## 20. NEOGENE BENTHIC FORAMINIFERS FROM DSDP SITES 360 AND 362, SOUTH EASTERN ATLANTIC

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Miocene to Quaternary benthic foraminifers have been examined from the South Atlantic Sites 360 and 362 (Figure 1). Site 360 is situated midway down the continental rise off Southwest Africa, at latitude 35°51'S, longitude 18°05'E, in a water depth of 2977 meters. Site 362 is situated on the Abutment Plateau of the Frio Ridge segment of the Walvis Ridge, at latitude 19°45'S, longitude 10°32'E, in a water depth of 1325 meters.

The portions examined are: Site 360, Cores 1-25 (lower Pliocene-lower Miocene); Site 362, Cores 1-38 (Pleistocene-lower Miocene).

Most of the material examined consists of foraminifer- or diatom-rich nannofossil ooze and chalks. The benthic foraminifers are sparse, and in many instances only 1-2 specimens were found for each species present (Tables 1 and 2).

The benthics appear as a very small portion of the total foraminifer fauna, in most cases less than 1% of the sample provided.

The benthic faunas are dominated by long-ranging, moderate to deep-water species, not particularly suitable for biostratigraphic subdivision. Miliolids, mainly *Quinqueloculina*, and *Biloculina* are persistent throughout Sites 360 and 362.

Arenaceous forms were found with six species present at Site 360, and nine at Site 362. From the range charts (Tables 1 and 2) it can be seen that the dominant and persistent forms are: Pullenia bulloides, Pullenia quinqueloba, Oridorsalis umbonatus, Oridorsalis tenera, Cassidulina subglobosa, Cassidulina laevigata, Alabamina tenuimarginata, Sphaeroidina bulloides, Martinottiella communis, Cibicides ihungia, Cibicides molestus, Bulimina truncanella, Angulogerina esuriens, Gyroidina prominula and Gyroidinoides zelandicus. Less common, though still present, are: Hopkinsina mioindex, Euuvigerina notohispida, Bolivina finlayi, Laticarinina halophora and various species of Stilostomella.

The following species observed are known from the New Zealand sequence: *Cibicides molestus, Cibicides ihungia, Bulimina marginata, Cassidulina laevigata,* and *Pullenia bulloides.* Vella (1962a, b, c, 1963) inferred the following depth ranges for Miocene and Pliocene forms from the east coast of the North Island, New Zealand:



Figure 1. Location of Sites 360 and 362.

Pullenia bulloides	1000-4000 feet
Pullenia quinqueloba	400-1000 feet
Cibicides molestus	200-2000 feet
Cibicides ihungia	20-4000 feet
Cassidulina laevigata	20-1000 feet
Bulimina marginata	20-1000 feet

## REFERENCES

- Vella, P.P., 1962a. Biostratigraphy and paleoecology of Mauriceville District, New Zealand: Trans. Roy. Soc. New Zealand Geol., v. 1, p. 183-199.
- \_\_\_\_\_, 1962b. Determining depths of New Zealand Tertiary seas: Tuatara, v. 10, p. 19-40.
- \_\_\_\_\_, 1962c. Late Tertiary Nonionid foraminifera from Wairarapa, New Zealand: Trans. Roy. Soc. New Zealand Geol., v. 1, p. 285-296.

\_\_\_\_\_, 1963. Some foraminifera from the upper Miocene and Pliocene of Wairarapa, New Zealand: Trans. Roy. Soc. New Zealand Geol., v. 2, p. 1-14.

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 TABLE 1

 Distribution of Lower Pliocene to Lower Miocene Benthic Foraminifers in Site 360

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Nuttalides truempyi		Bolivinopsis cubensis	Melanis zeobesus Melanis zeobesus Nadasaria obliquecostata Bilacultina sp. Cibicides robertsonianus Sigmoilopsis schlumbergeri		Stilostomella vernevilli	Stilostomella pomuligera	Quinqueloculina sp.	Nodosarella subnodos	Lagenonodosaria hirstua	Nodosaria delicatula	Nodosaria striata	Uvigerina sp.	Vaginulina vagina	Uvigerina plejeba	Vulvulina sp.	Uvigerina striata	Bulimina pupula	Proxifrons sp.	Ehrenbergina sp.	AUSTRAL-NEW ZEALAND PLANKTONIC FORAMINIFERAL ZONES (Jenkins 1966, 1967, 1975)	TROPICAL PLANKTONIC FORAMINIFERAL ZONES (Bolli 1957, 1966, 1973)		AGE		
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TABLE 2 – Continued

