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Recent Foraminiferal genus *Quinqueloculina* from Socotra Island and Hadhramout coastlines, Yemen

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Abstract

For the purpose of etablishing a database on benthic foraminifera in Yemen, two hundred and twelve recent benthic foraminifera species have been recorded from 32 sandy samples collected from different localities in Socotra Island during January 2017 and Hadhramout coastline, Yemen during August 2018 from a depth of 0 - 4 m, to identify benthic foraminiferal taxa to the species level. These samples were processed to extract the foraminiferal tests using a water saline brine based on the difference between the density of the shells and the solution. The extracted benthic foraminifera were separated according to the type of wall into three groups; the Agglutinated, Porcellaneous and hyaline walled foraminifera. Porcellaneous tests represent the largest number in the collected samples of the two study areas. One hundred and four species were identified. These species belonging to twenty-eight genera, four superfamilies and eight families. Twenty-nine species of these belong to the genus *Quinqueloculina* d'Orbigny which are discussed here and illustrated. The systematic classification of the species recorded from these samples was mentioned and compared with the type species. The previous recordings of these species, their geographical distribution regionally and globally, and their abundance in the study samples were tracked. The samples were deposited at the Department of Earth Sciences, Faculty of Petroleum and Natural Resources, Sana'a University.

Article Info

Keywords:
Hadhramout coastline,*Quinqueloculina*, Recent benthic foraminifera, Socotra Island, Yemen.

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1. INTRODUCTION

Socotra Island and Hadhramout coastlines situated at the Arabian Sea and Indian Ocean, which are considered warm-water areas with subtropical condition and open currents. The Arabian Sea is recognized to host a wide range of benthic foraminiferal morphospecies [1]. Some studies were carried out on foraminiferal assemblages in the region. For example, [2] identified a new forminiferal genus from the Lias of Socotra. [3–6] studied the foraminiferal content in the Arabian Sea, coasts of India. [7]. [8] studied the Middle Eocene-Early Miocene larger foraminifera from Dhofar (Oman) and Socotra Island (Yemen). [9] studied benthic foraminifera proxies in Mukalla coastal area, Hadhramout Governorate. [1] studied the benthic foraminifera from Bir Ali Beach, Shabwah Governorates. [10] studied an assessment of marine pollution with some heavy metals at Hadhramout coastal zone. The main objective of this paper is to classification and introduce details about the *Quinqueloculina* species in the beach sand of Socotra Island and the coastline of Hadhramout Governorate.

2. STUDY AREA

Socotra Island is the largest Yemeni Island, located between the latitudes 12° 18‘ and 12° 42‘ N and longitudes 53° 19‘ and 54° 33‘E [7] (Fig. 1A). Hadhramout is the largest governorate of the Yemen in terms of area. It occupies about 36% of the total area of Yemen. It is restricted between the latitudes 14° 30‘ and 14° 56‘ N and longitudes 49° 07‘ and 50° 21‘ E [8] (Fig. 1B). Hadhramout coastline occupies about 303.9 km of the Yemeni coasts [11] and consists of a series of sandy beaches punctuated some rocky protruding areas that

mostly extends into the shallow water.

3. METHODOLOGY

Fieldwork was carried out along the northern and southern coastline of Socotra Island during January 2017 and Hadhramout coastline during August 2018. Thirty-two sand samples were collected from selected stations along the coastline of the Socotra Island and Hadhramout coastline. These samples were collected from a depth ranging between 0 - 4 m by hand collecting (Fig. 1A, B). Thirteen of these samples were collected from the north and south of Socotra Island (Table 1). The rest samples were collected from Hadhramout coastline (Table 2). The collected samples were prepared to separate the foraminiferal tests from sediments. According to [12], this was accomplished depending on the difference in density between saline water and the shells, which composed of calcium carbonate. One hundred grams of each sample was boiled to get rid of the tissue or any unwanted material inside the shells and then they were washed by running distilled water using a (200-mesh) sieve to expel the mud material. Washed samples containing sand and shells were immersed in a plastic basin filled with saline solution and then stirred. As a result of the differences in the density of the salt liquid, sand grains and foraminiferal shells, the shells floated on the solution surface Tests were concentrated and extracted from the sediments and stored in a plastic vials. Tests were sorted according to their size using sieves of different sizes, then picked by double zero (00) brush and arranged in micropaleontolgical slides. This fauna was studied and identified by using light binocular microscope. Photos of identified foraminiferal species were taken by 12 Mega Pixel digital camera. Some of the images of the species were not clear enough, so they were replaced by clear images from published researches and websites such as www.foraminifera.net/eu site.

4. SYSTEMATIC CLASSIFICATION

Identification of benthic foraminiferal species has been completely based on the wall composition and structure, the external morphological features including the shape of test, arrangement of chambers, shape of chambers, number of whorls, number of chambers per whorl, shape of periphery, position and form of aperture, ornamentation of tests and the modifications of apertures. Twenty nine species belonging to *Quinqueloculina* were recorded in two study areas. Sixteen species were recorded in Socotra Island (Table 3), while were recorded twenty four species in Hadhramout coastline (Table 4). The distribution of the identified species through the samples was determined and displayed in Table (3 and 4). All the illustrated specimens and sediment samples utilized for this study have been indexed and deposited in the repository of the Earth Sciences Department, Faculty of Petroleum and Natural Resources, Sana'a University.

Suborder: Miliolina [13]
Superfamily: Miliolacea [14]
Superfamily: Miliolacea [14]
Family: Hauerinidae [15]
Subfamily: Haueriniae [15]
Genus: Quinqueloculina [16]
Quinqueloculina agglutinans [17]
(Pl. 1, Figs. 1, 2)

1839 *Quinqueloculina agglutinans* D'ORBIGNY, p. 195, pl. 12, figs. 11-13.
1994 *Agglutinella agglutinans* (d'Orbigny); [18], p. 44, pl. 70, figs. 1-9.
2001 *Agglutinella agglutinans* d'Orbigny; [19], p. 102, pl. 11, fig. 18.
2003 *Quinqueloculina agglutinans* d'Orbigny; [20], p. 18, fig. 4.3, 4.4.
2006 *Siphonaperta agglutinans* d'Orbigny; [21], p. 155, pl. 2, fig. 12.
2012 *Quinqueloculina agglutinans* d'Orbigny; [22], p. 119.
2012 *Siphonaperta agglutinans* d'Orbigny; [23], p. 51, fig. 13.18, 13.19.
2013 *Quinqueloculina agglutinans* d'Orbigny; [24], p. 8, pl. 2, fig. 5.
2017 *Quinqueloculina agglutinans* d'Orbigny; [1], p. 396, fig. 4.17, 4.18.
2019 *Quinqueloculina agglutinans* d'Orbigny; [25], p. 61, fig. 17.10.
2021 *Quinqueloculina agglutinans* d'Orbigny; [26], p. 102.

Material: Specimens of this species was occurred as a frequent form in samples HDC8, HDC11, as a common form in sample HDC2 and as a rare form in samples FSQ10, HDC1, HDC3A, HDC4, HDC5, HDC6, HDC9B, HDC12B, HDC13 and HDC14.
Geographic distribution: This species was originally described from Cuba [17]. Later, it was recorded from western Mexico [27], Japan [28], New Zealand [29], Sahul Shelf and Timor Sea [18], southwestern south China Sea, Sunda Shelf [19], Bermuda [20], Gulf of Iskenderun, eastern Mediterranean [21], Indian coast [5], southwestern Pacific New Caledonia [22], western Mediterranean Sea [23], Egyptian Red Sea coast [24], Delta Shelf off Myanmar, India [30], Bay of Bengal, India's east coast [25], Yemen [1], [31], [32] and Venezuela [26].

Quinqueloculina barnardi [33]
(pl. 1, Fig. 3-5)

1971 *Quinqueloculina barnardi* RASHEED, p. 26, 27, pl. 2, fig. 1.

