

## FORAMINIFERA COLLECTED OFF MANDAPAM (GULF OF MANNAR)

### ABSTRACT

This note deals with the recent foraminifera from the mud samples collected at 200 m off Mandapam (Gulf of Mannar). Fourteen species belonging to 11 genera and 8 families are described and illustrated, of which 4 species are new records. Foraminiferan species recorded for the first time from the Indian region are (1) *Bulimina elegans* d'Orbigny var. *exilis* H.B. Brady, (2) *Bolivina subtenuis* Cushman, (3) *Bolivina subreticulata* Parr and (4) *Streblus catesbyanus* (d'Orbigny).

CONSIDERABLE work has been done on foraminifera of the Indian region by various authors. The most important among them are the reports of John Murray (1889), Chapman (1907), Stubbings (1939), Amma (1958), Bhatia and Bhalla (1959), Bhalla (1968), Antony (1968), Rao (1969, 1970, 1971) and Hamsa (1971, 1972). Foraminiferan fauna of the Palk Bay and the Gulf of Mannar has been studied in detail by Carter (1880), Dakin (1906) and Gnana-muthu (1943). The present work is based on the samples collected during the year 1970 at a depth of 200 m off Mandapam.

Fourteen species belonging to 11 genera and 8 families have been obtained of which 4 species are new records from the Indian region.

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### *Material and Methods*

The mud samples were collected on 6-4-1970 from the trawl net hauled at a depths of 200 m off Mandapam, by the fishing vessel *Klaus Sunnana* which was specially engaged in deep-sea lobster fishing operations. The mud which was very soft, greyish-cement in colour was preserved in rectified spirit. Five samples were drawn out from the bulk material and examined for foraminifera. The specimens

were sorted out and identified after mounting them on slides using euparal.

#### Description

Family : Textulariidae ; Subfamily : Textulariinae ; Genus : *Textularia* DeFrance 1824.

*Textularia cuneiformis* d' Orbigny (Fig. 1 a)

*Textularia cuneiformis* Williamson 1858, *Rec. Foram. Gt. Britain*, p. 75, figs. 158, 159 ; Amma, J.S. 1958, *Bull. Res. Inst. Univ. Kerala*, Ser. C, 6 (1) : 39, pl. 2, fig. 56 ; Rao, Kameswara 1969, *J. Bombay nat. Hist. Soc.*, 66 (3) : 586, pl. 1, fig. 3.

**Diagnosis** : Test as long as broad, conical in shape and somewhat compressed ; chambers few, earlier ones small and later formed chambers increasing rapidly in size as added ; sutures depressed and curving downwards ; test wall smooth and finely punctate ; aperture a narrow slit situated at the base of the last formed chamber.

**Distribution in the Indian region** : Kerala Coast, Gulf of Cambay, Northeastern part of the Arabian Sea.

Family : Trochamminidae ; Subfamily : Trochammininae ; Genus : *Trochammina* Parker and Jones 1859.

*Trochammina inflata* (Montague) (Fig. 1 b)

*Trochammina inflata* Brady, 1884, *Rep. voy. Challenger, Zoology*, 9 : 338, pl. 41, figs. 4a-c ; Hofker, J. 1964, *Studies in fauna Curacao* 21 (83) : 15, fig. 1 ; Amma, J.S. 1958, *Bull. Res. Inst. Univ. Kerala*, Ser. C, 62, pl. 3, fig. 95 ; Rao, Kameswara 1969, *J. Bombay nat. Hist. Soc.* 66 (3) : 595, pl. 3, fig. 29.

**Diagnosis** : Test trochoid, with three whorls of inflated chambers, about 5-6 in the last whorl ; sutures distinct and strongly curved ; periphery lobulated ; aperture in the form of a narrow slit at the ventral side of the last formed chamber ; colour brownish yellow.

**Distribution in the Indian region** : Kerala Coast and Gulf of Cambay.

Family : Lagenidae ; Subfamily : Nodosariinae ; Genus : *Robulus* Montfort, 1808.

*Robulus limbosus* (Reuss) (Fig. 1 c)

*Robulina limbosa* Reuss, 1863, *Sitz. Akad. Wiss. Wien*, 48 (1) : 55, pl. 6, figs. 69 a, b (1864) ; *Robulus limbosus* (Reuss) Cushman, J.A. 1933, *U.S. Nat. Mus. Bull.*, 161 (2) : 3, pl. 1, figs. 4-6 ; 2, figs. 5a, b ; Rao, Kameswara 1971, *Proc. Indian Acad. Sci.*, 73 (4) : 159, fig. 32.

**Diagnosis** : Test planispiral, close coiled, biconvex in peripheral view ; periphery keeled and chambers 8 in the adult coil ; sutures distinctly limbate, slightly curved ; wall smooth, finely perforate ; aperture radiate at the peripheral angle of the test.

