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RESEARCH ARTICLE

LITTORAL RECENT FORAMINIFERA AROUND ARABIA

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ABSTRACT

The marine tropical region of the Red Sea, Arabian Sea and Arabian Gulf around Arabia are represent as one of the richest diagnostic marine biological areas of the world. This study includes the modern taxonomical consideration of 296 Recent foraminiferal species belonging to five suborders (consists of 23 Textulariina species (agglutinated forms), 157 Miliolina, 36 Lagenina, 70 Rotaliina, 9 Globigerinid species (the last mentioned four suborders constituting the hyaline forms), from eight littoral coasts around Arabia: Red Sea (Egypt and Saudi Arabia-SA), Arabian Sea (Socotra and southern Yemen), Hormoz Strait (Oman), Arabian Gulf (United Arab Emirates-UAE, Qatar and Iran), which were previously recorded in different literatures. Fifty-two of the total species are recorded from Egypt (~ 17.5%), 31 from SA (~ 10.48%), 61 from Socotra of Yemen (~ 20.6%), 93 from southern Yemen (~ 31.4%), 44 from HS (~ 14.8%), 19 from UAE (~ 0.6%), 4 from Qatar (~ 0.01%), 19 from Iran (~ 0.6%), 89 from the total Arabian Gulf (~ 30.0%). Sixty-seven species are recorded from two or more localities around Arabia (~ 22.6%), while the others (~77.4%) are endemic to another sites of their local description. The study of the geographical distribution of these assemblages and their relation to major geographical characteristics of the surrounding lands suggests that the nature of these assemblages depends mainly on biotic factors and depths.

KEYWORDS

Recent foraminifera, Arabia, Red Sea, Arabian Sea, Hormoz Strait, Arabian Gulf

1. INTRODUCTION

During the past four decades, many authors engaged in paleontology, paleoenvironment of the littoral Recent foraminiferal species in seven shallow coasts around Arabia: Red Sea (Egypt, SA), Arabia Sea (Yemen, Oman), Arabian Gulf (UAE, Qatar and Iran), and their distribution investigate (Figure 1). This study presents the diversity analysis of the recorded assemblages in the study area, which were carry out by the present author and others, including: i. e., (Anan, 1984; Cherif et al., 1997; Al-Kaabi, 1999; Al-Hitmi, 2000; Youssef, 2015; Amao and Kaminski, 2016; Al-Wosabi et al., 2017; Amao et al., 2018; Al-Wosabi et al., 2021; Amao et al., 2022; Al-Wosabi and Al-Qadassi, 2024).

Sp. No	Littoral Recent Foraminiferal species	Red Sea		Arabian Sea		HS	Arabian Gulf				
		1	2	3	4	5	6	7	8	9	10
1	*Pseudonubeculina arabica*								x		
2	*Ammobaculites agglutinans* d'Orbigny 182										x
3	*Spiroplectinella sagittula* Defrance, 1824				x						
4	*Gaudryina rudis* Wright, 1900				x						
5	*Eggerella advena* Cushman, 1921	x									
6	*Martinottiella communis* d'Orbigny, 1846			x							
7	*Bigenerina nodosaria* d'Orbigny 1826										x
8	*Sahulia barkeri* (Hofker, 1978)						x				x
9	*Textularia agglutinans* d'Orbigny, 1839	x		x	x						
10	*Textularia bocki* Höglund, 1947					x					
11	*Textularia canadelina* d'Orbigny, 1839				x						