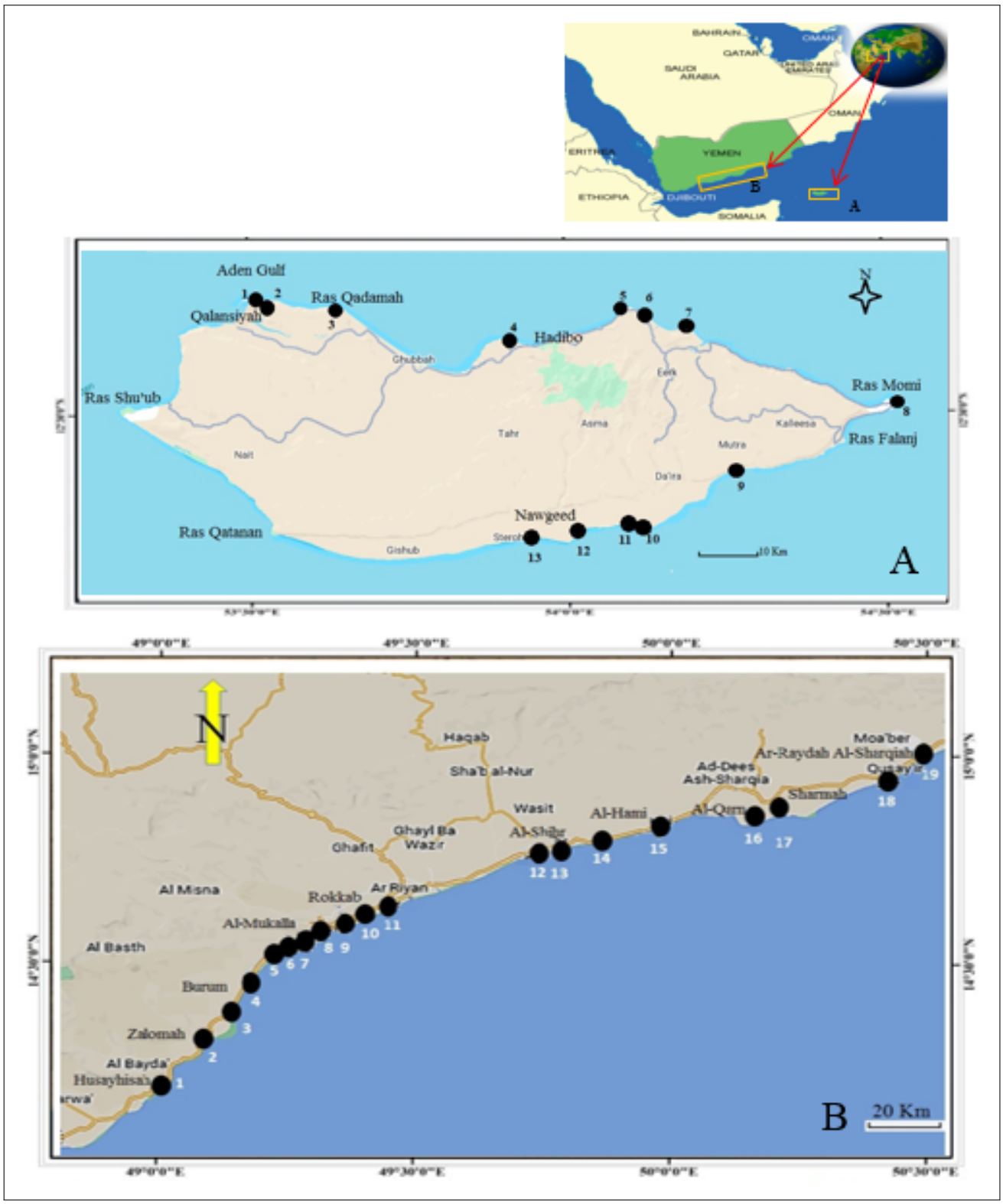

Figure 1. Location map of collected samples in the two study areas; A: Socotra Island, B: Hadhramout coastline (Source: Google Earth).

1988 *Quinqueloculina barnardi* Rasheed; [34], p. 233, pl. 4, figs. 18-20.
1997 *Quinqueloculina barnardi* Rasheed; [35], p. 265, fig. 3.23, 3.24.
2009 *Quinqueloculina barnardi* Rasheed; [36], p. 184, figs. 129a-f; 130a-k.
2012 *Quinqueloculina barnardi* Rasheed; [22], p. 119.

Material: *Q. barnardi* Rasheed was found as an abundant form in samples FSQ12, FSQ19, HDC1, HDC12B and HDC14, as a frequent form in sample FSQ23, as a common form in samples FSQ25, HDC3A and HDC10

and as a rare form in samples FSQ27, FSQ28, HDC4 and HDC15.

Geographic distribution: This species was originally described from Coral Sea, south of Papua, New Guinea [33]. It was later recorded from Papuan Lagoon, New Guinea [34], western Australia [35], Ningaloo Reef, western Australia [36] and southwestern Pacific, New Caledonia [22].

Quinqueloculina bradyana [37]

(pl. 1, Fig. 6)

1917 *Quinqueloculina bradyana* CUSHMAN, p. 52, pl. 18, fig. 2a-c.
1954 *Quinqueloculina bradyana* Cushman; [38], p. 332, pl. 83, fig. 26.
1995 *Quinqueloculina bradyana* Cushman; [39]], p. 83, figs. 14, 15.
2017 *Quinqueloculina bradyana* Cushman; [1], p. 369, fig. 4.19, 4.20.
2021 *Quinqueloculina bradyana* Cushman; [26], p. 102.

Material: In the present study, this species was found as a rare form in samples HDC13.

Geographic distribution: This species was recorded from Marshall Islands, south Pacific [38], Japan [40], New Zealand [29], the southeast Australian coast [39], Bermuda [20], Maldives Ridge, southeastern Arabian Sea [6] and New Caledonia, southwestern Pacific [22], Yemen [1] and Venezuela [26].

Quinqueloeulina disparilis [16]

(pl. 1, Figs. 7-9)

1826 *Quinqueloculina disparilis* D'ORBIGNY, p. 302, n. 21.
1878 *Spiroloculina disparilis* Terquem; [41], p. 55, pl. 5(10), fig. 12.
1893 *Quinqueloculina disparilis* d'Orbigny; [42], p. 212, pl. 2, figs. 55-57.
1923 *Quinqueloculina disparilis* d'Orbigny; [43], p. 47, pl. 6, figs. 60, 61.
1929 *Quinqueloculina disparilis* d'Orbigny; [44], p. 32, pl. 5, fig. 4.
1958 *Quinqueloculina disparilis* d'Orbigny; [45], p. 180, pl. 4, figs. 26, 27.
1974 *Quinqueloculina disparilis* d'Orbigny; [46], p. 200, fig. 55 a-g.
1980 *Quinqueloeulina disparilis* d'Orbigny; [31], p. 151, pl. 2, figs. 4-6.
1984 *Quinqueloeulina disparilis* d'Orbigny; [32], p. 48, pl. 1, fig. 18.
1991 *Quinqueloculina disparilis* d'Orbigny; [47], p. 36, pl. 33, figs. 1, 2.
1993 *Quinqueloculina disparilis* d'Orbigny; [48], p. 170, pl. 8, fig. 2.
1995 *Quinqueloculina disparilis* d'Orbigny; [49], p. 168, pl. 2, fig. 2.
2004 *Quinqueloculina disparilis* d'Orbigny; [50], p.73, pl. 10, figs. 1-3.
2012 *Quinqueloculina disparilis* d'Orbigny; [23], p. 56, fig. 15.10-15.12.

Material: This species was occurred as a frequent form in sample FSQ29 and as a rare form in samples FSQ10 and FSQ12.

Geographic distribution: *Q. disparilis* was originally described from the Gulf of Marseilles, France [16]. It was later recorded from Australia [43], southeastern Red Sea shores, Yemen [31, 32], Mediterranean [47], New Zealand [29], Gulf of Naples, Italy [48], eastern Aegean Sea, Turkey [50], south eastern Australia [51], and western Mediterranean Sea [23].

Quinqueloculina distorqucata [38]

(Pl. 1, Figs. 10-12)

1954 *Quinquelocnlina distorqucata* n. sp. CUSHMAN, p. 333, pl. 83, fig. 27.
1980 *Quinquelocnlina distorqucata* Cushman; [31], p. 151, pl. 3, figs. 4-6.
1984 *Quinquelocnlina distorqucata* Cushman; [32], p. 49, pl. 1, fig. 10.
1997 *Quinquelocnlina distorqucata* Cushman; [35], p. 265, fig. 3.25.

Material: *Q. distorqucata* Cushman was found as an abundant form in samples HDC13 and HDC14, as a frequent form in samples FSQ19, FSQ21 and HDC2, as a common form in samples FSQ25 and HDC6 and as a rare form in samples FSQ4, FSQ10, FSQ12, FSQ23, HDC9B and HDC10.

Geographic distribution: This species was originally described as a new species from Marshall Islands, south Pacific [38], southeastern Red Sea shores, Yemen [31, 32], Great Barrier Reef, Australia [52] and western Australia [35].

Quinqueloculina eburnean [17]

(pl. 1, Figs. 13, 14)

1839 *Triloculina eburnea* D'ORBIGNY, p. 180, pl. 10, figs. 21-23.
1987 *Quinqueloculina oblonga eburnea* (d'Orbigny); [52], pl. 46, figs. 3-5.
1993 *Quinqueloculina eburnea* (d'Orbigny); [53], p. 59, pl. 53, figs. 9-11; pl. 54, figs. 1-5.
2001 *Quinqueloculina eburnea* (d'Orbigny); [54], p. 128, 131, pl. 2, figs. 18, 19.
2004 *Quinqueloculina eburnea* (d'Orbigny); [50], p. 73, pl. 10, figs. 4, 5.

Material: *Q. eburnea* (d'Orbigny) was occurred as a rare form in samples FSQ19, FSQ23, FSQ29, HDC1 and HCD8.

Geographic distribution: This species was originally

described from Cuba [17]. Later, it was recorded from northern Great Barrier Reef, Australia [52], the Gulf of Aqaba, Red Sea [53] and eastern Aegean Sea, Turkey [50].

Quinqueloculina erinacea [55]
(pl. 1, Figs. 15-17)

1977 *Quinqueloculina erinacea* MIKHALEVICH, p. 447, fig. 4.
1983 *Quinqueloculina erinacea* Mikhalevich; [56], p. 114, fig. 203a-b.
2012 *Quinqueloculina erinacea* Mikhalevich; [22], p. 122.

Material: *Q. erinacea* Mikhalevich was recorded as a frequent from in samples HDC13 and HDC14 and as a rare form in samples HDC10 and HDC12B.
Geographic distribution: This species was recorded from northwestern Coast of Africa [55] and southwestern Pacific New Caledonia [22].