**Distribution in the Indian region** : North-eastern part of the Arabian Sea.

Family : Nummulitidae ; Genus : *Nonionina* d' Orbigny, 1826.

*Nonionina scapha* (Fichtel and Moll) (Fig. 1 d)

*Nonionina scapha* (Fichtel and Moll), Cushman, J.A. 1914, *U.S. Nat. Mus. Bull.* 71 (4) : 28, pls. 15, 16, figs. 1, 3, 4 ; *Nonion scaphum* (Fichtel and Moll), Antony, A. 1968, *Bull. Dept. Mar. Biol. Oceanogr.*, 4 : 58, pl. 4, fig. 1 ; *Nonion scapha* (Fichtel and Moll), Rao, K. Kameswara 1971, *Proc. Indian Acad. Sci.*, 73 (4) : 159, fig. 34.

**Diagnosis** : Test compressed, elongate-oval in shape, composed of about six chambers in the last whorl and rapidly increasing in size as added ; sutures distinct and depressed ; wall smooth and finely punctate ; aperture a narrow slit at the base of the apertural face.

**Distribution in the Indian region** : North-eastern and southwest coast of India.

Family : Camerimidae ; Subfamily : Cameriniinae ; Genus : *Operculina* d' Orbigny, 1826.

*Operculina gaimairdi* d' Orbigny (Fig. 1 e)

*Operculina gaimairdi* d'Orbigny, 1826, *Ann. Sci. Nat.* ; 7 (5) : 281 Cushman, J.A. 1921, *U.S. Nat. Mus. Bull.*, 100 (4) : 375 ; 1933, *Ibid.*, 161 (2) : 55,

pl. 13, fig. 1; Rao, Kameswara 1970, *J. Bombay nat. Hist. Soc.*, 67 (2) : 265, pl. 5, fig. 49.

**Diagnosis:** Test small, much compressed; chambers numerous, curved; sutures typical, nearly straight, then near the periphery bend back sharply to the outer edge; wall calcareous and perforate.

***Bulimina elegans* d'Orbigny, var. *exilis* H.B. Brady (Fig. 1 f)**

*Bulimina elegans* d'Orbigny, var. *exilis* H.B. Brady, 1884, *Rep. voy. Challenger, Zoology*, 9 : p. 399, pl. 50, figs. 5, 6; Cushman, J.A. 1922, *U.S. Nat. Mus. Bull.*, 104 (3) : p. 106, pls. 17, figs. 7-12; 19, figs. 2, 3.

