NEW OBSERVATIONS ON SEABROOKIA RUGOSA WATANABE, 1989 (FORAMINIFERA)

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ABSTRACT

Seabrookia rugosa Watanabe, 1989 has a radial hyaline wall structure. The fossil material, on which the type description is based, commonly has diagenetic calcite overgrowths which make the wall appear agglutinated. However, the modern examples have a smooth wall surface. This species has a wide Recent distribution including the Arctic, Atlantic and Southern oceans, from 400– 4,850 m. Fossil occurrences are known from the Atlantic, Southern, Indian and Pacific oceans, and the stratigraphic range is from late Paleocene to Recent.

INTRODUCTION

Seabrookia rugosa Watanabe, 1989 was first described using Paleogene-Neogene material. Recently, it has been found in Neogene and modern sediments. The Recent examples have a smooth wall whereas that of the fossil forms is commonly rough, hence the choice of species name. In this paper, we show that the rough appearance is caused by the development of a diagenetic cement. This species is widely distributed both geographically and stratigraphically.

MATERIAL AND METHODS

Specimens were obtained from Recent and fossil deepsea sediments (Table 1) which had been washed on a sieve with 63-µm mesh. They were examined in reflected and transmitted light, in polarized transmitted light, and with the scanning electron microscope (both low voltage, uncoated material, and high voltage, gold-coated material). Determination of the wall mineralogy was by laser raman spectroscopy and transmission electron microscopy.

WALL TEXTURE

Seabrookia rugosa was described and named based on fossil material which had an "almost opaque" wall of "granulose aspect" (Watanabe, 1989, p. 267). Specimens from the Arctic Ocean illustrated by Lagoe (1977, as Incertae sedis Species A, plate 5, figs. 18-21, p. 128) also have a rough surface, which he described as having "an unusual corroded aspect".

The majority of Miocene specimens have a rough wall texture, but rare examples from the Indian Ocean are smooth. The rough-textured specimens from the Miocene of the Atlantic and Indian oceans (DSDP and ODP samples) superficially appear to be agglutinated with coccoliths (Plate 1, figs. 12–19), but broken specimens reveal an internal, diagenetic, sparry calcite cement (Plate 1, figs. 18, 19). On closer examination of the wall exterior, it is seen that this also has a coating of diagenetic sparry cement, with adher-

ing coccoliths (Plate 1, figs. 13, 14, 18). The apertural lip is thickened with cement, and this causes the apertural opening to be narrowed (Plate 1, fig. 17). The surface texture of the Eocene specimen of *Seabrookia* sp. illustrated by Boltovskoy and Boltovskoy (1989, plate IV, fig. 20) and of *S. rugosa* (Watanabe, 1989, plate 1, figs. 15–17) appears to be similar. Because of these diagenetic effects, it is difficult to determine the wall structure in fossil material.

Modern and late Quaternary specimens examined in this study have a smooth, thin, transparent, hyaline calcite wall (Plate 1, figs. 1-11). Under crossed polars, the wall shows a dark extinction cross deformed due to the elongation of the chambers.

GEOGRAPHIC DISTRIBUTION OF RECENT MATERIAL

This species has a wide geographic distribution: NE Atlantic Ocean (Table 1) (Thomas and others, 1995); Southern Ocean (Table 1); Arctic Ocean, 1,363–3,068 m (Lagoe, 1977, as Incertae sedis Species A).