Quinqueloculina flavescens in [31]
(pl. 1, Fig. 18)

1905 *Quinqueloculina flavescens* D'ORBIGNY, p. 68, pl. 4, fig. 4.
1980 *Quinqueloculina flavescens* d'Orbigny; [31], p. 151, p. 5, figs. 10-12.
1984 *Quinqueloculina flavescens* d'Orbigny; [32], p. 49, p. 1, fig. 4.
2012 *Quinqueloculina flavescens* d'Orbigny; [7][7], p. 38, pl. 2, fig. 13.

Material: Specimens of this species found as an abundant form in samples HDC2 and HDC14, as a frequent form in sample HDC8, as a common form in samples HDC12B and HDC13 and as a rare form in sample HDC12A.
Geographic distribution: This species was originally described from Madagascar (d'Orbigny, 1905). It was recorded from Yemen in southeastern Red Sea shores [31, 32] and Socotra Island [7].

Quinqueloculina granulocostata [57]
(pl. 1, Figs. 19, 20)

1946 *Quinqueloculina granulocostata* GERMERAAD, p. 63, pl. 7, fig. 11, pl. 8, fig. 1.
1980 *Quinqueloculina granulocostata* Germeraad; [31], p. 151, pl. 1, figs. 13-15.
1984 *Quinqueloculina granulocostata* Germeraad; [32], p. 49, pl. 1, fig. 21.
1987 *Quinqueloculina granulocostata* Germeraad; [52], p. 87, pl. 41, fig. 3.
1988 *Quinqueloculina granulocostata* Germeraad; [34], p. 233, pl. 6, figs. 8-10.
1994 *Massilina granulocostata* (Germeraad); [18], p. 47, pl. 79, figs. 1-12.
2009 *Quinqueloculina granulocostata* Germeraad; [36], p. 211, figs. 150a-k, 151a-h.
2012 *Quinqueloculina granulocostata* Germeraad; [22], p. 123.
2017 *Quinqueloculina granulocostata* Germeraad; [1], p. 397, fig. 5.2, 5.3.

Material: This species was occurred as a frequent form in sample FSQ25 and as a rare form in samples HDC13 and HDC14.
Geographic distribution: This species was originally described from Indonesia [57]. It was recorded from northern Great Barrier Reef, Australia [52], Japan [58], Sahul Shelf and Timor Sea [18], the southeast Australian coast [39], Papuan Lagoon, southeast coast of New Guinea [34], east coast of India [4], Ningaloo Reef, western Australia [36] and southwestern Pacific New, Caledonia [22].
In Yemen, this species was recorded from the southeastern Red Sea [31, 32] and Bir Ali Beach, Arabian Sea [1].

Quinqueloculina jugosa [59]
(pl. 2, Fig. 1)

1944 *Quinqueloculina seminulum* (Linné) var. *jugosa* CUSHMAN, p. 13, pl. 2, fig. 5.
1980 *Quinqueloculina jugosa* Cushman; [31], p. 152, pl. 2, figs. 1-3.
1984 *Quinqueloculina jugosa* Cushman; [32], p. 49, pl. 1, fig. 17.
2004 *Quinqueloculina jugosa* Cushman; [50], p. 74, pl. 10, figs. 6, 7.
2005 *Quinqueloculina jugosa* Cushman; [60], fig. 1.16.
2012 *Quinqueloculina jugosa* Cushman; [22], p. 123.
2017 *Quinqueloculina jugosa* Cushman; [1], p. 397, fig. 5.4, 5.5.+

Material: This species was found as a frequent form in sample FSQ29.
Geographic distribution: The present species was described from the recent deposits of the New England Coast [59], northeastern Gulf of Mexico [61], Gulf of Kalloni, Greece [60], Turkey [50, 62] and southwestern Pacific New Caledonia [22].
In Yemen, this species recorded from the southeastern Red Sea shores [31, 32] and Bir Ali Beach, Arabian Sea, Yemen [1].

Quinqueloculina laevigata [63]
(pl. 2, Fig. 2)

1839 *Quinqueloculina laevigata* D'ORBIGNY, p. 143, pl. 3, figs. 31-33.
1974 *Quinqueloculina laevigata* d'Orbigny; [64], p. 240, pl. 2, figs. 1-5.
1976 *Quinqueloculina laevigata* d'Orbigny; [65], p. 89.

1980 *Quinqueloculina laevigata* d'Orbigny; [31], p. 152, pl. 5, figs. 4-6.
1984 *Quinqueloculina laevigata* d'Orbigny; [32], p. 49, pl. 1, fig. 2.
1991 *Quinqueloculina laevigata* d'Orbigny; [47], p. 37, pl. 33, figs. 8-11.
2003 *Quinqueloculina laevigata* d'Orbigny; [20], p. 19, fig. 4.11.
2004 *Quinqueloculina laevigata* d'Orbigny; [50], p. 74, pl. 10, figs. 8, 9.
2021 *Quinqueloculina laevigata* Deshayes; [26], p. 102.

Material: Specimens of this species was occurred as an abundant form in samples HDC11 and HDC13, as a frequent form in samples HDC2, HDC8, HDC9B and HDC12A and as a common form in samples HDC6 and HDC10.

Geographic distribution: *Q. laevigata* was described from the Holocene of the Canary Islands and from the Tertiary of Paris [63]. It was recorded from the western Mexico [27], western north America [66], Greece [64], southern California [65], Japan [28], Mediterranean Sea [47], New Zealand [29], Bermuda [20], Turkey [50], Gulf of Iskenderun, eastern Mediterranean [21], north Portugal [67] and Venezuela [26].

In Yemen, *Q. laevigata* occurs from the southeastern Red Sea shores [31, 32].

Quinquelocnlina lamarckiana [17]
(Pl. 2, Figs. 3, 4)

1839 *Quinqueloculina lamarckiana* D'ORBIGNY, p. 189, pl. 11, figs. 14, 15.
1921 *Quinqueloculina lamarckiana* d'Orbigny; [68], p. 419, pl. 87, figs. 2, 3.
1953 *Quinqueloculina lamarckiana* d'Orbigny; [69], p. 177, pl. 2J, fig. 3.
1956 *Quinqueloculina lamarckiana* d'Orbigny; [70], p. 17, pl. 2, fig. 10.
1961 *Quinqueloculina lamarckiana* d'Orbigny; [71], p. 16, pl. 1, fig. 10.
1969 *Quinqueloculina lamarckiana* d'Orbigny; [72], p. 401.
1976 *Quinqueloculina lamarckiana* d'Orbigny; [65], p. 63.
1980 *QuinquelocuLina lamarckiana* d'Orbigny; [31], p. 152, pl. 4, figs. 13-15.
1984 *QuinquelocuLina lamarckiana* d'Orbigny; [32], p. 50, pl. 1, fig. 23.
1992 *Quinqueloculina lamarckiana* d'Orbigny; [40], p. 67, pl. 7, figs.7a, b.
2004 *Quinquelocıılina lamarckiana* d'Orbigny; [50], p. 76, pl. 10, figs. 10, 11.
2020 *Quıinquelocıılina lamarckiana* d'Orbigny; [73], p. 96, pl. III, fig. 1.
2022 *Quinquelocıılina lamarckiana* d'Orbigny;.[74], p. 67, fig. 15K–M.

Material: Specimens of this species was occurred as a frequent form in samples HDC13 and HDC14 and as a rare form in samples HDC2 and HDC3A.

Geographic distribution: This cosmopolitan species was described from the recent deposits Cuba and Jamaica [17]. It was later recorded from the several parts of the world such as California [65, 69, 71], west India [70], western Mexico [27], the Atlantic continental shelf of U.S.A. [72], Japan [40], New Zealand [29], south eastern Australia [51], Bermuda [20], Maldives Ridge, southeastern Arabian Sea [6], north Portugal [67], Egypt [75], Turkey [50], Yemen [1], [31, 32], southeast coast of India, Tamil Nadu [73] and Mauritanian shelf [74].

Quinqueloculina limbata [16]
(pl. 2, Figs. 5-7)

1826 *Quinqueloculina limbata* D'ORBIGNY, p. 302, no. 20.
1923 *Miliolina limbata* (d'Orbigny); [43], p. 45, pl. 6, fig. 51.
1991 *Quinqueloculina limbata* d'Orbigny; [47], p. 37, pl. 34, figs. 1-5.
1994 *Quinqueloculina limbata* d'Orbigny; [18], p. 49, pl. 78, figs. 10-12.
2002 *Quinqueloculina limbata* d'Orbigny; [76], p. 63, pl. 1, figs. 16, 17.
2004 *Quinqueloculina limbata* d'Orbigny; [50], p. 77, pl. 10, fig. 12.
2011 *Quinqueloculina limbata* (d'Orbigny); [77], p. 357, fig. 7.12, 7.13.
2016 *Quinqueloculina* cf. *Q. limbata* (d'Orbigny); [78], p. 158, fig. 6.3.
2018 *Quinqueloculina limbata* (d'Orbigny); [79], p. 295, pl. 2, figs. 23, 24.

Material: In the study area, this species was found as an abundant form in sample HDC13, as a frequent form in samples HDC2, HDC9B, HDC10, HDC12A and HDC14, as a common form in samples HDC6 and as a rare form in samples FSQ10, FSQ27, FSQ28, HDC1, HDC8 and HDC11.

