic Sea. Marine Micropaleontology. 12, 21-48.
- Jumnongthai, J., 1980. Recent foraminifera from southern Thailand. Geology Survey Paper, 1. 1- 21.
- Kaladhar, R., Kamalakaran, S, Varma, K.U. and Bhaskara Rao, V. 1990. Recent foraminifera from nearshore shelf, south of Visakhapatnam, east coast of India. Indian Journal of Marine Science, 19, 71- 73.
- Kaminski, M.A., 2004. The Year 2000 Classification of the Agglutinated Foraminifera. In: Bubik, M., Kaminski, M.A., (ed.) Proceedings of the sixth International Workshop on Agglutinated Foraminifera, Grzybowski Foundation Special Publication, 8, 237-255.
- Kaminski, M.A., Aksu, A., Box, M., Hiscott, R.N., Filipescu, S. and Al-Salameen, M., 2002. Late Glacial to Holocene benthic foraminifera in the Marmara Sea: implications for Black Sea - Mediterranean Sea connections following the last deglaciation. Marine Geology, 190, 162-202.
- Keyzer, F. G., 1953. Reconsideration of the so-called Oligocene fauna in the asphaltic deposit of Buton (Malaya Archipelago), 2. Young Neogene foraminifera and calcareous algae. Leidsche Geologische Meded-Lingen, 17, 259-293.
- Khare, N., 1992. A study of foraminifera in surface and subsurface sediments from the shelf region off Karwar and their paleoclimatic significance. Unpublished PhD Thesis, Goa University, India.
- Kisel'man, E. N., 1972. Verkhnemelovy I Paleosenovye foraminifery novogo roda Spiroplectinella (Upper Cretaceous and Paleocene new foraminiferal genus *Spiroplectinella*). Trudy Saibirskogo Nauchno-Issledovatel'skogo Instituta Geologii Geofiziki I Mineral'nogo Syrya (SNIIGGIMS) Ministerstva Geologii Okhrany Nedr SSSR. Novosibirsk, 146: 134-140.
- Koukousioura, O., Triantaphyllou, M. V., Dimiza, M. D., Pavlopoulos, K., Syrides, G. and Vouvalidis, K., 2012. Benthic foraminiferal evidence and paleoenvironmental evolution of Holocene coastal plains in the Aegean Sea (Greece). Journal Quaternary International, 261, 105-117.
- Kumar, V., Manivannan, V. and Ragothaman, V., 1990. Distribution and species diversity of recent foraminifera from the Thamirabarani River estuary, Punnaikkayal, Tamil Nadu. Journal of Paleontological Society of India, 35, 53- 60.



- Kurbjeweit, F., Hemleben, Ch., Schmiedl, G., Schiebel, R., Pfannkuche, O., Wallmann, K. and Schafer, P., 2000. Distribution, biomass and diversity of benthic foraminifera in relation to sediment geochemistry in the Arabian Sea. *Deep-Sea Research*, II, 47(14), 2913–2955.
- Lacroix, E., 1938. Revision du genre *Massilina*. *Bulletin de l'institut Océanographique Monaco*, 754, 1-11.
- Lacuna M. L. D. G., Masangcay S. I. G., Orbita M. L. S. and Torres M. A. J., 2013. Foraminiferal assemblage in Southeast coast of Iligan Bay, Mindanao, Philippines. *Aquaculture, Aquarium, Conservation and Legislation International Journal of the Bioflux Society*, 6 (4), 303-319.
- Lagoe, M. B., 1977. Recent benthonic foraminifera from the Central Arctic Ocean. *Journal of Foraminiferal Research*, 7, 106-129.
- Lamarck, J.B., 1804. Suite des mémoires sur les fossils des environs de Paris. *Annales Muséum National d'Histoire Naturelle*. 1, 475-475.
- Lamarck, J.B., 1816. *Histoire naturelle des animaux sans vertèbres*. Verdière, Paris, tome 2, 1-568.
- Langer, M. R., 1992. New recent foraminiferal genera and species from the lagoon at Madang, Papua New Guinea. *Journal of Micropalaeontology*, 11, 85-93.
- Lankford, R. R. and Phleger, F. B., 1973. Foraminifera from the nearshore turbulent zone, western North America. *Journal of Foraminiferal Research*, 3, 101-132.