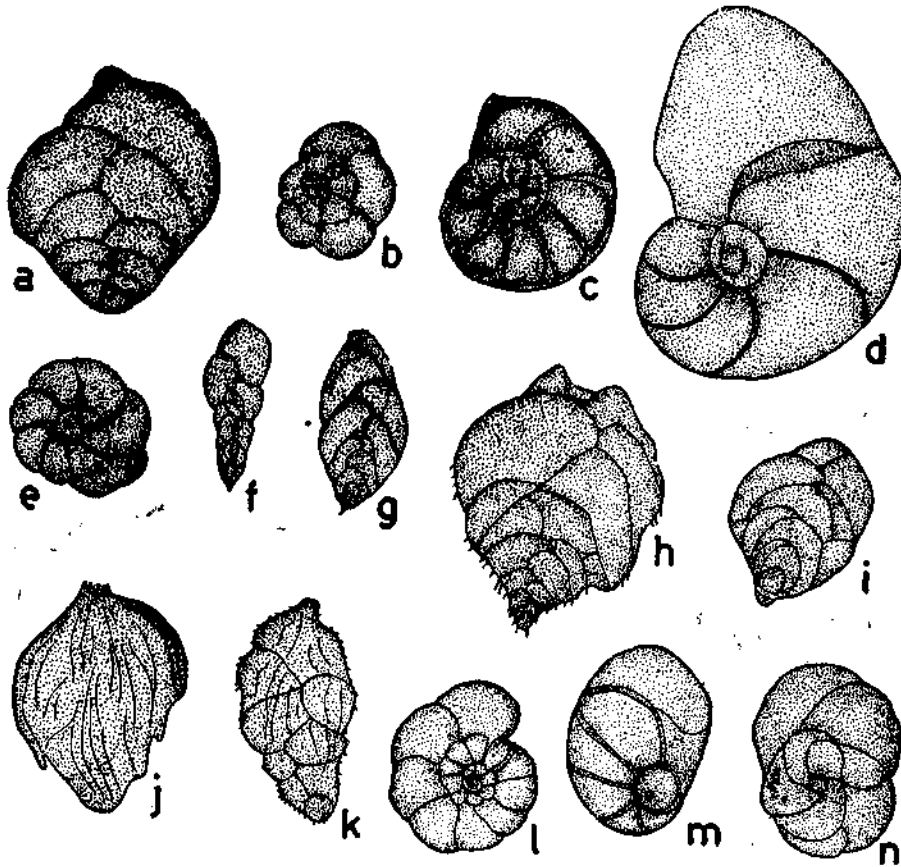


Fig. 1 a. *Textularia cuneiformis* d'Orbigny X 60; b. *Trochammia inflata* (Montague) X 60; c. *Robulus limbosus* (Reuss) X 60; d. *Nontonina scapha* (Fichtel and Moll) X 630; e. *Operculina gaimairdi* d'Orbigny X 100; f. *Bulimina elegans* d'Orbigny, var. *exilis* H.B. Brady X 60; g. *Bolivina robusta* H.B. Brady X 60; h. *B. rhomboidalis* (Millett) X 100; i. *B. subtenuis* Cushman X 60; j. *B. subreticulata* Parr X 100; k. *Uvigerina ampullacea* H.B. Brady X 60; l. *Streblus catesbyanus* (d'Orbigny) X 60; m. *Cancris auriculus* (Fichtel and Moll) X 100; and n. *Poroeponides lateralis* (Terquem) X 100.

**Distribution in the Indian region:** Gulf of Cambay.

**Family:** Buliminidae; **Subfamily:** Bulimini-nae; **Genus:** *Bulimina* d'Orbigny, 1826.

**Diagnosis:** Test elongate, tapering and somewhat fusiform, chambers typically tri-serial, numerous, apical and pointed with a spine; sutures distinct and depressed; wall

smooth, finely punctate; aperture typically a comma-shaped slit.

*Distribution in the Indian region*: Not hitherto recorded from the Indian waters.

Subfamily: Virguliniinae; Genus: *Bolivina* d'Orbigny 1839.

***Bolivina robusta* H.B. Brady (Fig. 1 g)**

*Bolivina robusta* H.B. Brady, 1884, *Rep. Voy. Challenger Zoology*, 9: p. 421, pl. 53, figs. 7-9; Chapman, F. 1907, *Linn. Soc. Journ. Zool.*, 39 (195): 32, pl. 4, fig. 82; Stubbings, H.G. 1939, *Br. Mus. (Nat. Hist.)*, 3 (2): 94, Cushman, J.A. 1942, *U.S. Nat. Mus. Bull.*, 161 (3): 17, pl. 6, fig. 2.

*Diagnosis*: Test compressed, about twice as long as broad; periphery subacute, apical end with a single acicular spine; chambers numerous, broader than height throughout, increasing in size as added; sutures distinct, limbate and obliquely curved; aperture a small opening with a slight lip; wall calcareous, smooth and finely perforate.

*Distribution in the Indian region*: Arabian Sea.

***Bolivina rhomboidalis* (Millett) (Fig. 1 h)**

*Textularia rhomboidalis* Millett, 1899, *Journ. Roy. Micr. Soc.*, p. 559, pl. 7, fig. 4; *Bolivina rhomboidalis* (Millett), Cushman, J.A. 1942, *U.S. Nat. Mus. Bull.*, 161 (3): 19, pl. 6, figs. 7, 8; Hofker, J. 1964, *Studies Fauna Curacao*, 21 (83): 77, figs. 205, 206; Rao, Kameswara 1970, *J. Bombay nat. Hist. Soc.*, 67 (2): 268, pl. 5, fig. 57.

*Diagnosis*: Test generally triangular in shape slightly longer than broad with truncate periphery. Chambers numerous, obliquely arranged, increasing in breadth from the bluntly pointed initial end to the broad apertural end; peripheral outline decorated with short spinose processes; wall smooth finely perforate; aperture slit like at the base of the inner margin of the last formed chamber.

*Distribution in the the Indian region*: Gulf of Cambay.

***Bolivina subtenuis* Cushman (Fig. 1 i)**

*Bolivina subtenuis* Cushman, 1936, *Cushman Lab. Forum. Res. Special Publ.*, 6: p. 57, pl. 8, fig. 10; 1942, *U.S. Nat. Mus. Bull.*, 161 (3): 29, pl. 8, fig. 5.

*Diagnosis*: Test compressed, as broad as long, widest just above the middle; chambers many, distinctly inflated; sutures strongly curved, the inner portion of each chamber showing signs of subdivision; wall smooth, finely perforate; aperture rounded with a minute lip.

*Distribution in the Indian region*: Not hitherto recorded from the Indian waters.