STRATIGRAPHIC OCCURRENCE

Seabrookia rugosa has been reported from the Late Paleocene to Recent: Late Paleocene-early Pliocene, eastern South Atlantic, DSDP Site 525 (Walvis Ridge, Boltovskoy and Boltovskoy, 1989, as Seabrookia sp.; Watanabe, 1989, as Seabrookia rugosa); late Paleocene, North Atlantic (Boltoyskoy, and others, 1992); Oligocene-Recent, Northeast Atlantic, DSDP Sites 608 and 610 (Thomas, 1986, as Quinqueloculina sp. juv.); early-late Miocene, Atlantic Ocean (Table 1); Quaternary, Northeast Atlantic (Thomas and others, 1995, as Seabrookia rugosa); early Eocene-Recent, Southern Ocean, ODP Sites 689 and 690 (Thomas, 1990, as Quinqueloculina spp.); middle Eocene-middle Miocene, Arabian Sea (Boltovskoy and Vera Ocampo, 1993); late Oligocene-late Miocene, Indian Ocean (Table 1); late Palaeocene-middle Eocene, Pacific Ocean, ODP Site 865 (Thomas, in prep., as Seabrookia rugosa); Eocene-Quaternary, Pacific Ocean, DSDP Site 317 (Boltovskoy and Watanabe, 1994. as Seabrookia rugosa); late Eocene-Recent, Pacific Ocean, DSDP Sites 573, 574 and 575 (Thomas, 1985, as Quinqueloculina sp., juvenile); late Miocene, Pacific Ocean (Table 1).

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Seabrookia rugosa Watanabe. 1–8 uncoated specimens examined in a low vacuum SEM. 9–19 gold-coated specimens examined in a high-vacuum SEM. 1–11 Northeast Atlantic, BOFS core 5K, 99–100 cm, 50°41.3'N, 21°51.9'W, water depth 3,547 m, late Quaternary, ~19,800 yrs BP (Thomas, and others, 1995). 12–19 Miocene forms showing calcite overgrowth with attached coccoliths. 12–15 DSDP 563-11-14, 74–76 cm. 16 ODP 667A-23H-2, 55–57 cm. 18, 19 Broken sections showing primary wall (w) and calcite overgrowths (o), ODP 667A-27X-4, 70–72 cm.

TABLE 1. Records of Seabrookia rugosa utilized in this study. PAP = Porcupine Abyssal Plain; CVAP = Cape Verde Abyssal Plain.

Locality and sites	Latitude, longitude	Water depth (m)	Stratigraphic interval
Atlantic Ocean		······································	
RRS Discovery (PAP site)	48°51'N, 16°30'W	4,850	Recent
RRS Discovery (CVAP site)	21°03'N, 31°11'W	4,505	Recent
BOFS core 14K	58°37.2'N, 19°26.2'W	1,750	Recent
BOFS core 5K, 99–100 cm	50°41.3'N, 21°51.9'W	3,547	late Quaternary
DSDP Hole 368	17°30.04'N, 21°21.02'W	3,366	early-middle Miocene
DSDP Hole 400A	47°22.90'N, 09°11.90'W	4,399	early-middle Miocene
DSDP Hole 518	29°58.42'S, 38°08.12'W	3,944	early-late Miocene
DSDP Hole 529	28°55.83'S, 02°46.08'E	3,035	early-middle Miocene
DSDP Hole 563	33°38.53'N, 43°46.04'W	3,786	early-middle Miocene
ODP Hole 667A	04°34.15'N, 21°54.68'W	3,529	early-middle Miocene
Indian Ocean			
DSDP Hole 216	01°27.73'N, 90°12.48'E	2,247	early-middle Miocene
DSDP Hole 237	07°04.99'S, 58°07.48'E	1,623	early-late Miocene
ODP Hole 707A	07°32.72'S, 59°01.01'E	1,552	late Oligocene-late Miocene
ODP Hole 709C	03°54.90'S, 60°33.10'E	3,040	late Oligocene-late Miocene
ODP Hole 710A	04°18.70'S, 60°58.80'E	3,824	late Oligocene-middle Miocene
ODP Hole 758A	05°23.05'N, 90°21.67'E	2,923	early-middle Miocene
Pacific Ocean			
ODP Hole 849D	0°10.99'N, 110°31.17'W	3,839	late Miocene
Southern Ocean	• • • •	·	
Cores AN92-2/1 and 2/2	71°18.6'S, 0°17.2'E	400	Recent

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