FORAMINIFERA OF THE PALK BAY AND GULF OF MANNAR

ABSTRACT

In this study of Foraminifera, twelve species have been described and illustrated along with a list of 34 species reported from the beach sands of Palk Bay and Gulf of Mannar. This includes six new records from the Indian region. Details regarding the morphology of the test and the world-wide distribution of the different species have been given.

From a study of literature, it is found that a good amount of work has been carried out on the Foraminifera of the Indian Region (Carter, 1880; John Murray, 1889; Chapman, 1895, 1907; Dakin, 1906; Stubbings, 1939; Gnanamuthu, 1943; Sethulakshmi Amma, 1958; Bhatia and Bhatia, 1959; Bhatia, 1968; Antony, 1968; Rao 1969, 1970, 1971; and Hamsa, 1971). For the present study samples of beach sands were collected from various localities along the intertidal areas of Palk Bay and Gulf of Mannar. Sampling was done by picking up the fine sand from the top 5-7 cm from the shore deposits exposed at low tide. The material examined contained 34 species of Foraminifera belonging to 13 families and 24 genera.

The author is grateful to Dr. S. Z. Qasim, Director, Central Marine Fisheries Research Institute and to Dr. E. G. Silas for kindly going through the paper and suggesting improvements.

List of species:

Out of the 34 species, the diagnostic characters of 12 species which are of special interest have been included here along with illustrations. Of the 12 species described, 6 species marked with an asterisk (*) in the following list are recorded for the first time from the Indian coasts: 1. Quingueloculina seminulum (Linnaeus); 2. Q. vulgaris d’Orbigny; 3. Q. venusta Karner; 4. Q. boueana d’Orbigny; 5. Q. bicornis (Walker and Jacob); 6. Q. contorta d’Orbigny; 7. Triloculina oblonga (Montagu); 8. T. circularis (Bornemann); 9. Hauerina bradyi Cushman; 10. Cornuspira planorbis Schultze; 11. *Marginulina cf. crepidula (Fichtel and Moll); 12. Nodosaria cylindracea Dakin; 13. Nonion scaphum (Fichtel and Moll); 14. *Elphidium frigidum Cushman; 15. Peneroplis periusus (Forekål); 16. P. planatus (Fichtel and Moll); 17. Bolivina variabilis (Williamsen); 18. Sprillina vivipara Ehrenberg; 19. S. limbata Brady, var. denticulata Brady; 20. Discorbis globularis (d’Orbigny); 21. D. orbicularis (Torquem); 22. *Rosalina concina (Brady); 23. Parrella bengalensis (Schwager); 24. Rotalia calcar (d’Orbigny); 25. *Asterorotalia pulchelia (d’Orbigny); 26. *Pararotalia armata (d’Orbigny); 27. *Amphistegina gibbosa d’Orbigny; 28. Globigerina bulloides d’Orbigny; 29. Globorotalia menardii d’Orbigny; 30. Planulina arctica (d’Orbigny); 31. P. westleri (Schwager); 32. Cibicides lobatulus (Walker and Jacob); 33. Planorbulina mediterranea d’Orbigny; and 34. Polyvema cylindricum Carter.

In the present work, the system of classification followed is that adopted by Cushman (1959).

Hauerina bradyi Cushman (Fig. 1a)

(Family Miliolidae; Subfamily Hauerininae; Genus Hauerina d’Orbigny, 1839)

Hauerina bradyi Cushman, 1959, p. 180, pl. 14, fig. 26a, b; Hofker, 1964, p. 61 figs. 166-167.
### Table 1. Meristic and Morphometric characters of the syntypes of *O. biauritus* (Cantor) and *O. brunneus* (Day) (Measurements in mm)

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<tr>
<td>Total length</td>
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<td>Standard length</td>
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<td>330</td>
<td>385</td>
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<td>90</td>
<td>95</td>
<td>110</td>
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<td>13</td>
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<tr>
<td>Snout</td>
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<td>19</td>
<td>19</td>
<td>22</td>
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<tr>
<td>Depth at anal origin</td>
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<td>48</td>
<td>40</td>
<td>54</td>
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<td>Dorsal fin formula</td>
<td>IX, 1, 27</td>
<td>IX, 1, 27</td>
<td>IX, 1, 29</td>
<td>IX, 1, 28</td>
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<td>Lateral transverse scale</td>
<td>13-1/4-8-10</td>
<td>121/8</td>
<td>15/10</td>
<td>12/1/10</td>
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<td>In standard length, head</td>
<td>29.2%</td>
<td>28.1-28.7%</td>
<td>28.1-28.7%</td>
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<td>In head, eye</td>
<td>12.8%</td>
<td>10.6-13.5%</td>
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<td>Depth at anal origin</td>
<td>44.9%</td>
<td>42.1-53.3%</td>
<td>42.1-53.3%</td>
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I am thankful to Dr. E. Trewavas, British Museum, London, for the information about the syntype of *Otolithoides biauritus* (Cantor).