***Bolivina subreticulata* Parr (Fig. 1 j)**

*Bolivina subreticulata* Parr, 1932, *Proc. Roy. Soc. Victoria*, 44: p. 12, pl. 1, figs. 21 a, b; Cushman, J.A. 1942, *U.S. Nat. Mus. Bull.*, 161 (3): 21, pl. 9, fig. 2.

*Diagnosis*: Test rhomboid, widest along the median line with sharp edges; chambers numerous, fairly distinct; sutures limbate; wall calcareous, finely perforate, and ornamented with irregular costae; aperture terminal elongate oval.

*Distribution in the Indian region*: This is the first record from the Indian region.

Subfamily: Uvigeriniinae; Genus: *Uvigerina* d'Orbigny, 1826.

***Uvigerina ampullacea* H. B. Brady (Fig. 1 k)**

*Uvigerina ampullacea* H.B. Brady, Cushman, J.A. 1921, *U.S. Nat. Mus. Bull.*, 100 (4): 274, pl. 55, fig. 7, *Ibid.*, 161 (3): 46, pl. 13, figs. 2-6; Rao, K. Kameswara 1971, *Proc. Indian Acad. Sci.*, 73 (4): 160, fig. 47.

*Diagnosis*: Test elongate, fusiform with apertural end produced to a tubular neck; chambers inflated; sutures distinct, slightly depressed; peripheral outline ornamented by numerous, fine, short, rather evenly distributed spines; body surface ornamented with

numerous, longitudinal costae; aperture at the end of the tubular neck, with a lip.

*Distribution in the Indian region:* North-eastern part of the Arabian Sea.

Family: Rotaliidae; Genus: *Streblus* Fischer, 1817.

***Streblus catesbyanus* (d'Orbigny) (Fig. 11)**

*Rosalina catesbyana* d'Orbigny, 1839, *Foram. de Cuba*, p. 99, pl. 4, figs. 22, 24; *Streblus catesbyanus* (d'Orbigny), Hofker, J. 1964, *Studies fauna Curacao*, 21 (83): 93, figs. 232, 233, 235.

*Diagnosis:* Test rounded, dorsal side somewhat flattened; periphery rounded; and lobulate; dorsal sutures curved bending backward; all the chambers particularly the younger ones visible on the dorsal side; the last whorl contains  $8\frac{1}{2}$  chambers; umbilical cavity wide; aperture wide open at the base of the apertural face.

*Distribution in the Indian region:* This species has been recorded for the first time from the Indian region.

Subfamily: Baggininae; Genus: *Cancris* Montfort, 1808.

***Cancris auriculus* (Fichtel and Moll) (Fig. 1 m)**

*Cancris auriculus* (Fichtel and Moll), Todd, R. 1965, *U.S. Nat. Mus. Bull.*, 161 (4): 22, pl. 5, fig. 5; Antony, A. 1968, *Bull. Dept. Mar. Biol. Oceanogr.*, 4: 97, pl. 7, figs. 5 a, b; *Cancris auricula* (Fichtel and Moll) Rao, K. Kameswara 1971. *Proc. Indian Acad. Sci.*, 74 (4): 161, fig. 52.

*Diagnosis:* Test compressed, elongate-oval in shape, six chambers in the final coil, gradually

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increasing in size as added; sutures marked by distinct lines, slightly curved and the umbilicus is broad and depressed; aperture is situated at the base of the last formed chamber.

*Distribution in the Indian region:* North-eastern and southwest coast of India.

Family: Eponididae; Genus: *Poroeponides* Cushman, 1944.

***Poroeponides lateralis* (Terquem) (Fig. 1 n)**

*Rosalina lateralis* Terquem, 1878, *Mem. Soc. Geol. France*, ser. 3, 1 (3): 25, pl. 2, figs. 11 a-c; *Poroeponides lateralis* (Terquem), Bhatia and Bhalla, 1959, *J. Paleont. Soc. India*, 4: 80, pl. 2, figs. 3 a, b; Bhalla 1968, *Bull. Nat. Inst. Sci. India*, 38: 387, pl. 2, figs. 8a, b.

*Diagnosis:* Test flat and coiled; chambers few, gradually increasing in size as added; chambers at dorsal side obliquely placed; aperture narrow, elongate opening at the ventral side; apertural face coarsely perforated; test smooth, finely punctate.

*Distribution in the Indian region:* Orissa, Vishakapatnam and west coast.

*Remarks*

*Bulimina elegans* d'Orbigny var. *exilis* H. B. Brady, *Bolivina subtenuis* Cushman, *B. subreticulata* Parr and *Streblus catesbyanus* (d'Orbigny) are recorded for the first time in Indian waters and the other 10 species have not been reported so far from the Gulf of Mannar. The species described here have a cosmopolitan distribution and are well-known from the Indo-Pacific region.

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