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12	*Textularia conica* d'Orbigny, 1839	x		x	x	x					
13	*Textularia earlandi* Parker, 1952					x				x	
14	*Textularia foliacea* Heron-Allen and Earland, 1915	x		x		x				x	
15	*Textularia gramen* d'Orbigny, 1846				x		x				
16	*Textularia porrecta* Brady 1884										x
17	*Textularia saggitula* Defrance 1824										x
18	*Textularia schencki* Cushman and Valentine, 1930	x									
19	*Textularia sica* Lalicker and Bermudez 1941										x
20	*Pseudoclavulina crustata* Cushman 1936										x
21	*Clavulina angularis* d'Orbigny, 1826	x	x								
22	*Clavulina pseudoparisiensis* Anan, 1984	x	x					x			
23	*Valvulina triangularis* Parker, Jones and Brady, 1865	x									
24	*Spirillina vivipara* Ehrenberg, 1841	x									
25	*Carterina spiculotesta* (Carter, 1877)	x									
26	*Cornuspira involvens* (Reuss, 1850)					x					
27	*Planispirinella exigua* (Brady), 1879				x						
28	*Vertebralina striata* d'Orbigny, 1826	x	x	x							
29	*Adelosina crassicarinata* (Collins, 1958)						x				x
30	*Adelosina echinata* d'Orbigny 1826										x
31	*Adelosina honghensis* (Lac, 1982)					x					x
32	*Adelosina laevigata* d'Orbigny, 1826				x	x					
33	*Adelosina mediterranensis* (Le Calvez and Le Calvez, 1958)				x						
34	*Adelosina sidebottomi* (Rasheed 1971)										x
35	*Cribrolinoides curta* Cushman, 1917				x						
36	*Spiroloculina acutimargo* Brady, 1884				x						
37	*Spiroloculina aequa* Cushman, 1932				x						
38	*Spiroloculina angulata* (Cushman, 1917)		x								
39	*Spiroloculina antillarum* d'Orbigny, 1839	x			x						
40	*Spiroloculina aequa* Cushman, 1917			x							
41	*Spiroloculina carinata* Wiesner 1928										x
42	*Spiroloculina costigera* Terquem, l882										x
43	*Spiroloculina cuorrugata* Cushman and Todd, 1944		x								
44	*Spiroloculina communis* Cushman and Todd, 1944		x		x	x	x				
45	*Spiroloculina depressa* d'Orbigny, 1826	x		x	x	x					
46	*Spiroloculina elegans* Cushman, 1917				x						
47	*Spiroloculina elegantissima* Said, 1949					x					
48	*Spiroloculina excavata* d'Orbigny 1848										x
49	*Spiroloculina manifesta* Cushman and Todd, 1944							x			
50	*Spiroloculina laevigata* Cushman and Todd, 1944			x							x
51	*Spiroloculina lucida* Cushman and Todd, 1944		x								
52	*Spiroloculina ornate* d'Orbigny, 1839			x							
53	*Spiroloculina pulchella* d'Orbigny 1948										x
54	*Spiroloculina rotundata* (Williamson 1858)										x
55	*Spiroloculina nummiformis* Said 1948										x
56	*Spiroloculina tenuiseptata* Brady, 1884				x						
57	*Siphonaperta agglutinans* (d'Orbigny, 1839)		x		x						
58	*Siphonaperta arenata* (Said 1949)										x
59	*Siphonaperta horrida* (Cushman), 1947				x						
60	*Siphonaperta pittensis* (Albani, 1974)									x	
61	*Siphonaperta irregularis* (d'Orbigny), 1826	x			x						
62	*Agglutinella agglutinans* d'Orbigny 1826										x
63	*Agglutinella laticollis* (Le Calvez and Le Calvez, 1958)						x				x
64	*Siphonaperta dilatata* (Le Calvez and Le Calvez, 1958)						x				x
65	*Cycloforina contorta* (d'Orbigny, 1846)						x				
66	*Cycloforina gracilissima* (Bogdanowich 1950)										x
67	*Cycloforina granulocostata* (Germeraad, 1946)						x				
68	*Cycloforina macerata* (Cushman and Todd 1944)										x
69	*Cycloforina rugosa* (d'Orbigny, 1852)						x				
70	*Hauerina bradyi* Cushman, 1917			x							
71	*Hauerina diversa* Cushman, 1946				x						
72	*Massilina granulocostata* Germeraad, 1946			x							
73	Massilina *milletti* (Wiesner, 1923)						x				
74	*Quinqueloculina agglutinata* d'Orbigny, 1839				x						
75	*Quinqueloculina akneriana* d'Orbigny 1826										x
76	*Quinqueloculina angularis* d'Orbigny, 1826		x								
77	*Quinqueloculina bicarinata* d'Orbigny 1878										x
78	*Quinqueloculina bidentata* d'Orbigny, 1839	x									
79	*Quinqueloculina bosciana* d'Orbigny, 1839;					x					
80	*Quinqueloculina bradyana* Cushman, 1910				x						
81	*Quinqueloculina brongniartina* (d'Orbigny, 1839)	x									
82	*Quinqueloculina bubyanensis* (Shublak 1977)										x
83	*Quinqueloculina buchiana* d'Orbigny 1846										x
84	*Quinqueloculina carinatastriata* (Wiesner), 1923				x						
85	*Quinqueloculina catalinensis* Nutland, 1928	x									