- Larsen, A. R., 1976. Studies of recent *Amphistegina*, taxonomy and some ecological aspects. *Israel Journal of Earth Sciences*, 25, 1-26.
- Le Calvez, Y., 1949. Revision des foraminifères Lutetiens du Bassin de Paris. II *Rotaliidae* et familles affines. *Memoires du Service de la Carte Géologique détaillée de la France*, 1-54.
- Le Calvez, Y. and Le Calvez, J., 1958. Répartition des foraminifères dans la Baie de Villefrance, I. *Miliolidae*. *Annales de l'Institut Océanographique*, 35, 159- 234.
- Leiter, C., 2008. *Benthos-Foraminiferen in Extremhabitaten: Auswertung von METEOR-Expeditionen vor Namibia*. PhD Thesis, Ludwig-Maximilians-Universität, Munich, Germany, 103pp.
- Leroy, D. and Levinson, S.A., 1974. A deep-water Pleistocene microfossil assemblage from a well in the northern Gulf of Mexico. *Micropaleontology*, 20, 1-37.
- Levy, A., Poignant, A., Rosset-Moulinier, M. and Rouvillois, A., 1975. Sur quelques foraminifères actuels des plages de Dunkerque et des environs: néotypes et espèces nouvelles. *Revue de Micropaléontologie*, 17, 171-181.
- Linné, C., 1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. G. Engelmann (Lipsiae). 10, 1-824.
- Lloyd, J. M., 2006. Modern distribution of benthic foraminifera from Disko Bugt, West Greenland. *Journal of foraminiferal Research*, 36(4), 315-331.
- Loeblich A. R. and Tappan, H., 1953. Studies of Arctic foraminifera. *Smithsonian Miscellaneous Collections*, 121, 1-150.
- Loeblich, A.R. and Tappan, H., 1964. *Sarcodina, chiefly "Thecamoebians" and foraminifera* (2 vols.). in: Moore, R. C. (eds.), *Treatise on Invertebrate Paleontology, Protista 2, part C*, Geological Society of America and Kansas University Press, 900pp.
- Loeblich, A.R. and Tappan, H., 1964. *Rupertlanella*, new name of *Pseudotriloculina* Rasheed, 1971, non *cherif*, 1970 (Miliolacea). *Journal of Foraminiferal Research*, 15, 52.
- Loeblich, A. R. and Tappan, H., 1988. *Foraminiferal genera and their classification*. Van Nostrand Reinhold, New York, 970pp.
- Luczowska, E., 1974. *Miliolidae* (Foraminiferid) from the Miocene of Poland, Part II. *Biostratigraphy, paleoecology and systematic*. *Acta Palaeontologica Polonica* 19:3-176.
- Madkour, H. A., 2013. Recent benthic foraminifera of shallow marine environment from the Egyptian Red Sea coast. *Global Advanced Research Journal of Geology and Mining Research*, 2(1), 5-14.
- Majewski, W., Lecroq, B., Sinniger, F. and Pawlowski, J., 2007. Monothalamous foraminifera from Admiralty Bay, King George Island, West Antarctica. *Polish Polar Research*. 28, 187-210.
- Maliker, Y., 2010. Western Mediterranean shelf foraminifera: Recent distribution, Holocene sea-



- level reconstructions, and paleoceanographic implications. PhD dissertation, Hamburg University, 169pp.
- McCloskey, B., 2009. Foraminiferal responses to arsenic in a shallowwater hydrothermal system in Papua New Guinea and in the laboratory. PhD Dissertations, University of South Florida, 425pp.
- Melis, R. and Violanti, D., 2006. Foraminiferal biodiversity and Holocene evolution of the Phetchaburi Coastal area (Thailand Gulf). *Marine Micropaleontology*, 61, 94-115.
- Mendes, I., Gonzalez, R., Dias, J. M. A., Lobo, F. Martins V., 2004. Factors influencing recent benthic foraminifera distribution on the Guadiana shelf (Southwestern Iberia). *Marine Micropaleontology*, 51(1-2), 171-192.
- Mercau, J. R., Laprida, C., Chandler, D. D. E., Lopez, R. A. and Marcomini, Y. S., 2011. Modern foraminifera from coastal settings in northern Argentina: implications for the paleoenvironmental interpretation of mid Holocene littoral deposits. *Modern foraminifera from coastal settings, northern Revista Mexicana de Ciencias Geologicas*, 28, 45-64.