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**References**


Marginalina cf. crepidula (Fichtel and Moll) (Fig. 1b)

(Family Lagenidae; Subfamily Nodosariinae; Genus Marginalina d' Orbigny, 1826)

Marginalina cf. crepidula (Fichtel and Moll). Cushman, 1939, p. 9, pls. 1 & 2, figs. 1a, b & 10a, b.

Test ovate in outline and subcylindrical; early chambers forming a close spiral and later ones are inflated; sutures distinct; wall calcareous and finely punctated; aperture radiate, at dorsal angle. Distribution in Indian Seas: Palk Bay and Gulf of Mannar (New record). General distribution: Mediterranean, Cape Martin and Nukuhiva Island.

Nodosaria cylindracea Dakin (Fig. 1c)

(Family Lagenidae; Subfamily Nodosariinae; Genus Nodosaria Lamarck, 1812)

Nodosaria cylindracea Dakin. 1906, p. 235, plate, fig. 8.

Test elongate and cylindrical; about 12 chambers, arranged in a straight line and separated by distinct sutures; surface with numerous fine longitudinal striations; aperture a small opening at centre of last formed chamber. Distribution in Indian Seas: Gulf of Mannar. General distribution: Not known from other seas.

Elphidium frigidum Cushman (Fig. 1d)

(Family Nonionidae; Genus Elphidium Montfort, 1808)

Elphidium frigidum Cushman. 1933, p. 5, pl. 1, fig. 8; Loeblich, A.R. (Jr.) and H. Tappan, 1953, p. 99, pl. 18, figs. 4-9.

Test involute and planispiral; chambers slightly inflated, last whorl comprised of about ten to thirteen chambers; periphery rounded, and sutures slightly depressed and curved with a row of sutural pores from which grooves extend in both directions, grooves usually dying out in central area of each chamber; wall calcareous and densely punctated; aperture consisting of a row of pores at base of apertural face. Distribution in Indian Seas: Gulf of Mannar and Palk Bay (New record). General distribution: Off Point Barrow Base Camp, northern Alaska, east of Cape Rammelsburg, west side of Frobisher Bay, Baffin Land, Off North Wolstenholme Island, northwest Greenland.
Peneroplis planatus (Fichtel and Moll) (Fig. 1e)
(Family Peneroplidae; Subfamily Spirolininae; Genus Peneroplis Montfort, 1808)

Peneroplis planatus (Fichtel and Moll) Cushman, 1933, p. 61, pl. 19, figs. 1-3; 1959, p. 243, pl. 24, fig. 1.

Test free and compressed; younger chambers planispirally arranged and later portion much complanate and spreading out, reaching back on both sides towards earlier chambers, but not entirely embracing; sutures distinct, depressed and somewhat limbate; wall very distinctly striate; the striae numerous and nearly parallel to periphery; aperture simple, at base of apertural face. Distribution in Indian Seas: Krusadi Island (Gnanamuthu, 1943). General distribution: Mediterranean, Fiji Islands, Tonga Islands, Rotonga and Sulu Sea.

Rosalina concinna (Brady) (Fig. 1f)
(Family Rotaliidae; Subfamily Discorbinae; Genus Rosalina d' Orbigny, 1826)

Discorbina concinna Brady, 1884, p. 646, pl. 90, figs. 7, 8; Rosalina concinna (Brady) Todd, 1965, p. 10, pl. 4, fig. 3.
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Test free, circular in outline and last whorl comprised of four crescent-shaped chambers; wall thin, translucent and finely punctated on both dorsal and ventral surfaces. *Distribution in Indian Seas*: Gulf of Mannar and Palk Bay (New record). *General distribution*: Off the Cape Verde Islands, Coast of Holland and tropical Pacific Ocean.

**Parrella bengalensis** (Schwager) (Fig. 1g)

(Family Rotaliidae; Subfamily Rotaliinae; Genus *Parrella* Finlay, 1939)

*Anomalina bengalensis* Schwager, 1866, p. 259, tab. 7, fig. 11; *Parrella bengalensis* (Schwager) Cushman, 1959, p. 291, pl. 51, fig. 19a-c.

Test planispiral and many-chambered; all chambers visible dorsally and only those of last whorl visible ventrally; wall calcareous and finely punctated; sutures oblique and umbilical area with a distinct solid mass aperture at base of last-formed chamber. *Distribution in Indian Seas*: Car Nicobar Island; Gulf of Mannar and Palk Bay. *General distribution*: Off Japan, Philippines, and Sulu Sea.