Geographic distribution: This species was recorded from Sahul Shelf and Timor Sea [18], Mediterranean [47], Turkey [50], Gulf of Iskenderun, eastern Mediterranean [21], Saudi Arabia [77–79], Egypt [75] and southwestern Pacific New Caledonia [22].

Quinqueloculina mosharrafai [80]
(Pl. 2, Figs. 8, 9)

1949 *QuinquelocuLina mosharrafai* SAID, p. 10, pl. 1, fig. 23.
1956 *QuinquelocuLina* cf. *mosharrafai* Said; [70]], p. 17, pl. 2, fig. 11.
1980 *QuinquelocuLina* cf. *mosharrafai* Said; [31], p.

153, pl. 1, figs. 16-18.
1984 *QuinquelocuLina* cf. *mosharrafai* Said; [32], p. 50, pl. 1, fig. 14.
2013 *Quinqueloculina mosharrafai* Said; [75], p. 294, pl. 1, fig. 17.
2013*Quinqueloculina mosharrafi* Said; [24], p. 10, pl. 2, fig. 6.
2016 *Quinqueloculina mosharrafai* Said; [78], p. 156, fig. 5.26.

Material: *Q. mosharrafai* Said was found as a common form in sample FSQ23 and as a rare form in samples FSQ10 and FSQ25.

Geographic distribution: This form was described from northern Red Sea [80]. It was later recorded from western India [70], southeastern Red Sea shores, Yemen [31, 32], Egypt [75] and Saudi Arabia [78].

Quinqueloculina neostraitula [81]

(pl. 2, Figs. 10, 11)

1932 *Quinqueloculina striatula* Cushman; [82], p. 27, pl. 7, figs. 3, 4.
1950 *Quinqueloculina neostraitula* THALMANN, p. 45.
1950 *Quinqueloculina straitula* Cushman; [83], p. 5, pl.1, fig. 9.
1954 *Quinqueloculina neostriatula* Thalmann; [38], p. 333, pl. 83, fig. 28.
1987 *Quinqueloculina neostriatula* Thalmann; [52], p. 91, pl. 43, figs. 1-6.
1988 *Quinqueloculina neostriatula* Thalmann; [34], p. 234, pl. 6, figs. 22-25.
1980 *Qumqueloculina neostraitula* Thalmann; [31], p. 154, pl. 1, figs. 1-3.
1984 *Quinqueloculina neostraitula* Thalmann; [32], p. 51, pl. 1, fig. 25.
2009 *Quinqueloculina neostriatula* Thalmann; [36], p. 225, figs 162, 163.
2011 *Varidentella neostriatula* (Thalmann); [77], p. 357, figs. 7.18, 7.19.
2012 *Quinqueloculina neostriatula* Thalmann [*Varidentella neostriatula*]; [22], p. 124.

Material: Specimens of this species was occurred as a frequent form in sample HDC13 and as a rare form in samples HCD1 and HDC14.

Geographic distribution: The present species was described from the recent deposits of Fiji Islands, Pacific Ocean [82] as *Q. straitula*. This form was also recorded as *Q. neostriatula* (Thalmann) from northern Red Sea [83], Marshall Islands, south Pacific [38], southeastern Red Sea shores, Yemen [31, 32], northern Great Barrier Reef, Australia [52], Japan [40], Papuan Lagoon, southeast coast of New Guinea [34], western Australia [35], Ningaloo Reef, western Australia [36] and Saudi Arabia [77].

Quinqueloculina parkeri [84]

(Pl. 2, Fig. 12)

1881 *Miliolina parkeri* BRADY, p. 46. 1917 *Quinqueloculina parkeri* (Brady); [37], p. 50, pl. 15, fig. 3.
1932 *Quinqueloculina parkeri* (Brady); [82], p. 25, pl. 6, figs. 3, 4.
1957 *Quinqueloculina parkeri* (Brady); [85], p. 286, pl. 85, figs. 13a-14b.
1980 *Quinqueloculina parkeri* (Brady); [31], p. 154, pl. 1, figs. 10-12.
1984 *Quinqueloculina parkeri* (Brady); [32], p. 51, pl. 1, figs. 24.
2009 *Quinqueloculina parkeri* (Brady); [5], p. 25, image 3.
2009 *Quinqueloculina parkeri* (Brady); [6], p. 40, pl. 8, fig. 6.
2012 *Quinqueloculina parkeri* (Brady); [7], p. 38, pl. 2, figs. 16, 17.
2012 *Quinqueloculina parkeri* (Brady); [22], p. 12.
2014 *Quinqueloculina parkeri* (Brady); [30], p. 131, pl. 9, fig. 13a-c.
2017 *Quinqueloculina parkeri* (Brady); [1], p. 400, figs. 18, 19.
2019 *Quinqueloculina parkeri* (Brady); [25], p. 63, fig. 18.7.
2021 *Quinqueloculina parkeri* (Brady); [26], p. 102.

Material: Specimens of this species was found a frequent form in samples HDC2, HDC3A and HDC6, as a common form in sample HDC14 and as a rare form in sample FSQ10.

Geographic distribution: *Q. parkeri* (Brady) was recorded in different regions such as Hawaii Islands [84], northern Red Sea [83], Marshall Islands, south Pacific [38], southern Thailand [86], east coast of India [4], Japan [40], western Australia [87], southwestern Pacific, New Caledonia [22], Delta Shelf off Myanmar, India [30], Bay of Bengal, India's east coast [25] and Venezuela [26].

In Yemen: This species was recorded from the southeastern Red Sea shores [31, 32], Socotra Island [7] and Bir Ali Beach, Arabian Sea [1].

Quinqueloculina philippinensis [68]

(pl. 2, Fig. 13)

1917 *Quinqueloculina reticulata* [37], p. 55, pl. 16, fig. 1
1921 *Quinqueloculina kerimbatica* (Heron-Allen & Earland) var. *philippinensis* CUSHMAN, p.438, pl. 89, figs. 2-3, text-fig. 34.
1941 *Quinqueloculina pseudoreticulata* Parr; [88], p. 305.
1993 *Pseudotriloculina philippinensis* Hottinger *et al.*; [53], p. 55-56, pl. 47, figs. 1-7.
1994 *Quinqueloculina pseudoreticulata* Parr; [89], p. 25, pl. 9, figs. 2-3.

1994 *Quinqueloculina philippinensis* Cushman; [18], p. 50, pl. 81, figs. 1-10.
2007 *Quinqueloculina pseudoreticulata* Parr; [90], p. 18, pl. 1, fig. 8a-b.
2012 *Quinqueloculina pseudoreticulata* Parr; [22], p. 125.
2014 *Quinqueloculina philippinensis* Cushman; [30], p. 131, pl. 9, fig. 15a-c.
2018 *Quinqueloculina philippinensis* Cushman; [91], p. 133, pl. 4.1, figs. 40, 41.
2019 *Quinqueloculina philippinensis* Cushman; [25], p. 65, fig. 18.9-18.11.

Material: Specimens of this species was occurred as a rare form in sample FSQ10.
Geographic distribution: This species was recorded the Gulf of Aqaba, Red Sea [53], Sahul Shelf and Timor Sea [18], southwestern south China Sea, Sunda Shelf [19], Ningaloo Reef, western Australia [36], Papua, New Guinea [92], southwestern Pacific, New Caledonia [22], Delta Shelf off Myanmar, India [30], western Australian shelf [91] and Bay of Bengal, India's east coast [25].

Quinqueloculina plicosa [93]
(pl. 2, Fig. 14)

1856 *Quinqueloculina plicosa* COSTA, p. 322, pl. 25, fig. 2, 5, 7.
1980 *Quinqueloculina plicosa* Costa; [31], p. 154, pl. 1, figs. 7-9.
1984 *Quinqueloculina plicosa* Costa; [32], p. 51, pl. 1, fig. 16.
2000 *Quinqueloculina plicosa* Costa; [94], p. 168, fig. 2.
2017 *Quinqueloculina plicosa* Costa; [1], p. 400, fig. 5.20-5.22.

Material: This species was occurred as a rare form in sample HDC12B.
Geographic distribution: This species was recorded from Italy [93], Qatar [94] and Yemen [1, 31, 32].

Quinqueloculina poeyana [17]
(Pl. 2, Figs. 15, 16)

1839 *Quinqueloculina poeyana* D'ORBIGNY, p. 191, pl. 11, figs. 25-27.
1980 *Quinqueloculina poeyana* d'Orbigny; [31], p. 154, pl. 2, figs. 7-9.
1984 *Quinqueloculina poeyana* d'Orbigny; [32], p. 51, pl. 1, fig. 20.
2010 *Quinqueloculina poeyana* d'Orbigny; [95], p. 6, pl. 1, fig. 5.
2011 *Quinqueloculina poeyana* d'Orbigny; [77], p. 357, fig. 7.14, 7.15.
2012 *Quinqueloculina poeyana* d'Orbigny; [7], p. 28, pl. 2, figs. 14, 15.
2015 *Quinqueloculina poeyana* d'Orbigny; [96], p. 141, fig. 4.h.
2017 *Quinqueloculina poeyana* d'Orbigny; [1], p. 400, fig. 5.23-5.25.
2022 *Quinqueloculina poeyana* d'Orbigny; [97], p. 270, fig. 4.7.