- Meriç, E., Avşar, N. and Bergin, F., 2004. Benthic foraminifera of Eastern Aegean Sea (Turkey) systematics and autoecology. Turkish Marine Research Foundation and Chamber of Geological Engineers of Turkey, Publication No. 18, 306pp.
- Meriç, E., Avşar, N., Nazik, A., Yokeş, B., Ergin, M., Eryılmaz, M., YücesoyEryılmaz, F., Gökaşan, E., Suner, F., Tur, H., Aydın, Ş. and Dinçer, F., 2009. Factors controlling formation of benthic foraminifera, ostracod, mollusc assemblages and sediment distribution of the geochemistry in the Dardanelles Strait. *Geology Bulletin of Turkey*, 52 (2), 155-216.
- Milker, Y. and Schmiedl, G., 2012. A taxonomic guide to modern benthic shelf foraminifera of the western Mediterranean Sea. *Palaeontologia Electronica*, 15 (2), 16A, 134p.
- Milker, Y., Schmiedl, G., Betzler, C., Römer, M., Jaramillo-Vogel, D. and Siccha, M., 2009. Distribution of recent benthic foraminifera in neritic carbonate environments of the Western Mediterranean Sea. *Marine Micropaleontology*, 70, 207-225.
- Miller, D. N., 1953. Ecological study of the Foraminifera of Mason Inlet, North Carolina. – Contribution from the Cushman Laboratory for Foraminiferal Research, 4 (2), 41-63.
- Millett, F. W., 1898. Report on the Recent Foraminifera of the Malaya Archipelago collected by Mr. a. Durrand, F. R. M. S., *Journal of Royal Microscopical Society*, 1898:258-269.
- Montagu, G., 1803. *Testacea Brittanica or Natural History of British Shells Marine, Land and Fresh Water, Including the Most Minute*. J.S. Hollis, Romsey.
- Montfort, P. denys de., 1808. *Conchyliologie Systematique et Classification Methodique des Coquilles*, Vol. 1. Paris: F. Schoell.
- Morigi, C., Jorissen, F.J., Fraticelli, S., Horton, B.P., Principi, M., Sabbatini, A., Capotondi, L., Curzi, P.V. and Negri, A., 2005. Benthic foraminiferal evidence for the formation of the Holocene mud-belt and bathymetrical evolution in the central Adriatic Sea. *Marine Micropaleontology*, 57, 25-49.
- Murray, J. W., 1969. Recent foraminifera from the Atlantic continental shelf of the United States. *Micropaleontology*, 15, 401-419.
- Murray, J. W. 1970. Foraminifera of the Western Approaches to the English Channel. *Micropaleontology*, 16, 471-85.
- Murray, J. W., 2003. An illustrated guide to the benthic foraminifera of the Hebridean shelf, west of Scotland, with notes on their mode of life. *Palaeontologia Electronica*, 5 (1), 1-31.
- Natsir, S. M. and Muchlisin, Z. A., 2012. Benthic foraminiferal assemblages in Tambelan Archipelago, Indonesia. *Aquarium, Conservation and Legislation International Journal of the Bioflux Society*, 5, 259-264.
- Neugeboren, J. L., 1850. Foraminiferen von Felső-Lapugy: zweiter Artikel. *Verhandlungen und Mittheilungen des Siebenburgischer Verein für Naturwissenschaften zu Hremannstadt*, 1, 118-127.
- Nigam, R., Setty, M.G.A.P. and Ambre, N.V., 1979. A checklist of benthic foraminifera from the inner shelf of Dabhol-Vengurla region, Arabian Sea. *Journal of Geological Society of India*, 20, 244-247.

- Nobes, K. and Uthicke, S., 2008. Benthic foraminifera of the Great Barrier Reef, A guide to species potentially useful as water quality indicators. Australian Inst. of Marine Sci., Townsville, 38pp.
- Nuglisch, K., 1985. Foraminiferen - marine Mikroorganismen. Die neue Brehm-Bücherei, Wittenberg. 176pp.
- Oflaz, S. A., 2006. Taxonomy and Distribution of the Benthic Foraminifera in the Gulf of Iskenderun, Eastern Mediterranean. Unpublished M.Sc. Thesis, Middle East Technical University, Ankara, 306 p.
- Orbigny, A. d', 1826. Tableau methodique de la classe des Cephalopodes Annal. Sci. Natur. 7, 245-314.