86	*Quinqueloculina corrugate* (Collins, 1958)				x						
87	*Quinqueloculina crassa* d'Orbigny, 1850		x								
88	*Quinqueloculina debenayi* Langer, 1992				x						
89	*Quinqueloculina disparilis* d'Orbigny in Schlumberger, 1893							x			
90	*Quinqueloculina erinacea* Mikhalevich, 1976									x	
91	*Quinqueloculina flavescens* d'Orbigny, 1826		x								
92	*Quinquelocnlina granulocostata* Germeraad, 1946				x						
93	*Quinquelocnlina jugosa* Cushman, 1944				x						
94	*Quinqueloculina laevigata* d'Orbigny, 1826	x	x								
95	*Quinqueloculina lamarckiana* d'Orbigny, 1839	x	x		x						
96	*Quinqueloculina lapidea* Cherif. 1973	x									
97	*Quinqueloculina lata* Terquem, 1876				x						
98	*Quinqueloculina limbata* d'Orbigny, 1826		x			x	x				
99	*Quinqueloculina mosharrafi* Said, 1949	x	x		x						
100	*Quinqueloculina multimarginata* Said, 1949				x						
101	*Quinqueloc. neapolitana* Sgarrella and Moncharmont Zei, 1993				x						
102	*Quinqueloculina neostriatula* Thalmann, 1950		x				x				x
103	*Quinqueloculina padana* Perconig, 1954				x						
104	*Quinqueloculina parkeri* Brady, 1881			x	x			x			
105	*Quinqueloculina partschii* d'Orbigny, 1846		x								
106	*Quinqueloculina peregrina* d'Orbigny 1846										x
107	*Quinqueloculina peregrina striata* (Wiesner, 1912)	x									
108	*Quinqueloculina plicosa* Costa, 1856				x						
109	*Quinqueloculina poeyana* d'Orbigny, 1839			x	x						x
110	*Quinqueloculina pseudoreticulata* Parr, 1941				x						
111	*Quinqueloculina puichella* d'Orbigny, 1826	x									
112	*Quinqueloculina quinquecarinata* Collins, 1958					x					
113	*Quinqueloculina samoensis* Cushman, 1924		x								
114	*Quinqueloculina seminula* (Linnaeus, 1758)		x		x	x					
115	*Quinqueloculina stel1igera* Schlumberger, 1893						x				
116	*Quinqueloculina subdecorata* Cushman, 1918			x							
117	*Quinqueloculina subpolygona* Parr, 1945				x						
118	*Quinquelocnlina trigonula* Terquem, 1876				x						
119	*Quinqueloculina undulosecostata* Terquem, 1882				x						
120	*Quinqueloculina vulgaris* d'Orbigny, 1826	x			x		x				x
121	*Flintinoides labiosa* (d'Orbigny 1839)										x
122	*Amphimorphina butonensis* Keyzer, 1953				x						
123	*Milliolinella subrotunda* (Montagu, 1803)	x			x						
124	*Milliolinella webbiana* (d'Orbigny, 1836)	x									
125	*Pseudomassilina pacificiensis* Cushman, 1924				x						x
126	*Pseudomassilina robusta* Lacroix 1938										x
127	*Pyrgo anomala* (Schlumberger, 1891)								x		
128	*Pyrgo elongata* d'Orbigny, 1826						x				
129	*Pyrgo labiata* (Schlumberger, 1891)			x							
130	*Pyrgo laevis* Defrance 1824										x
131	*Pyrgo oblonga* (d'Orbigny, 1839)				x						
132	*Pyrgo striolatus (Brady 1884)*										x
133	*Pseudotriloculina elongata* (d'Orbigny 1826)										x
134	*Ptychomiliola arabiensis* (Shublak 1977)										x
135	*Triloculina affinis* d'Orbigny, 1826		x		x						x
136	*Triloculina barnardi* Rasheed in Haig, 1988						x				x
137	*Triloculina bertheliana* Brady, 1884			x							
138	*Triloculina brongniatiana* d'Orbigny, 1836				x						
139	*Triloculina elongotricarinata* Debenay, 2013				x						
140	*Triloculina fichteliana* d'Orbigny, 1839				x						
141	*Triloculina insignis* Brady 1884				x						
142	*Triloculina longidentata* Bandy, 1953			x							
143	*Triloculina marioni* Schlumberger, 1893				x		x				
144	*Triloculina mindenensis* Howe, 1939			x							
145	*Triloculina neoinjlata* El-Nakhal, 1980								x		
146	*Triloculina oblonga* (Montagu, 1803)				x				x		
147	*Triloculina peroblonga* Cushman, 1922			x							
148	*Triloculina plicata* Terquem, 1876				x						
149	*Triloculina quadrata* Collins, 1958			x							
150	*Triloculina rotunda* d'Orbigny, 1826				x						
151	*Triloculina schreiberiana* d'Orbigny 1839										x
152	*Triloculina suborbicularis* d'Orbigny, 1826	x									
153	*Triloculina terquemiana* (Brady, 1884)				x						