Material: This species was found as a frequent form in sample HDC11 and as a rare form in samples FSQ12, HDC4 and HDC8.
Geographic distribution: *Q. poeyana* d'Orbigny previously recorded from the recent deposits of Cuba [17]. It was later recorded from California [71], northeastern Gulf of Mexico [61], western Mexico [27], the Atlantic continental shelf of U.S.A. [72], Brazil [98], New Zealand [29], South eastern Australia [51], western Australia [87, 99], north Basrah-Iraq [95], north Portugal [67], Farasan Island, southern Red Sea, Saudi Arabia [77], Oman Coast [96] and Venezuela [26].
In Yemen, this species was recorded from the southeastern Red Sea shores [31, 32], Socotra Island [7], Bir Ali Beach, Arabian Sea [1] and Al-Bawadi Island, southern Red Sea [97].

Quinqueloculina polygona [17]
(pl. 2, Fig. 17)

1839 *Quinqueloculina polygona* D'ORBIGNY, p. 198, pl. 12, figs. 21-23.
1921 *Quinqueloculina polygona* d'Orbigny; [68], p. 66, pl. 16, figs. 3, 4.
1929 *Quinqueloculina polygona* d'Orbigny; [44], p. 28, pl. 3, figs 5a-c.
1932 *Quinqueloculina polygona* d'Orbigny; [82], p. 25, pl. 6, fig. 6.
1973 *Quinqueloculina polygona* d'Orbigny; [100], p. 406, pl. 6, fig. 19, 20.
1980 *Quinqueloculina polygona* d'Orbigny; [31], p. 155, pl. 4, figs. 4-6.
2012 *Quinqueloculina polygona* d'Orbigny; [22], p. 125.
2021 *Quinqueloculina polygona* d'Orbigny; [26], p. 103.

Material: Specimens of this species was occurred as a rare form in samples HDC14 and HDC15.
Geographic distribution: The present species was described from the recent deposits of Cuba and Jamaica [17]. It was later recorded from Puerto Rico [100], southeastern Red Sea shores, Yemen [31, 32], New Zealand [29], Japan [40], southwestern Pacific, New Caledonia [22], and Venezuela [26].

Quinqueloculina pseudoreticulata [88]
(pl. 2, Figs. 18-20)

1941 *Quinqueloculina pseudoreticulata* PARR, p. 305.
1994 *Quinqueloculina philippinensis* Cushman; [18], p. 50, pl. 81, figs. 1-10.

2012 *Quinqueloculina pseudoreticulata* Parr [*Quinqueloculina variolata* d'Orbigny; *Quinqueloculina philippinensis* Cushman]; [22], p. 125.
2018 *Quinqueloculina pseudoreticulata* Parr; [79], p. 295, pl. 2, fig. 22.

Material: This species was found as a common form in sample FSQ19 and as a rare form in samples FSQ21, FSQ10 and HDC14.
Geographic distribution: This species was recorded from Sahul Shelf and Timor Sea [18], Ningaloo Reef, western Australia [36], Indian coast [5], southwestern Pacific New Caledonia [22] and Saudi Arabia [79].

Quinqueloculina rariformis [101]
(pl. 3, Fig. 1)

1981 *Quinqueloculina*? *rariformis* MCCULLOCH, p. 51, pl. 15, fig. 12a-b.
2012 *Quinqueloculina rariformis* McCulloch; [22], p. 125.

Material: This species was recorded as a common form in sample HDC13 and as a frequent form in sample HDC14.
Geographic distribution: This species was recorded from southwestern Pacific New Caledonia [22].

Quinqueloculina seminulum [102]
(pl. 3, Figs. 2-4)

1758 *Serpula seminulum* LINNÉ, p. 786, pl. 2, fig. 1a-c.
1956 *Quinqueloculina seminulum* Linné; [70], p. 17, pl. 2, fig. 9.
1966 *Quinqueloculina seminulum* Linné; [103], p. 68, pl. 7, figs. 5-7.
1969 *Quinqueloculina seminulum* Linné; [72], p. 416.
1973 *Quinqueloculina seminulum* Linné; [100], p. 391.
1976 *Quinqueloculina seminulum* Linné; [65], p. 89.
1980 *Quinqueloculina seminula* (Linné); [31], p. 155, pl. 5, figs. 13-15.
1984 *Quinqueloculina seminulum* (Linné) [32], p. 54, pl. 1, fig. 5.
2003 *Quinqueloculina seminulum* (Linné); [104], p. 17, pl. 4, figs. 11, 12.
2007 *Quinqueloculina seminulum* (Linné); [90], p. 18, pl.1, fig. 9 a-b.
2010 *Quinqueloculina seminula* (Linné); [105], p. 101, pl. 7, fig. 8a-c.
2012 *Quinqueloculina seminula* (Linné); [23], p. 57, fig. 15.30, 15.31.
2012 *Quinqueloculina seminula* (Linné); [22], p. 126.
2019 *Quinqueloculina seminulum* (Linné); [25], p. 65, fig. 18.13, 18.14.
2022 *Quinqueloculina seminulum*(Linné); [97], p. 270, fig. 4.6a, b.

Material: This species was occurred as a frequent form in sample HDC12B, as a common form in samples HDC12A and HDC13 and as a rare form in samples HDC8 and HDC15.
Geographic distribution: This cosmopolitan species was originally described from the recent deposits of the Adriatic Sea [102]. It was later recorded from the numerous localities such as Belgium [106], India [70], western Mexico [27], Denmark [103], the Atlantic continental shelf of U.S.A. [72], New foundland [107], Puerto Rico [100], southern California [65], Japan [40], New Zealand [29], south eastern Australia [51], Marmara Sea [108], the Hebridean shelf, west of Scotland [104], France [109], north Portugal [67], southwestern Pacific, New Caledonia [22], western Mediterranean Sea [23], south Africa coast line [110], Saudi Arabia [78], Bay of Bengal, India's east coast [25], Venezuela [26] and Yemen [31, 32, 97].

Quinqueloculina sulcata [16]
(pl. 3, Fig. 5)

1826 *Quinqueloculina sulcata* D'ORBIGNY, p. 301, no. 17.
1900 *Quinqueloculina sulcata* Fornasini, [111], p. 364, fig. 9.
1932 *Quinqueloculina sulcata* d'Orbigny; [82], p. 28, pl. 7, figs. 5-8.
1954 *Quinqueloculina sulcata* d'Orbigny;. [38], p. 334, pl. 84, figs. 1, 2.
1994 *Quinqueloculina sulcata* d' Orbigny; [18][18], p. 50, pl. 82, figs. 1-6.
2007 *Quinqueloculina sulcata* d'Orbigny; [90], p. 18, pl. 1, fig. 10a-b.
2012 *Quinqueloculina* cf. *Q. sulcata* d'Orbigny; [22], p. 127.
2019 *Quinqueloculina sulcata* Fornasini; [25], p. 65, fig. 18.19, 18.20.

Material: This species was found as a rare form in samples HDC6, HDC13 and HDC14.
Geographic distribution: This species was recorded from Marshall Islands, south Pacific [38], Saurashtra coast, Gujarat [90], southwestern Pacific, New Caledonia [22] and Bay of Bengal, India's east coast [25].

Quinqueloculina trigonula [41]

(Pl. 3, Fig. 6)

I876 *Quinquelocnlina trigonula* TERQUEM, 84, pl. 12, fig. 4.
1975 *Quinquelocnlina trigonula* Terquem; [112], p.172. pl, figs. 10-15.
1980 *Quinquelocnlina trigonula* Terquem; [31], p. 157, pl. 3, figs. 1-3.
1984 *Quinquelocnlina trigonula* Terquem; [32], p. 55, pl. 1, fig. 9.
2017 *Quinquelocnlina trigonula* Terquem; [1], p. 402,

fig. 6.27, 6.28.

Material: This species was occurred as a frequent form in samples HDC11 and HDC16, as a common form in samples FSQ29 and HDC2 and as a rare form in samples HDC10 and HDC12B.

Geographic distribution: This species was described from the northern shores of France [41]. In Yemen, it was recorded from the southeastern Red Sea shores by [31, 32] and from Bir Ali Beach, Arabian Sea by [1].

Quinqueloculina tropicalis [113]
(Pl. 3, Fig. 7)

1924 *Quinqueloculina tropicalis* CUSHMAN, p. 63, pl. 23, figs. 9, 10.
1960 *Quinqueloculina tropicalis* Cushman; [114], p. 10, pl. 5, fig. 3.
1980 *Quinqueloculina tropicalis* Cushman; [31], p. 157, pl. 5, figs. 7-9.
1984 *Quinqueloculina tropicalis* Cushman; [32], p. 55, pl. 1, fig. 3.
1994 *Quinqueloculina tropicalis* Cushman; [18], pp. 50-51, pl. 78, figs. 13-15.
1995 *Quinqueloculina tropicalis* Cushman; [39], p. 85, figs. 170, 171, 174, 175.
2012 *Quinqueloculina tropicalis* Cushman; [22], p. 127.
2016 *Quinqueloculina tropicalis* Cushman; [78], p. 156, fig. 5.25.

Material: Specimens of this species was occurred as an abundant form in sample HDC6, as a frequent form in samples HDC1, HDC2, HDC5, HDC12A and HDC14 and as a common form in samples HDC3B, HDC10 and HDC11.

Geographic distribution: [113] was described *Q. tropiealis* from the recent deposits of Pago Pago Harbor. It was recorded later from the numerous localities such as the southeastern Red Sea shores, Yemen [31, 32], southeastern Australia [39, 51], Papua, New Guinea [92], Indian coast [5], southwestern Pacific New Caledonia [22] and Saudi Arabia [78].