- Orbigny, A. d', 1839. Foraminiferes, in Ramon de la Sagra, Histoire physique, politique et naturelle de file de Cuba. Paris, Arthus Bertrand.
- Orbigny, A. d', 1846. Foraminiferes Fossiles Du Bassin Tertiaire De Vienne (Autriche). Gide et Comp, Libraires- Editeurs, Paris, Gide et Comp.
- Parker, F. L., 1958. Eastern Mediterranean foraminifera. Reports of the Swedish Deep-Sea Expedition, Sediment Cores from the Mediterranean Sea and the Red Sea, 8, 217-285.
- Parker J. H., 2009. Taxonomy of foraminifera from Ningaloo Reef, Western Australia. Memoirs of the Association of Australasian Palaeontologists, 36, 1-810.
- Parr, W. J., 1941. A new genus, *Planulinoides*, and some species of foraminifera from South Australia. Mining and Geological Journal, 2, 177.
- Parr, W. J., 1945. Recent foraminifera from Barwon Heads, Victoria. Proceedings of the Royal Society of Victoria, 56, 189-227.
- Perconig, E., 1954. Note paleontologiche Sulla zona costiera di Agrigento (Sicilia). Contributi di Scienze Geologiche con particolare riguardo all'Italia central, 3, 91-98.
- Phleger, F. B., 1965. Living benthic foraminifera from coastal marsh, southwestern Florida. Bol. Soc. Geol. Mexicana, 28(1), 45-60.
- Phleger, F. B. and Parker, F. L., 1951. Ecology of foraminifera, northwest Gulf of Mexico, Part II, Foraminifera species. Geological Society of America Memoir, 46, 1-59.
- Ragothaman, V. and Kumar, V., 1985. Recent foraminifera off the coast of Rameshwaram, Palk Bay, Tamil Nadu. Bulletin of the Geological, Mining and Metallurgical Society of India, 97-121.
- Rana, S. S., 2009. Study of foraminiferal distribution in surface and subsurface sediments off central east coast of India and their paleoecological significance. Published PhD Thesis, Department of Marine Science Goa University, Goa, India.
- Rao, K. K., 1970. Foraminifera of the Gulf of Cambay. Journal of Bombay Natural History, 66: 584-596.
- Rao, K. K., Sivadas, P., Narayanan, B. Jayalakshmi, K.V. and Krishnan Kutty, M. 1987. Distribution of foraminifera in the lagoons of certain islands of the Lakshadweep Archipelago. Arabian Sea. Indian Journal of Marine Science, 16, 161-178.
- Rao. T.V. and Rao, M. S., 1974. Recent foraminifera of Suddagadda estuary, east coast of India. Micropaleontology, 20, 398-419.
- Rasmussen, T. L., 2005. Systematic paleontology and ecology of benthic foraminifera from the Plio- Pleistocene Kallithea Bay section, Rhodes, Greece. Cushman Foundation for Foraminiferal Research Special Publication, Y13, 39, 53-157.*
- Reichel, M., 1937. Etude sur les Alvéolines, II. Schweizerische Paläontologische Abhandlung, 59 (3), 95-147.
- Reiss, Z., 1963. Reclassification of perforate foraminifera. Bulletin of the Geological Survey of Israel, 59, 1-111.
- Renema, W., 2003. Foraminifera on reefs around Bali (Indonesia). Zoologische Verhandelingen. 345, 337-366.
- Reuss, A. E., 1850. Neues Foraminiferen aus den Schichten des osterreichischen Tertiärbeckens. Denkschriften der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe, 1, 365-390.
- Rocha, A. T. and Ubaldo, M. L., 1964. Nota Sobre of foraminifera recents da areias das praias dejampor (Damao) e de Baga Goa. Garcia de orto (lisabo), 12, 645-650.
- Sabbatini, M., Capotondi, L., Curzi, P. V. and Negri, A., 2005. Benthic foraminiferal evidence for the formation of the Holocene mud-belt and bathymetrical evolution in the central Adriatic

- Sea. *Marine Micropaleontology*, 57, 25–49.
- Said, R., 1949. Foraminifera from the northern Red Sea. Special Publication Cushman Laboratory for Foraminiferal Research, 26, 1-44.
- Said, R., 1950. Additional foraminifera from the northern Red Sea. Contribution from the Cushman Laboratory for Foraminiferal Research, 1, 5-9.