154	*Triloculina tricarinata* d'Orbigny, 1826				x	x			x	x	x
155	*Triloculina trigonula* (Lamarck, 1804)				x	x			x		

156	*Triloculina trihedra* Loeblich and Tappan, 1953			x	x						
157	*Triloculina wiesneri* Le Calvez and Le Calvez, 1958					x					
158	*Triloculinella valvularis* (Reuss 1851)										x
159	*Steigerina bubnaensis* McCulloch 1977										x
160	*Scutuloris australis* (Parr, 1932)	x									
161	*Scutuloris dilletata* (d'Orbigny, 1839)	x									
162	*Scutuloris labiosa* (d'Orbigny, 1839)	x									
163	*Varidentella pseudocostata* (Venglinsky 1958)										x
164	*Varidentella rotunda* (Gerke, 1938)										x
165	*Hauernia bradyi* Cushman, 1917	x									
166	*Articulina alticostata* Cushman 1944										x
167	*Articulina carinata* Wiesner, 1923			x							
168	*Articulina pacifica* Cushman 1944										x
169	*Articulina sagra* d'Orbigny, 1839								x		
170	*Rupertianella rupertiana* Brady, 1884				x		x				x
171	*Borelis schlumbergeri* Reichel, 1937				x						x
172	*Coscinospira hemprichii* Ehrenberg, 1839				x						
173	*Peneroplis arietinus* (Batsch, 1791)				x						
174	*Peneroplis bradyi* Cushman, 1930				x						
175	*Peneroplis pertusus* (Forskal, 1775)	x	x	x	x						x
176	*Peneroplis planatus* (Fichtel and Moll, 1803)	x	x	x	x		x				
177	*Dendritina arbscula* Cushman, 1927	x									
178	*Spirolina arietina* (Batch, 1884)	x	x						x		
179	*Amphisorus hemprichi* Ehrenberg, 1838	x									
180	*Sorites marginalis* (Lamarck, 1816)	x	x		x						
181	*Sorites orbiculus* Forskal, 1775		x		x						
182	*Hyalinonetrion sahulensis* Paterson and Richardson, 1987										x
183	*Lagena perlucida* (Montagu, 1803)					x					
184	*Lagena semistriata* Williamson, 1848					x					
185	*Lagena spirata* (Bandy 1949)										x
186	*Dentalina inornata* d'Orbigny, 1846			x							
187	*Amphimorphina butonensis* Keyzer, 1953			x							
188	*Procerolagena clavata* d'Orbigny, 1826			x							
189	*Pseudopolymorphina hanzawai* Cushman and Ozawa, 1928			x							
190	*Sigmoidella elegantissima* Parker and Jones, 1865			x							
191	*Fissurina bispinata* Ujiié, 1963					x					
192	*Fissurina lacunata* Burrows and Holland, 1895			x							
193	*Fissurina lucida* (Williamson, 1848)					x					
194	*Palliolatella bradii* Silvestri, 1902			x							
195	*Bolivina dilatata* Reuss, 1850					x					
196	*Bolivina dottiana* Coryell and Mossman, 1942					x					
197	*Bolivina foxenensis* Bramlette, 1951					x					
198	*Bolivina plicata* d'Orbigny 1839										x
199	*Bolivina porrectum* Brady, 1881	x									
200	*Bolivina pseudoplicata* Heron-Allen and Earland, 1930			x							x
201	*Bolivina pseudopunctata* Höglund, 1947			x	x						
202	*Bolivina seminuda* Cushman, 1911			x							
203	*Bolivina spathulata* (Williamson, 1858)					x					
204	*Bolivina striatula* Cushman, 1922					x					
205	*Bolivina translucens* Phleger and Parker, 1951					x					
206	*Bolivina variabilis* (Williamson, 1858)				x						
207	*Bolivinella folia* Parker and Jones, 1865			x							
208	*Loxostomina limbata* Brady, 1881	x		x							
209	*Loxostomina mayori* (Cushman 1922)										x
210	*Abditodentrix rhomboidalis* Millett, 1899			x							
211	*Cassidulina laevigata* d'Orbigny, 1826					x					
212	*Parabrizalina porrecta* (Brady 1881)										x
213	*Sagrinella lobata* Brady, 1881			x	x						
214	*Sagrina simpsoni* (Heron-Allen and Earland 1915)										x
215	*Chrysalidinella dimorpha* Brady, 1881			x							
216	*Chrysalidina pacific* Uchio, 1952			x							
217	*Bulimina marginata* d'Orbigny, 1826					x				x	x
218	*Siphouvigerina proboscidea* (Schwager, 1866)									x	
219	*Reussella aequa* Cushman and McCulloch 1948										x
220	*Reussella simplex* (Cushman, 1929)	x									
221	*Reussella spinulosa* (Reuss, 1850)				x						x
222	*Pavonina flabelliformis* d'Orbigny, 1826			x							
223	*Baggina californica* Cushman 1926										x