Quinqueloculina tubus [85]
(Pl. 3, Fig. 8)

1957 *Quinqueloculina tubus* TODD, p. 306, pl. 85, fig. 18.
1988 *Quinqueloculina tubus* Todd; [34], p. 234, pl. 8, figs. 25-28.
1994 *Quinqueloculina cuvieriana* d'Orbigny; [18], p. 48, pl. 78, figs. 4-6.
2009 *Quinqueloculina tubus* Todd; [36], p. 276, figs. 198a-l, 199a-g, 200a-i.
2012 *Quinqueloculina tubus* Todd; [22], p. 128.

Material: Specimens of this species was found as a rare form in samples FSQ4, FSQ10 and HDC14.

Geographic distribution: This species was recorded from Saipan, Mariana Islands [85], Sahul shelf and Timor Sea [18], Papuan Lagoon, southeast coast of New Guinea [34], Ningaloo Reef, western Australia [36] and southwestern Pacific, New Caledonia [22].

Quinqueloculina undulosecostata [115]
(Pl. 3, Fig. 9)

1882 *Quinqueloculina undulosecostata* TERQUEM, p. 185, pl. 20, figs. 18, 19.
1956 *Quinqueloculina undulosecostata* Terquem; [70], p. 17, pl. 2, fig. 8.
1980 *Quinqueloculina undulosecostata* Terquem; [31], p. 157, pl. 1, figs. 4-6.
1984 *Quinqueloculina undulosecostata* Terquem; [32], p. 55, pl. 1, fig. 15.
2017 *Quinqueloculina undulosecostata* Terquem; [1], p. 402, fig. 7.2, 7.3.

Material: Specimens of this species was found as an abundant form in sample HDC13 and as a rare form in sample HDC4.

Geographic distribution: *Q. undulosecostata* was described from the Eocene of Paris [115]. It was later recorded from the recent deposits of the shores of India [70] and the main Sea shores of Yemen [1, 31, 32].

Quinqueloculina variolata [16]
(pl. 3, Figs. 10, 11)

1826 *Quinqueloculina variolata* D'ORBIGNY, p. 302, no. 26
1977 *Quinqueloculina variolata* d'Orbigny; [116] , p. 102, figs. 15-17.
1993 *Quinqueloculina variolata* d'Orbigny; [48], p. 180, pl. 8, fig. 1.
2012 *Quinqueloculina pseudoreticulata* Parr [*Quinqueloculina variolata* d'Orbigny; *Quinqueloculina philippinensis* Cushman]; [22], p. 125.
2016 *Quinqueloculina variolata* d'Orbigny; [117], p. 10, pl. 1, fig. 15.

Material: Specimens of this species was occurred as a common form in sample FSQ25 and as a rare form in samples FSQ12 and FSQ23.

Geographic distribution: This species was recorded from Italy [48], southwestern Pacific, New Caledonia [22] and Tunisia [117].

5. CONCLUSION

Thirty-two surface sand samples were collected along the northern and southern coastlines of Socotra Island and the Hadhramout coastline. These samples were collected at a depth ranging between 0 – 4 m. to identify the benthic foraminiferal species in these ar-

eas. In this paper, the systematic position of recorded foraminiferal species is applied to identify twenty nine *Quinqueloculina* species. *Quinqueloculina* genus as mentioned above represent excellent indicators for the nearshore conditions, and inner shelf environments such as the intertidal and turbulent zones, lagoons, bays, reefal deposits, shallow open ocean (warm water) and marshes and rare in bathyal and deeper environments. These species were recorded in previous studies in the main Sea shores of Yemen as southeastern Red Sea shores and Socotra Island.

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Table 1: Coordinates of the studied stations, their measured environmental parameters and main type of substrates in Socotra Island.

Item	Sample No.	Location	Latitude N	Longitude E	pH	S (%0)	T °C	Position	Substrate
1	FSQ4	Deleshiah beach A	12° 41‘ 09.5“	54° 07‘ 53.1“	7.22	34.3	24.8	Northen coastline	Brownish fine-med. Sands
2	FSQ10	Nojahar Beach	12° 38‘ 34.3“	53° 56‘ 12.6“	5.94	34	18.4	Northen coastline	Whitish medium sands
3	FSQ12	Ras Irsel	12° 33‘ 12.4“	54° 30‘ 53.4“	8.16	34	22.5	Northen coastline	Whitish medium sands
4	FSQ17	Dhihamri beach	12° 40‘ 16.1“	54° 11‘ 46.5“	8.26	33.9	12.8	Northen coastline	Coarse- med. sands
5	FSQ19	Detwah beach	12° 41‘ 49.5“	53° 29‘ 12.7“	7.83	34.5	26.2	Northen coastline	Fine-med sands
6	FSQ20	Detwah lagoon	12° 41‘ 54.7“	53° 30‘ 08.6“	7.76	35	24.9	Northen coastline	Med.-fine sands
7	FSQ21	Qadamah beach	12° 41‘ 48“	53° 39‘ 24.1“	8.26	34.4	28.2	Northen coastline	Pebbly- sandy beach
8	FSQ23	Deleshiah beach B	12° 40‘ 16.6“	54° 09‘ 01.3“	8.6	34.2	28.4	Northen	Sandy beach
9	FSQ25	Mahferhen- Khaisat Nahab	12° 24‘ 04.2“	54° 13‘ 31.4“	8.98	34	28.8	Southern coastline	Fine sand
10	FSQ27	Haif	12° 21‘ 13.2“	54° 04‘ 39.8“	7.83	34.1	29.8	Southern coastline	Semi restricted lagoon, fine sands
11	FSQ28	Haif	12° 20‘ 12“	54° 04‘ 30.4“	8.21	34	28.5	Southern coastline	Open sea, med-fine sands
12	FSQ29	Awmaq	12° 20‘ 40.0“	54° 01‘ 11.3“	8.88	34.2	28.2	Southern coastline	Fine – med. sands
13	FSQ30	Stero	12° 19‘ 46.7“	53° 55‘ 08.0“	8.92	34.1	28.5	Southern coastline	Fine –med.sands

Table 2: Coordinates of the studied stations, their measured environmental parameters and main type of substrates in Hadhramout coastline.

Item	Sample No.	Location	Latitude N	Longitude E	pH	S ($‰_0$)	T °C	Substrate
1	HDC1	Husayhisah	14 14‘ 49.8“	48° 52‘ 23.8“	7.52	34.2	24.8	Rocky sand beach
2	HDC2	Zalomah	14 18‘ 3.4“	48° 56‘ 14.3“	7.98	34.1	28.2	Rocky sand beach
3	HDC3A	Burum A	14° 21‘ 31.3“	48° 58‘ 56.4“	8.1	34.2	25.3	sandy beach
4	HDC3B	Burum B	14° 21‘ 36.2“	48° 58‘ 56.8“	8.5	34.2	25.5	sandy beach
5	HDC4	Sixty St. Al-Shafi’i	14° 27‘ 19.8“	49° 01‘ 49.4“	8.38	34.1	26.2	sandy beach
6	HDC5	Sixty Street	14° 30‘ 57“	49° 05‘ 10“	8.6	34.3	26.9	sandy beach
7	HDC6	Al-Mukalla	14° 31‘ 44.4“	49° 06‘ 36.7“	8.18	34.2	27.4	sandy beach
8	HDC7	Al-Mihdhar Corniche	14° 30‘ 37.8“	49° 09‘ 53.3“	8.16	34	28.5	Rocky beach
9	HDC8	Al-Selail	14° 32‘ 53.8“	49° 10‘ 38.7“	8.48	34.1	28.8	Rocky beach
10	HDC9A	Rawkab A	14° 34‘ 2.7“	49° 12‘55.2“	8.33	34.1	29.8	sandy beach
11	HDC9B	Rawkab B	14° 34‘ 5.8“	49° 12‘ 55.4“	8.3	34.1	28.5	sandy beach
12	HDC10	Al-Shihr 1	14° 45‘ 17.7“	49° 37‘ 3.0“	8.2	34.2	29.1	sandy beach
13	HDC11	Al-Shihr 2 Al-‘Eqah	14° 45‘ 29.6“	49° 37‘ 30.6“	8.18	34.3	28.5	sandy beach
14	HDC12A	Al-Hami A	14° 48‘ 12.9“	49° 48‘ 31.9“	8.4	34.3	29.5	sandy beach
15	HDC12B	Al-Hami B	14° 49‘ 09.4“	49° 51‘ 41.2“	8.3	34.3	29.1	sandy beach
16	HDC13	Al-Qarn	14° 49‘ 27.3“	50° 00‘ 47.8“	7.5	34	30.5	sandy beach
17	HDC14	Sharmah	14° 50‘ 55.2“	50° 01‘35.97“	8.23	34.2	27.8	sandy beach
18	HDC15	Qusayr	14° 55‘ 55.9“	50° 20‘ 18.2“	8.04	34.1	28.1	sandy beach
19	HDC16	Ar-Raydah Al-Sharqiah	15° 01‘14.16“	50° 28‘ 7.6“	7.26	34.2	28.9	sandy beach