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 TABLE 2

 Distribution of Pleistocene to Lower Miocene Benthic Foraminifers at Site 362

NEOGENE BENTHIC FORAMINIFERS

TABLE 2 - Continued

Stilostomella verneuilli Anauloaerina esutiens	Globobulimina (arenaceous)	Dentalina subcostata	Proxifrons sp.	Ellipsoglandulina subconica	Vaginulinopsis sp.	Uvigerina 'bortotara'	Boliving anastomosa Cercharting an	Nodosaria hispida	Noviuva plebeja	Astrononion impressum	Buliminella sp.	Textularia (square)	Nodosaria pyrula	Bulimina pupula	Textularia sp.	Hofkeruva zeacuminata	Hoeglunding elegans	Loxostomum sp.	Cibicides novozelandicus	Concris sp.	Unigering sp.	Ceroberting (Jong, min)	Kosaina sp.	woorimorphing sp.	Astrononion charlottensis	AUSTRAL-NEW ZEALAND PLANKTONIC FORAMINIFERAL ZONES (Jenkins 1966, 1967, 1975)		AGE	
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_									1					_		-											Globorotalia miocenica	м	
									ł		-			I												Glaboratalia puncticulata	Globorotalia margaritae	L	PLIOCENE
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PLATE 1

	Figure 1	Bolivinopsis cubensis (Cushman and Bermudez). ×41. Sample 362-19, CC. Globorotalia conomiozea
	Figure 2	Zone; upper Miocene. Massilina tenuis (Czjzek). ×47. Sample 362-19, CC. Globorotalia conomiozea Zone; upper Miocene.
	Figure 3	Vaginulina vagina (Stache). ×23. Sample 362-19, CC. Globorotalia conomiozea Zone; upper Miocene.
	Figure 4	Vaginulinopsis spinulosa (Stache). ×16. Sample 360-23, CC. Globigerinoides trilobus trilobus Zone; lower Pliocene.
	Figures 5, 6	Plectofrondicularia whaingaroica (Stache). ×29. Sample 362-11, CC. Globorotalia puncticulata Zone; lower Pliocene.
	Figure 7	Stilostomella basicarinata Hornibrook. ×29. Sample 362-14, CC. Globorotalia puncticulata Zone; lower Pliocene.
	Figure 8	Stilostomella pomuligera (Stache). ×29. Sample 362-8, CC. Globorotalia inflata Zone; middle Pliocene.
	Figure 9	Stilostomella stachei (Chapman). $\times 29$ . Sample 362-20, CC. Globorotalia conomiozea Zone; upper Miocene.
	Figure 10	Bulimina truncanella Finlay. $\times$ 70. Sample 362-20, CC. Globorotalia conomiozea Zone; upper Miocene.
	Figure 11	Angulogerina esuriens Hornibrook. ×99. Sample 362-17-4, 58-60 cm. Globorotalia puncticulata Zone; upper Miocene.
	Figure 12	Cassidulina subglobosa Brady. ×68. Sample 362-20, CC. Globorotalia conomiozea Zone; upper Miocene.
	Figures 13, 14	Pullenia bulloides (d'Orbigny). ×59. Sample 362-8, CC. Globorotalia inflata Zone; middle Pliocene.
	Figures 15, 16	Pullenia quinqueloba (Reuss). ×59. Sample 362-4, CC. Globorotalia inflata Zone; Pleistocene to upper Pliocene.
	Figure 17	Alabamina tenuimarginata (Chapman, Parr and Collins). ×29. Sample 362-20, CC. Globorotalia conomiozea Zone; upper Miocene.
	Figures 18-20	Gyroidina zelandicus (Finlay). ×29. Sample 362-19, CC. Globorotalia conomiozea Zone; upper Miocene.
	Figures 21-23	Anomalina aotea Finlay. ×50. Sample 362-20, CC. Globorotalia conomiozea Zone; upper Miocene.
,	Figures 24, 25	Anomalinoides fasciatus (Stache). ×47. Sample 362-8, CC. Globorotalia inflata Zone; middle Pliocene.



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