224	*Cancris auriculus* (Fichtel and Moll, 1798)										x
225	*Cancris oblongus* (Williamson, 1858)					x					
226	*Eponides cribrorepandus* Asano and Uchio, 1951			x							x
227	*Eponides repandus* Fichtel and Moll, 1798			x	x						
228	*Neoeponides schreibersii* d'Orbigny, 1846			x							x
229	*Gavelinopsis campanulata* (Galloway and Wissler, 1927)	x									
230	*Gavelinopsis turbinata* (Cushman and Valentine, 1930)	x									
231	*Rosalina anomala* Terquem, 1875				x						
232	*Rosalina bradyi* Cushman, 1915			x	x					x	
233	*Rosalina globularis* d'Orbigny, 1826				x						
234	*Rosalina obtusa* d'Orbigny 1846										x
235	*Discorbinoides minogasiformis* Ujiié, 1992			x							
236	*Buliminoides williamsoniana* Brady, 1881			x							
237	*Discorbinella bertheloti* (d'Orbigny 1839)										x
238	*Siphoninoides echinatus* Brady, 1879			x							
239	*Hyalinea balthica* (Schroeter, 1783)				x						
240	*Cibicides lobatulus* (Walker and Jacob, 1798)					x					
241	*Cibicides refulgens* Montfort, 1808			x							x
242	*Planorbuluna mediterranensis* d'Orbigny, 1826			x	x						x
243	*Montfortella bramlettei* Loeblich and Tappan, 1963			x							
244	*Cymbaloporetta squam*mosa (d'Orbigny, 1826)	x									
245	*Cymbaloporella tabellaeformis* Brady, 1884	x		x	x						
246	*Asterigerina carinata* Cushman, 1927	x									
247	*Amphistegina lessoni* d'Orbigny, 1826		x		x						x
248	*Amphistegina lobifera* Larsen, 1976				x						
249	*Amphistegina radiata* (Fichtel and Moll, 1798)	x		x	x						
250	*Amphistegina vulgaris* d'Orbigny, 1839			x							
251	*Nonion fabum* (Fichtel and Moll, 1798)				x						
252	*Nonion tennerbankense* Mc Culioch, 1977			x							
253	*Pseudononion japonicum* Assano 1936										x
254	*Heterolepa dutemplei* (d'Orbigny, 1846)										x
255	*Hanzawaia leroyi LeRoy*, 1974					x					
256	*Hanzawaia tagaensis* Asano, 1949					x					
257	*Neorotalia calcar* d'Orbigny, 1839			x	x						
258	*Anomalina bradyi* Said, 1949	x									
259	*Ammonia aoteana* (Finlay, 1940)				x						
260	*Ammonia beccarii* (Linne, 1758)	x	x	x	x	x	x		x		
261	*Ammonia convexa* Nobes and Uthicke, 2008			x	x					x	
262	*Ammonia elegans* (d'Orbigny 1826)										x
263	*Ammonia faceta* He, Hu and Wang, 1965					x					
264	*Ammonia parkinsoniana* (d'Orbigny, 1839)				x						
265	*Ammonia tepida* Cushman, 1926					x					
266	*Asterorotalia dentata* (Parker and Jones, 1865)					x					x
267	*Asterorotalia milletti* Billman, Hottinger and Oesterle, 1980					x					x
268	*Asterorotalia mutispinosa* (Nakamura, 1937)	x									
269	*Challengerella bradyi* Billman, Hottinger and Oesterle, 1980					x					x
270	*Challengerella persica* Billmann, Hottinger and Oesterle 1980										x
271	*Elphidium aculeatum* (d'Orbigny, 1846)				x						
272	*Elphidium advenum* (Cushman, 1922)		x		x	x					
273	*Elphidium craticulatum* (Fichtel and Moll 1808)										x
274	*Elphidium crispum* (Linnaeus, 1758)	x	x		x		x		x		
275	*Elphidium excavatum* (Terquem, 1875)						x				
276	*Elphidium fichtellianum* (d'Orbigny, 1846)					x				x	
277	*Elphidium gerthi* Van Voorthuysen, 1957			x	x						
278	*Elphidium hispidulum* Cushman, 1936					x					
279	*Elphidium jenseni* Cushman, 1924			x							
280	*Elphidium macellum* Fichtel and Moll, 1798			x	x		x				x
281	*Elphidium margaritaceum Cushman*				x						
282	*Cribroelphidium clarum* (Krashenennikov 1960)										x
283	*Criproelphidium excavatum* (Terquem, 1875)					x					
284	*Criproelphidiu. microgranulosum*(GallawayandWiessler,1951)	x			x						
285	*Cribroelphidium poeyanum* (d'Orbigny 1826)										x
286	*Cribrononion frigidum* (Cushman, 1933)	x									
287	*Heterostegina suborbicularis* d'Orbigny, 1826						x				
288	*Globorotalia mendardii* Parker, Jones and Brady, 1865			x							
289	*Globigerinita glutinata Egger 1893*										x
290	*Globigerina bulloides* d'Orbigny, 1826	x		x							
291	*Globigerina calida* Parjer 1962										x
292	*Globigerina rubescens* Hofker 1956										x