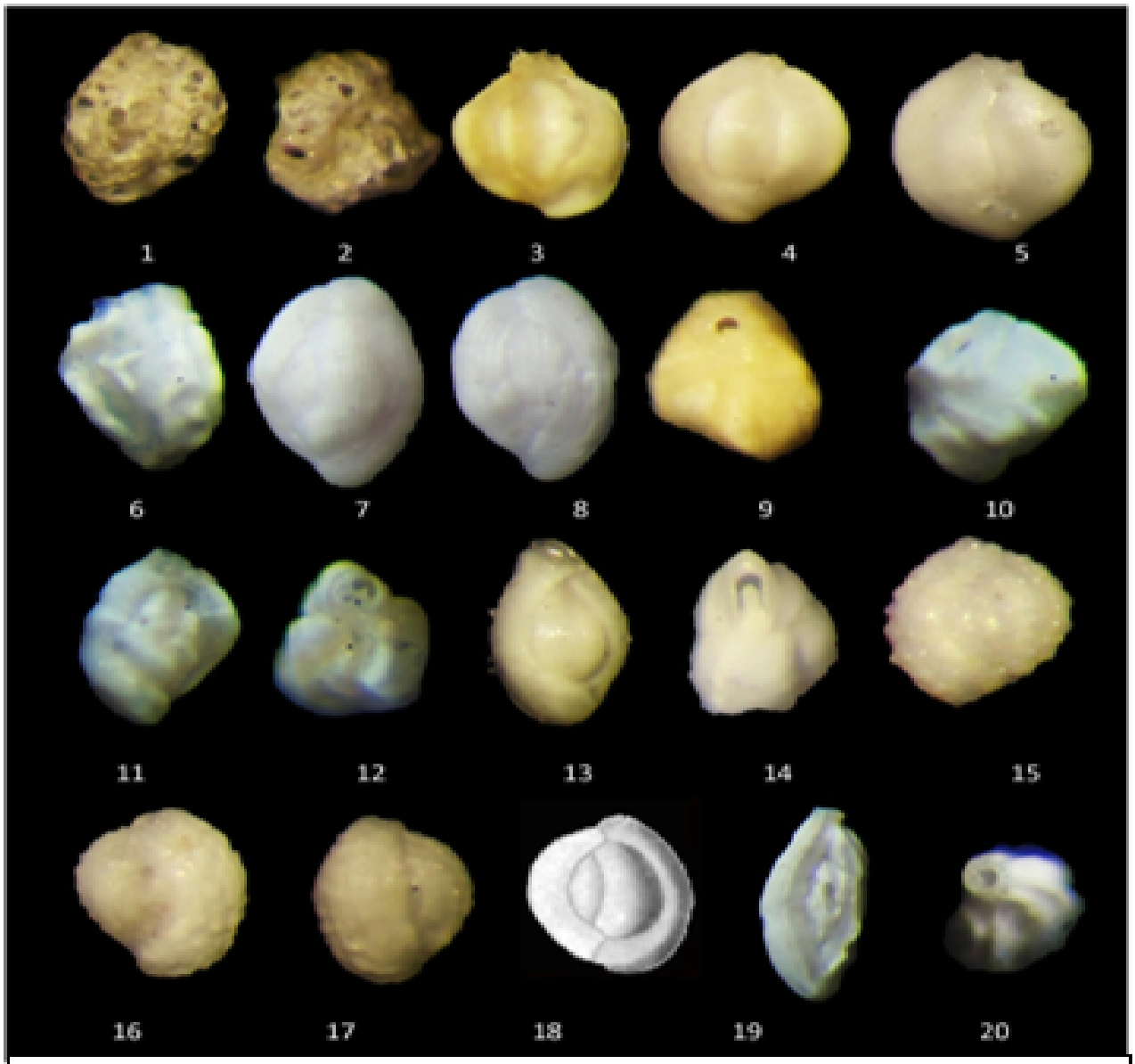
Table 1. Species of *Quinqueloculina* genus from Socotra Island. Abbreviations: R, Rare, less than 5 organisms by taxa/sample; F, Frequent, between 6 to 10 organisms by taxa/sample; C, Common, between 11–15 organisms by taxa/sample; A, Abundant, more than 15 organisms by taxa/sample.

Suborder	Species	FSQ4	FSQ10	FSQ12	FSQ17	FSQ19	FSQ20	FSQ21	FSQ23	FSQ25	FSQ27	FSQ28	FSQ29	FSQ30
Miliolina	*Quinqueloculina agglutinans*		R											
	Quinqueloculina barnardi			A			A		F	C	R	R		
	Quinqueloeulina disparilis		R	R									F	
	Quinqueloculina distorqucata	R	R	R		F		F	R	C				
	Quinqueloculina eburnean					R			R				R	
	Quinqueloculina granulocostata									F				
	Quinqueloculina jugosa												F	
	Quinqueloculina philippinensis		R											
	Quinqueloculina limbata		R								R	R		
	Quinqueloculina mosharrafai		R						C	R				
	Quinqueloculina parkeri		R											
	Quinqueloculina poeyana			R										
	Quinqueloculina pseudoreticulata		R			C			R					
	Quinqueloculina trigonula	R											C	
	Quinqueloculina tubus	R	R											
	Quinqueloculina variolata			R					R	C				

Table 2. Species of *Quinqueloculina* genus from Hadhramout coastline. Abbreviations: R, Rare, less than 5 organisms by taxa/sample; F, Frequent, between 6 to 10 organisms by taxa/sample; C, Common, between 11–15 organisms by taxa/sample; A, Abundant, more than 15 organisms by taxa/sample.

Suborder	Species	HDC1	HDC2	HDC3A	HDC3B	HDC4	HDC5	HDC6	HDC7	HDC8	HDC9A	HDC9B	HDC10	HDC11	HDC12A	HDC12B	HDC13	HDC14	HDC15	HDC16
Miliolina	*Quinqueloculina agglutinans*	R	C	R		R	R	R		F		R	R	F		R	R	R		
	Quinqueloculina barnardi	A		C		R	F						C			A		A	R	
	Quinqueloculina bradyana																R			
	Quinqueloculina distorqucata		F					C				R	R				A	A		
	Quinqueloculina eburnean	R								R										
	Quinqueloculina erinacea												R			R	F	F		
	Quinqueloculina flavescens		A							F				C	R	C	C	A		
	Quinqueloculina granulocostata																R	R		
	Quinqueloculina laevigata		F					C		F		F	C	A	F	C	A			
	Quinqueloculina lamarckiana	R															R	F		
	Quinqueloculina limbata	R	F					C		R		F	F	R	F		A	F		
	Quinqueloculina neostraitula	R															F	R		
	Quinqueloculina parkeri		F	F				F										C		
	Quinqueloculina plicosa															R				
	Quinqueloculina poeyana					R				R				F						
	Quinqueloculina polygona																	R	R	
	Quinqueloculina pseudoreticulata																	R		
	Quinqueloculina rariformis																C	F		
	Quinqueloculina seminula									R					C	F	C		R	
	Quinqueloculina sulcata							R									R	R		
	Quinqueloculina trigonula		C										R	F		R		A		F
	Quinqueloculina tropicalis	F	F		C		F	A					C	C	F			F		
	Quinqueloculina tubus																	R		
	Quinqueloculina undulosecostata					R											A			

Plate 1



1- *Quinqueloculina agglutinans*, Lateral view, 140X, 2- *Q. agglutinans*, Apertural view, 140X, 3- *Quinqueloculina barnardi*, Lateral view, 140X, 4- *Q. barnardi*, Lateral view, 140X, 5- *Q. barnardi*, Lateral view, 140X, 6- *Quinqueloeulina bradyana*, Lateral view, 140X, 7- *Quinqueloeulina disparilis*, Lateral view, 140X, 8- *Q. disparilis*, Lateral view, 140X, 9- *Q. disparilis*, Apertural view, 140X, 10- *Quinqueloculina distorqucata*, Lateral view, 140X, 11- *Q. distorqucata*, Lateral view, 140X, 12- *Q. distorqucata*, Apertural view, 140X, 13- *Quinqueloculina eburnean*, Lateral view, 140X, 14- *Q. eburnean*, Apertural view, 140X, 15- *Quinqueloculina erinacea*, Lateral view, 140X, 16- *Q. erinacea*, Lateral view, 140X, 17- *Q. erinacea*, Lateral view, 140X, 18- *Quinqueloculina flavescens*, Lateral view, 19- *Quinqueloculina granulocostata*, Lateral view, 140X, 20- *Q. granulocostata*, Apertural view, 140X.