- Saidova, Kh. M., 1975. Benthonnye Foraminifery Tikhogo Okeana (Benthonic foraminifera of the Pacific Ocean). 3 vol. Moscow: Institute Okeanologii P. P. Shirshova, Akademiya Nauk SSSR.
- Saidova, Kh. M., 1981. Osovermennom sostoyanii sistemy nadvidykh taksonov Kaynozoyksikh Bentsonkh Foraminifer (On an up-to-date system of supraspecific taxonomy of Cenozoic Benthonic foraminifera) Moscow: Institute Okeanologii P. P. Shirshova, Akademiya Nauk SSSR.
- Samir, A. M., Abdou, H. F., Zazou, S. M. and El-Menhawey, W. H., 2003. Cluster analysis of recent benthic foraminifera from the northwestern Mediterranean coast of Egypt. *Revue de Micropaleontologie*, 46, 111-130.
- Sarkar, S. D. S. and Gupta, A. K., 2009. Late Quaternary benthic foraminifera from Ocean Drilling Program Hole 716A, Maldives Ridge, southeastern Arabian Sea. *Micropaleontology*, 55 (1), 23- 48.
- Sgarrella, F. and Moncharmont Zei, M., 1993. Benthic foraminifera of the Gulf of Naples (Italy): systematics and autoecology. *Bollettino Della Società Paleontologica Italiana*, 32 (2), 145-264.
- Schlumberger, C. 1893. Note sur les genres Trillina et Linderina, *Bulletin de la Societe Geologique de France*, sen. 3 (21), 118-123.
- Schroeter, J.S., 1783. Einleitung in die Conchilienkenntnis nach Linné, Erster Band. Gebauer, J.J, Halle.
- Schultze, M. S., 1854. Über den Organismus der Polythalamina (Foraminiferen) nebst Bemerkungen Über die Rhizopoden im Allgemeinen. Leipzig: Wilhelm Engelmann.
- Schwager, C., 1876. Saggio di una classificazione dei foraminiferi avuto riguardo alle loro famiglie naturali. *Bulletino R. Comitato Geologico d'Italia*, 7:475-485.
- Schwager, C., 1877. Quadro del proposto Sistema di classificazione dei foraminiferi con guscio, *Bulletino R. Comitato Geologico d'Italia*, 8, 18-27.
- Schumacher, S., Jorissen, F. J., Dissard, D., Larkin, K. E. and Gooday, A. J., 2007. Live (Rose Bengal stained) and dead benthic foraminifera from the oxygen minimum zone of the Pakistan continental margin (Arabian Sea). *Marine Micropaleontology*, 62, 45-73.
- Scott, D. B. and Hengstum, P. J. V., 2011. Ecology of foraminifera and habitat variability in an underwater cave: distinguishing anchialine versus submarine cave environments. *Journal of Foraminiferal Research*, 41(3), 201–229.
- Seears, H., 2011. Biogeography and phylogenetics of the planktonic foraminifera. PhD thesis, University of Nottingham, United Kingdom, P. 76 –77.
- Silvestri, A., 1923. Lo stipites Della Elissoforme e sue affinita. *Memorie Della Pontificia Accademia Della Scienze, Nuovi Lincei*, ser. 2: 231-270.
- Sen Gupta, B. K., 1971. The benthonic foraminifera of the Tail of the Grand Banks. *Micropaleontology*, 17(1), 69-98.
- Setty M. G. A. P. and Nigam, R., 1980. Microenvironment and anomalous benthic foraminiferal distribution within the neritic regime of the Dabhol-Vengurla sector (Arabian Sea). *Revista Italianade Paleontologia and Stratigrafia*, 417-428.
- Sgarrella, F. and Moncharmont Zei, M., 1993. Benthic foraminifera in the Gulf of Naples (Italy): systematics and autoecology. *Bollettino Della Società Paleontologica Italiana*, 32 (2), 145-264.
- Shareef, N. A. and Venkatachalapathy, V., 1988. Foraminifera from the shore sands of Bhaktal and Devgad Islands, west coast of India. *Journal of Geological Society of India*, 31, 432-441.
- Steinker, D. C., 1980. Nearshore foraminifera from Bermuda. *The Compass*, 57, 129-148.