293	*Globigerinoides ruber* d'Orbigny, 1839			x							x
294	*Globigerinoides sacculifer* Brady, 1884			x							
295	*Globigerinoides trilobus* (d'Orbigny 1839)										x
296	*Orbulina universa* d'Orbigny 1839			x							x

Figure 1: Arabia and other costs around it: Red Sea(Egypt and SA), Arabian Sea (Yemen and Oman), Arabian Gulf (UAE, Qatar and Iran).

2. Material Of Study

Following the Code of Zoological Nomenclature of rich and well-preserved two hundreds and ninety-six littoral Recent benthic and planktic foraminiferal species from seven sites around Arabia made it possible to elucidate them with modern taxonomical consideration. More richer quantity species of the assemblage are recorded in the Arabian Sea (~ 31.4%), followed by Arabian Gulf (~ 30.0%) and (~ 28.0%) in the Red Sea.

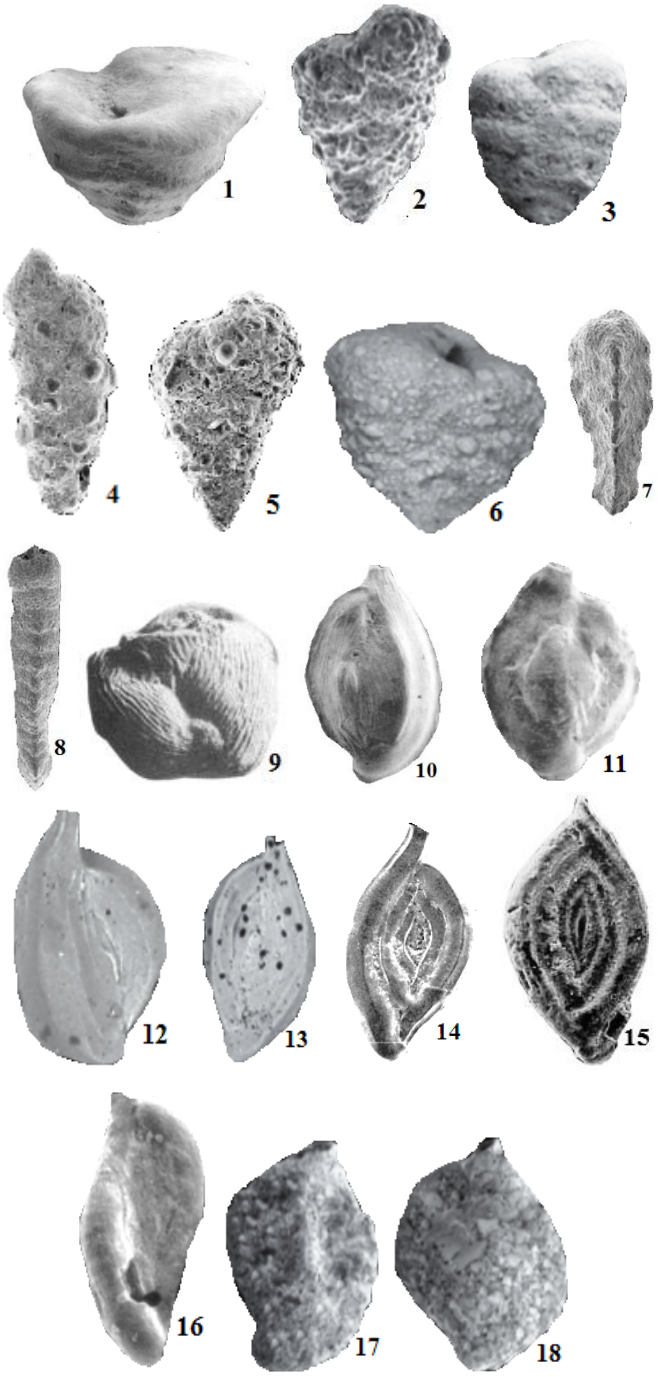
3. Systematic Paleontology

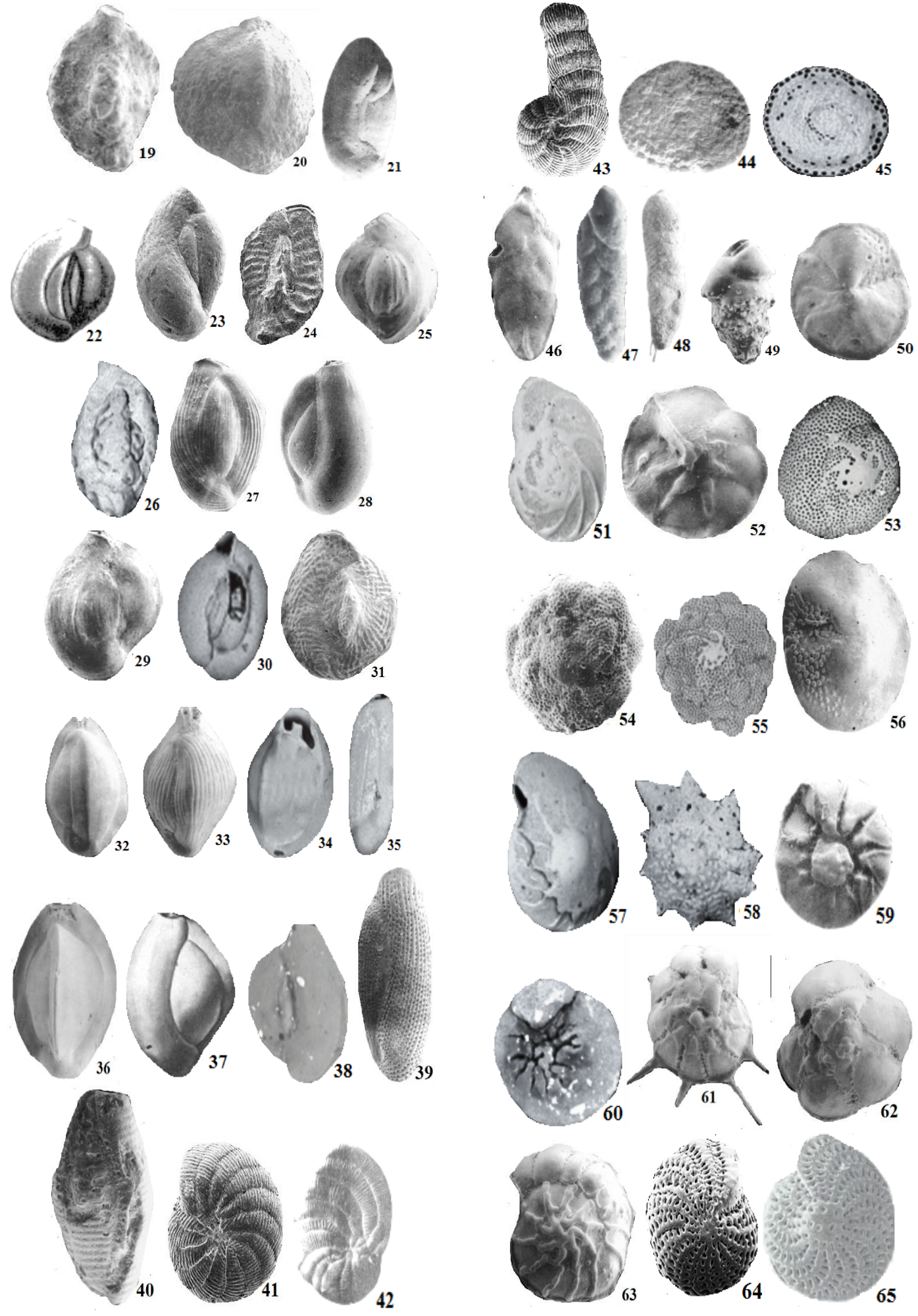
The taxonomy of the recorded Recent foraminiferal species (23 of Textulariid, 157 Miliolid, 36 Lagenid, 70 Rotaliid, and 9 Globigerinid species) used here is that of Loeblich and Tappan (1988). The geographic distribution of the recoded assemblage is shown in Table 1. In this study, 72 recorded distributed species (two localities or more) are illustrated in Plate 1, while the other endemic species are presented in the provided references.

Table 1

Red Sea: **1.** Egypt (Anan, 1984), **2.** Saudi Arabia (Youssef, 2015); **Arabian Sea**: **3.** Yemen**,** Socotra Island (Al-Wosabi et al. (2012), **4.** South Yemen (Al-Wosabi et al., 2017); **Hormoz Strait (HS)**, **5.** Oman, (Ali et al., 2021), **Arabian Gulf: 6.** UAE (Al-Kaabi, 1999), **7.** Qatar, (Al-Hitmi, 2000), **8.** Iran **(**Amao and Kaminski, 2016), **9.** (Amao et al., 2017); **10.** Arabian Sea, Cherif et al. (1997).