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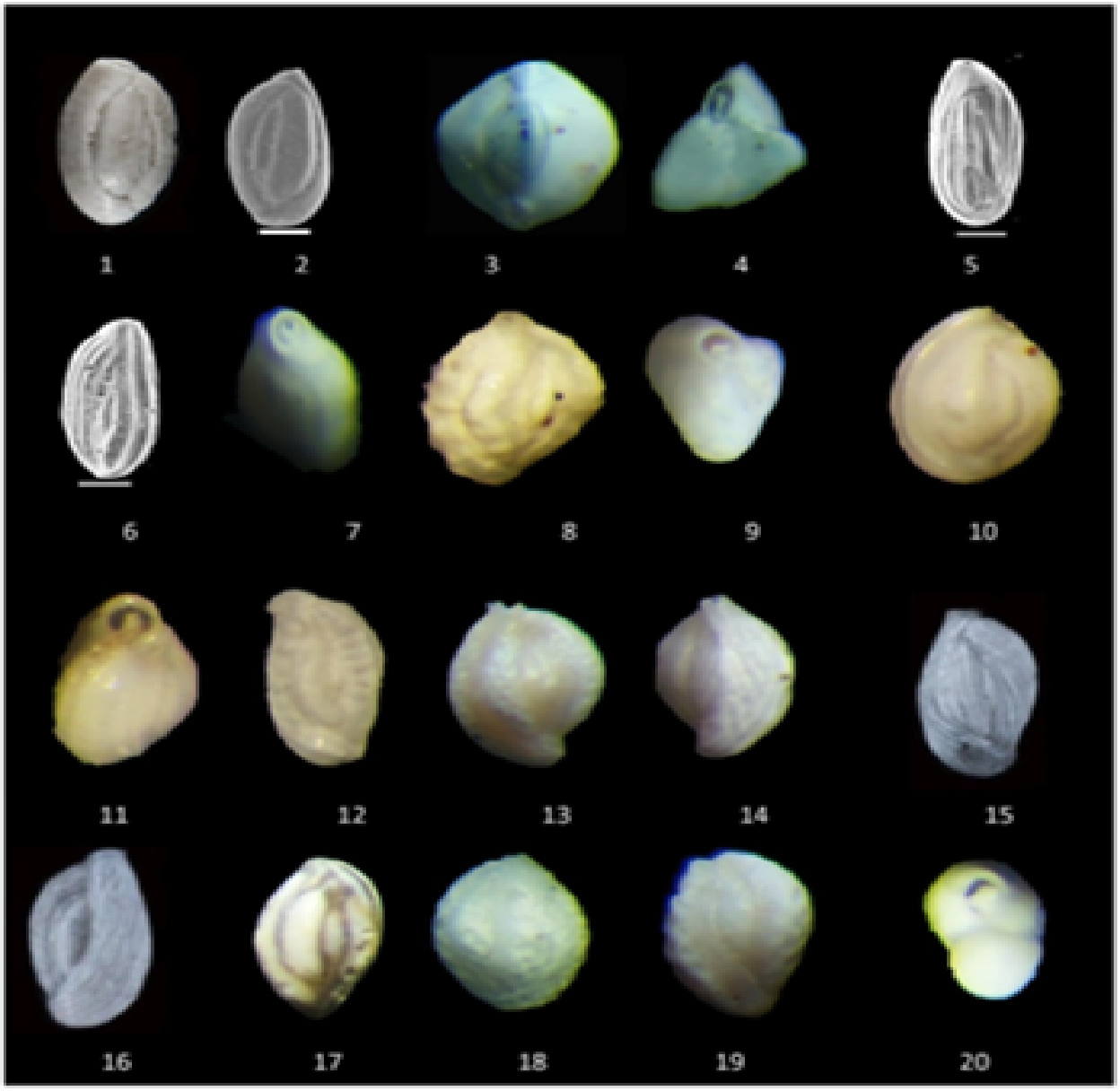
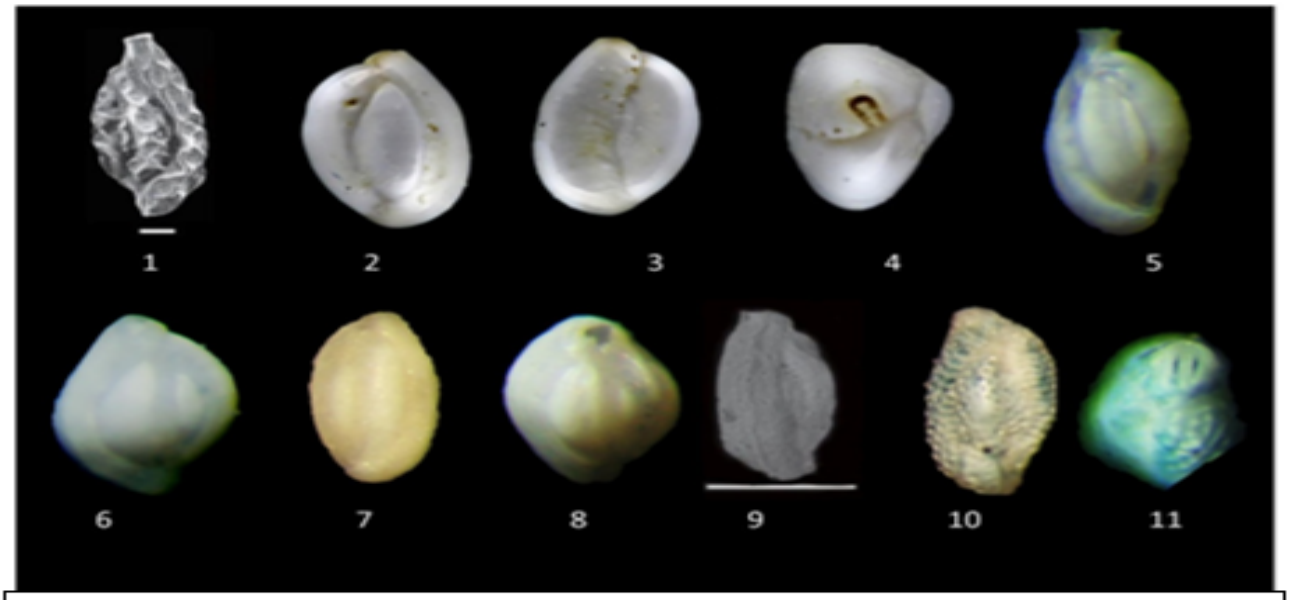
Plate 2



1- *Quinqueloculina jugosa*, Lateral view, 140X, 2- *Quinqueloculina laevigata*, Lateral view, 50µm, 3- *Quinqueloculina lamarckiana*, Lateral view, 140X, 4- *Q. lamarckiana*, Apertural view, 140X, 5- *Quinqueloculina limbata*, Lateral view, 140X, 6- *Q. limbata*, Lateral view, 100µm, 7- *Q. limbata*, Apertural view, 100µm, 8- *Quinqueloculina mosharrafi*, Lateral view, 140X, 9- *Q. mosharrafi*, Apertural view, 140X, 10- *Quinqueloculina neostraitula*, Lateral view, 140X, 11- *Q. neostraitula*, Apertural view, 140X, 12- *Quinqueloculina parkeri*, Lateral view, 140X, 13- *Quinqueloculina philippinensis*, Lateral view, 140X, 14- *Quinqueloculina plicosa*, Lateral view, 140X, 15- *Quinqueloculina poeyana*, Lateral view, 530µm, 16- *Q. poeyana*, Lateral view, 460µm, 17- *Quinqueloculina polygona*, Lateral view, 140X, 18- *Quinqueloculina pseudoreticulata*, Lateral view, 140X, 19- *Q. pseudoreticulata*, Lateral view, 140X, 20- *Q. pseudoreticulata*, Apertural view, 140X.

Plate 3



1- *Quinqueloculina rariformis*, Lateral view, 100µm, 2- *Quinqueloculina seminulum*, Lateral view, 1020µm, 3- *Q. seminulum*, Lateral view, 1020µm, 4- *Q. seminulum*, Apertural view, 1020µm, 5- *Quinqueloeulina sulcata*, Lateral view, 140X, 6- *Quinqueloculina trigonula*, Lateral view, 140X, 7- *Quinqueloculina tropicalis a*, Apertural view, 100µm, 8- *Quinqueloculina tubus*, Lateral view, 140X, 9- *Quinqueloculina undulosecostata*, Lateral view, 200µm, 10- *Quinqueloculina variolata*, Lateral view, 140X, 11- *Q. variolata*, Apertural view, 140X,

الملخص

لغرض إنشاء قاعدة بيانات عن المثقبات القاعية الحديثة في اليمن، تم تسجيل مائتين واثني عشر نوعا تم استخلاصها من 32 عينة رملية تم جمعها من مواقع مختلفة في جزيرة سقطرى خلال يناير 2017 وساحل حضرموت خلال أغسطس 2018 من عمق 0 - 4 م، لتعريف أصناف المثقبات القاعية إلى مستوى النوع. تمت معالجة هذه العينات لاستخلاص أصداف المثقبات باستخدام محلول ملحي من الماء بناء على الفرق بين كثافة الأصداف والمحلول. تم فصل المثقبات القاعية حسب نوع الجدار إلى ثلاث مجموعات؛ المثقبات ذات الجُدُر المتجمعة والخزفية والزجاجية. تمثل الأصداف الخزفية العدد الأكبر في العينات المجمعة من منطقتي الدراسة. تم التعرف على مائة وأربعة أنواع من هذه الأصداف تنتمي إلى ثمانية وعشرين جنسًا وأربعة فوق عائلات وثمان عائلات. من تلك الأنواع ينتمي تسعة وعشرون إلى جنس *Quinqueloculina* d'Orbigny والتي تمت مناقشتها هنا والموضحة في اللوحات المرفقة. تم ذكر التصنيف المنهجي للأنواع المسجلة من هذه العينات ومقارنتها بالنوع النظامي، كما تم تتبع التسجيلات السابقة لهذه الأنواع وتوزيعها الجغرافي إقليمياً وعالمياً ومدى تواجدها في عينات الدراسة. تم إيداع العينات في قسم علوم الأرض، كلية البترول والموارد الطبيعية، جامعة صنعاء.

الكلمات المفتاحية: ساحل حضرموت، كوينكيولوكيولينا، المثقبات القاعية الحديثة، جزيرة سقطرى، اليمن.