**Asterorotalia pulchella** (d’Orbigny) (Fig. 1h)

(Family Rotaliidae; Subfamily Rotaliinae; Genus *Asterorotalia* Hofker, 1951)

*Calcarina pulchella* D’ Orbigny, 1839, Foram. Cuba, p. 92, pl. 5, figs. 16-18; *Asterorotalia pulchella* (d’Orbigny) Hofker, 1951, pt. 3, p. 505.

A few specimens of this species were found in the sample.

The species described by Hofker (1951) varies slightly from that of the specimen described by Thalmann as *Rotalia trispinosa* Thalmann (Eclog. Geol. Helv., 1933, 26: p. 248). Thalmann states that the spines in his material are solid and show no canal system but Hofker has found that all the spines in specimens of *Asterorotalia pulchella* observed by him show at least a single central canal and are not solid. The present forms are essentially similar in all respects to the specimens described by Hofker, especially in having the central canal in the spines.

Bhatia and Bhalla (1959) who collected *Asterorotalia trispinosa* (Thalmann) from Puri beach sand synonymised *Asterorotalia pulchella* (d’Orbigny) with the former which is entirely a distinct species as established clearly by Hofker (1951). This mistake has been rectified subsequently by Bhalla (1968).

Specimens well-developed, and have three spines (spines have broken after mounting in balsam); spines developed in first whorl, run through older whorls and pierce straight through a chamber. *Distribution in Indian Seas*: Palk Bay and Gulf of Mannar (New record). *General distribution*: Off Seba, Savu, Borneo-bank, Off Hawaiian Islands and Cuba.
Pararotalia armata (d'Orbigny) (Fig. 1i)

(Family Rotaliidae; Subfamily Rotaliinae; Genus Pararotalia Le Calvez, 1949)

Pararotalia armata (d'Orbigny) Loeblich, A. R. (Jr.) and H. Tappan, 1957, p. 9, pl. 5, figs. 2a-c.

Test free trochospiral and biconvex; chambers few and last whorl comprised of seven chambers; periphery acute and peripheral margin of each chamber ends with a short spine; umbilical area with a clear shell material; wall calcareous with limbate sutures; aperture situated at base of last formed chamber. Distribution in Indian Seas: Palk Bay and Gulf of Mannar (New record). General distribution: Dax, Dept. Landes, France.

Amphistegina gibbosa d'Orbigny (Fig. 1j)

(Family Amphisteginidae; Genus Amphistegina d'Orbigny, 1826)

Amphistegina gibbosa d'Orbigny, 1839, Foram. Cuba, p. 120, pl. 8, figs. 1-3; Hofker, 1964, p. 88, figs. 224-226.

Test not much compressed, lenticular and asymmetrical with 12 to 13 chambers at dorsal side; margin subacute and not keeled; sutures simple and curved backward; umbilical region hyaline and smooth with clear shell material; aperture slit-like on ventral side; secondary chamberlets on ventral side are small with simple sutures. Distribution in Indian Seas: Palk Bay and Gulf of Mannar (New record). General Distribution: Caribbean shallow waters.

Cibicides lobatulus (Walker and Jacob) (Fig. 1k)

(Family Anomalinidae; Subfamily Cibicidinae; Genus Cibicides Montfort, 1808)

Cibicides lobatulus (Walker and Jacob) Cushman, 1959, p. 335, pl. 36, fig. 11; Hofker, 1964, p. 76, fig. 204 a-c; Antony, 1968, p. 114, pl. 8, fig. 11a, b.

Test dorsally flattened and shows complete spiral of chambers; wall calcareous with distinct pores on both sides; peripheral margin lobulate; aperture marginal, extending over dorsal side. Distribution in Indian Seas: North and South-west coasts of India, Palk Bay and Gulf of Mannar. General Distribution: Philippines, Hawaiian Islands and Off Japan.

Polycrema cylindricum Carter (Fig. 11)

(Family Homotremidae; Genus Polycrema Carter, 1880)

Polycrema cylindricum Carter, 1880, p. 441, pl. 18, fig. 1 a-g; Cushman 1959, p. 347, pl. 37, figs. 30-32.

Test attached, cylindrical, consisting of a thick pillar developed from a slightly expanded base, dichotomously branched at free end into two branches, which are
equal and opposite, terminating respectively in an expansion, from which radiate a number of sponge-spicules. Test wall calcareous and surface pierced with scattered foramina. Orange in colour. Distribution in Indian Seas: Gulf of Mannar. General distribution: East Africa, Mediterranean, West Indies, Sulu-Archipelago and Damar Island.

Remarks:

In general, the foraminiferal fauna of this area resembles that of Philippines and adjacent seas. More than two-thirds of the species reported here have also been recorded from the different parts of the Indian region by recent workers.

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