Plate 1: Figure. 1. *Sahulia barkeri* (Hofker, 1978), **2.** *Textularia agglutinans* d'Orbigny (1839), **3.** *T. conica* d'Orbigny (1839), **4.** *T. earlandi* Parker (1952), **5.** *T. foliacea* Heron-Allen and Earland (1915**), 6.** *T. gramen* d'Orbigny (1846)**, 7.** *Clavulina angularis* d'Orbigny (1826)**, 8.** *C. pseudoparisiensis* Anan (1984**), 9.** *Vertebralina striata* d'Orbigny (1826)**, 10.** *Adelosina crassicarinata* (Collins, 1958)**, 11.** *A. honghensis* (Lac, 1982), **12.** *A. laevigata* d'Orbigny (1826)**, 13.** *Spiroloculina antillarum* d'Orbigny (1839), **14.** *S. communis* Cushman and Todd (1944), **15.** *S. depressa* d'Orbigny (1826)**, 16.** *S. laevigata* Cushman and Todd (1944)**, 17.** *Siphonaperta agglutinans* (d'Orbigny, 1839), **18.** *S. irregularis* (d'Orbigny, 1826), **19.** *Agglutinella laticollis* (Le Calvez and Le Calvez, 1958)**, 20.** *Siphonaperta dilatata* (Le Calvez and Le Calvez, 1958)**, 21.** *Quinqueloculina laevigata* d'Orbigny (1826)**, 22.** *Q. lamarckiana* d'Orbigny (1839), **23.** *Q. limbata* d'Orbigny (1826)**, 24.** *Q. mosharrafi* Said (1949), **25.** *Q. neostriatula* Thalmann (1950), **26.** *Q. parkeri* Brady (1881)**, 27.** *Q. poeyana* d'Orbigny (1839)**, 28.** *Q. seminula* (Linnaeus, 1758)**, 29.** *Q. vulgaris* d'Orbigny (1826)**, 30.** *Milliolinella subrotunda* (Montagu, 1803)**, 31.** *Pseudomassilina pacificiensis* Cushman (1924)**, 32.** *Triloculina affinis* d'Orbigny (1826)**, 33.** *T. barnardi* Rasheed in Haig (1988), **34.** *T. marioni* Schlumberger (1893), **35.** *T. oblonga* (Montagu, 1803), **36.** *T. tricarinata* d'Orbigny (1826)**, 37.** *T. trigonula* (Lamarck, 1804)**, 38.** *T. trihedra* Loeblich and Tappan (1953), **39.** *Rupertianella rupertiana* Brady (1884)**, 40.** *Borelis schlumbergeri* Reichel (1937)**, 41.** *Peneroplis pertusus* (Forskal, 1775), **42.** *P. planatus* (Fichtel and Moll, 1803), **43.** *Spirolina arietina* (Batch, 1884), **44.** *Sorites marginalis* (Lamarck, 1816)**, 45.** *S. orbiculus* Forskal (1775)**, 46.** *Bolivina pseudopunctata* Höglund (1947), **47.** *B. pseudopunctata* Höglund (1947), **48.** *Loxostomina limbata* Brady (1881), **49.** *Bulimina marginata* d'Orbigny (1826)**, 50.** *Eponides cribrorepandus* Asano and Uchio (1951), **51.** *E. repandus* Fichtel and Moll (1798), **52.** *Neoeponides schreibersii* d'Orbigny (1846)**, 53.** *Rosalina bradyi* Cushman (1915), **54.** *Planorbuluna mediterranensis* d'Orbigny (1826)**, 55.** *Cymbaloporella tabellaeformis* Brady (1884)**, 56.** *Amphistegina lessoni* d'Orbigny (1826)**, 57.** *A. radiata* (Fichtel and Moll, 1798)**, 58.** *Neorotalia calcar* d'Orbigny (1839), **59.** *Ammonia beccarii* (Linne, 1758), **60.** *A. convexa* Nobes and Uthicke (2008)**, 61.** *Asterorotalia dentata* (Parker and Jones, 1865)**, 62.** *A. milletti* Billman, Hottinger and Oesterle (1980)**, 63.** *Challengerella bradyi* Billman, Hottinger and Oesterle (1980)**, 64.** *Elphidium advenum* (Cushman, 1922)**, 65.** *E. crispum* (Linnaeus, 1758)**, 66.** *E. macellum* Fichtel and Moll (1798)**, 67.** *E. fichtellianum* (d'Orbigny, 1846), **68.** *E. gerthi* Van Voorthuysen (1957), **69.** *Criproelphidium microgranulosum* (Gallaway and Wiessler, 1951), **70.** *Globigerina bulloides* d'Orbigny (1826)**, 71.** *Globigerinoides ruber* d'Orbigny (1839), **72.** *Orbulina universa* d'Orbigny (1839).

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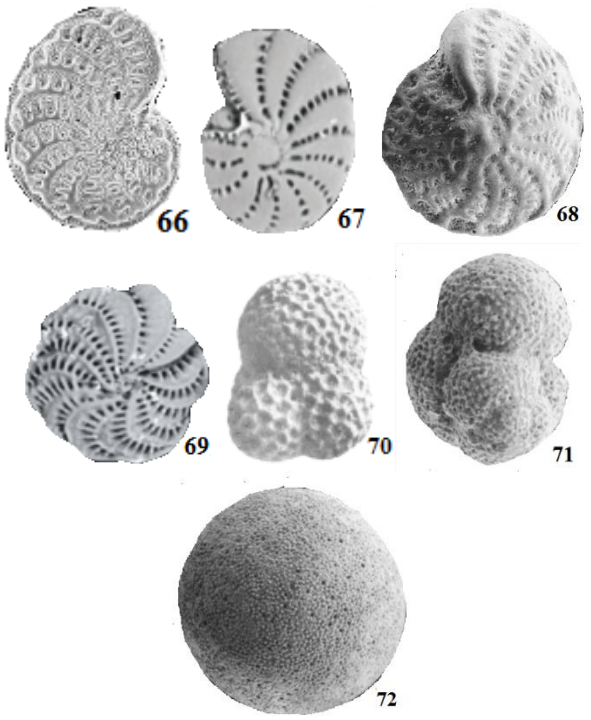

4. Geography Distribution

The geography of the littoral coast in the study area is very interest are widely distributed in the Southern Tethys, which indicates an open marine environment between these localities: Red Sea, Arabian Sea and Arabian Gulf (Figure 2).