- Stubbings, H. G., 1939. Stratification of biological remains of marine deposits of the Arabian Sea. *British Museum, (Nat. Hist.)*, John Murray Expedition, 3(3), 159-192.
- Suhartati, M. and Muchlisin, Z. A., 2012. Benthic foraminiferal assemblages in Tambelan

- Archipelago, Indonesia. *Aquarium, Conservation and Legislation International Journal of the Bioflux Society*, 5(4), 259-264.
- Terquem, O., 1875. Essai sur le classement des animaux qui vivent sur la plage et dans les environs de Dunquerque. *Easc*, 1. Paris, pp. 1–54.
- Terquem, O., 1876. Essai sur le classement des animaux qui vivent sur la plage et dans les environs de Dunquerque. *deuxieme fascicule*, 55-100.
- Terquem, O., 1882. Les foraminifères de l'Éocène environs de Paris. *Memoires de la Societe Geologique de France*, ser.3, 2 (3), 1-193.
- Todd, R., 1965. The foraminifera of the tropical Pacific collections of the «Albatross», 1899-1900, Part 4, Rotaliform families and planktonic families. *United States National Museum Bulletin*, 161, 1-139.
- Todd, R. and Low, D., 1971. Foraminifera from the Bahama Bank west of Andros Island. *United States Geological Survey Professional Paper*, 683-C: 1-22.
- Toefy, R., McMillan, I. K., und Gibbons, M. J., 2005. The foraminifera associated with the alga *Gelidium pristoides*, South Africa. *African Invertebrates*, 46, 1-26.
- Van Voorthuysen, H. J., 1957. Foraminiferen aus dem Eemian (Riss-Würm interglazial) in der Bohrung Amersfoort 1 (*Locus typicus*). *Mededelingen van der Geologische Stichting*, 11, 27-39.
- Vedantam, D. and Rao, M.S. 1970. Recent foraminifera from off Pentakota, east coast of India. *Micropaleontology* 16 (3), 325-344.
- Wiesner, H., 1920. Zur Systematik der Miliolideen. *Zoologischhes Anzeiger* 51, 13-20.
- Wiesner, H., 1923. Die Miliolideen der östlichen Adria. The author, Prag. *Bubanc. Albani*, A. D., 1974. New benthonic foraminifera from Australian waters. *Journal of Foraminiferal Research*, 4, 35-37.
- Wiesner, H., 1931, Die Foraminiferen der deutschen Südpolar-Expedition 1901-1903. In: Drygalski, E. von, (ed.) *Deutsche Südpolar-Expedition 1901-1903*, im Auftrage des Reichsministeriums des Innern: 20 (= *Zoologie*, Band 12), 49-165. Walter DeGruyter and Co. (Berlin and Leipzig).
- Williamson, W. C., 1858. On the recent foraminifera of Great Britain. *The Ray Society*, London, 1-107.
- Wisshak, M. and Rueggeberg, A., 2006. Colonisation and bioerosion of experimental substrates by benthic foraminifera from euphotic to aphotic depths (Kosterfjord, SW Sweden). *Facies*, 52, 1-17.
- Wright, J., 1900. The foraminifera of Dog's Bay, Connemara. *Irish Naturalist*, 9: 50-55.
- Yalcin, H., Meric, E, Avsar, N., Tctiker, S., and Dincer, F., I., 2006. Recent colored benthic foraminifera and their mineralogical and geochemical features in the Aegean and Southwestern Mediterranean Coasts. *Geological Bulletin of Turkey*, 49 (2), 29-51.
- Yanko, V., 1995. Benthic foraminifera as indicators of heavy metal pollution along Israeli Coasts. In: Yanko, V. (ed.) *Avicenna (AVI CT92-0007)*, benthic foraminifera as indicators of heavy metal pollution-a new kind of biological monitoring for the Mediterranean. *Task 5*, 58-152.
- Yanko, V., avsar, N., Sanvoisin, R., Spezzaferri, S, Meric, E. and Basso, D., 1993. Foraminiferal study: Taxonomy, distribution. *Task 9*, 31-33.
- Yassini, I. and Jones B. G., 1995. Recent foraminifera and ostracoda from estuarine and shelf environments on the southeastern coast of Australia. *University of Wollongong Press*, New South Wales, Wollongong, 484pp.
- Zheng, S. Y., 1979. The recent foraminifera of the Xisha Island, Guangdong Province, China, II. *Studia Marina Sinica*, 15, 101-232.