Figure 2: The geographic localities of the seven countries around the Arabia: Egypt and SA (Red Sea), Yemen and Oman (Arabian Sea), UAE, Qatar and Iran (Arabian Gulf).

Seventy-two of 296 recorded species (~ 24.0%) of the recorded assemblage have wide geographic distribution in two or more localities around the Arabian Peninsula, which indicates an open marine environment between these localities, while the other species (~ 76.0%) are endemic to their original description. An additional remarks of the paleogeographic distribution of the recorded species can be presented:

- One littoral (inner neritic) species of the assemblage *Ammonia beccarii* has wide geographic distribution, which recorded in seven localities in the Red Sea, Arabian Sea and Arabian Gulf.
- Four species are recoded from five localities in the study area: *Triloculina tricarinata, Elphidium crispum*, *Peneroplis pertusus* and *P. planatus*.
- Five species are recoded from four localities: *Textularia conica*, *T. foliacea*, *Spiroloculina communis*, *S. depressa* and *Elphidium macellum.*
- Twenty-one species are recoded from three localities: *Textularia agglutinans*, *Clavulina pseudoparisiensis, Vertebralina striata, Quinqueloculina lamarckiana*, *Q. mosharrafi*, *Q. parkeri, Q. poeyana, Q. seminula*, *Triloculina affinis*, *T. trigonula, Rupertianella rupertiana, Spirolina arietina*, *Sorites marginalis*, *Bulimina marginata, Rosalina bradyi, Planorbuluna mediterranensis*, *Cymbaloporella tabellaeformis, Amphistegina lessoni*, *A. radiata*, *Ammonia convexa* and *Elphidium advenum.*
- Forty-one species are recoded from two localities: *Sahulia barkeri, Textularia earlandi*, *T. gramen, Clavulina angularis, Adelosina crassicarinata*, *A. honghensis, A. laevigata, Spiroloculina antillarum*, *S. laevigata, Siphonaperta agglutinans, S. irregularis, S. dilatata, Agglutinella laticollis*, *Quinqueloculina laevigata*, *Milliolinella subrotunda*, *Pseudomassilina pacificiensis, Triloculina barnardi, T. marioni, T. oblonga*, *T. trihedra, Borelis schlumbergeri, Sorites orbiculus, Bolivina pseudoplicata, B. pseudopunctata, Loxostomina limbata, Sagrinella lobata, Reussella spinulosa, Eponides cribrorepandus, E. repandus, Neoeponides schreibersii, Cibicides refulgens, Neorotalia calcar, Asterorotalia dentata*, *A. milletti*, *Challengerella bradyi, Elphidium fichtellianum*, *E. gerthi, Criproelphidium microgranulosum, Globigerina bulloides*, *Globigerinoides ruber* and *Orbulina universa*.
- The other species in the study area are recorded only from one locality.

5. Environment And Ecology

All the recorded littoral (inner neritic) benthic and planktic foraminiferal species in this study have an excellent preservation of the tests, in spite that these localities are distinguished by their own particular environmental conditions (Figure 3).

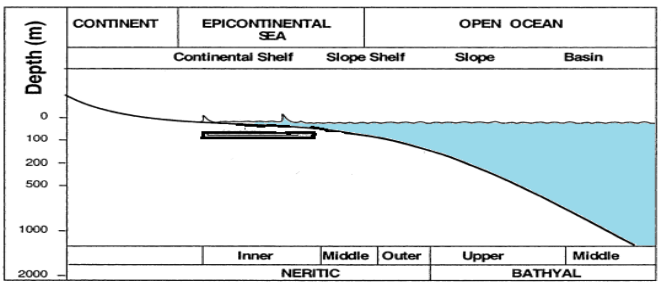

Figure 3: The environmental settings of shallow littoral (inner neritic) of recorded foraminiferal species around Arabia.

Some of the recorded assemblage have wide geographic distribution in two or more localities around the Arabian Peninsula, which indicates an open marine environment between these localities.

The faunal assemblage of the Arabian Sea displays a high diversity (~ 52.0%), which has a wide range of benthic foraminiferal morphospecies, followed by Arabian Gulf (~ 30.0%), while the fauna of the Red Sea displays relatively low diversities (~ 28.0%).

The highest diversities (~ 31.4%) of the coasts of the Yemen in the Arabian Sea as a continuation with the Iranian Ocean suggests that the amounts of nutrients provided by more open sea currents, which consists an important factor determining the constitution of the foraminifera of bottom sediments and affected by active wave and surface currents favoring the formation and dispersal of carbonates and terrigenous material..

The arenaceous foraminifera in this study (~0.08%) tend to increase in shallow-water cooler environments and the shallow water specimens have coarser grained and associated lowered oxygen, while availability of deeper water species have smooth tests.

The abundance of Miliolid species (~ 40.0%) in the study area reflects the warmer climate conditions.

Excessive evaporation and partial isolation from the Red Sea and Arabian Gulf induces abnormally high salinities throughout most of the basin, which located within an arid climatic zone bordering a desert region.

The presence of some sporadic planktic foraminiferal species indicates the drifting of the sea water toward the littoral coasts around Arabia.

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