12. CENOZOIC PLANKTONIC FORAMINIFERAL BIOSTRATIGRAPHY OF THE SOUTHWESTERN PACIFIC AND TASMAN SEA— DSDP LEG 29

D. Graham Jenkins, Geology Department, University of Canterbury, Christchurch, New Zealand

ABSTRACT

A description is given of the Cenozoic planktonic foraminifera obtained from 10 sites of DSDP Leg 29. The New Zealand Cenozoic planktonic foraminiferal zonal scheme was used with only slight modifications; these are discussed. Brief comments are made on selected taxa.

INTRODUCTION

Drilling operations by *Glomar Challenger* on Leg 29 of the Deep Sea Drilling Project, undertaken during March-April 1973, yielded 1181 meters of sediment from 16 holes at 10 sites (Figure 1). This report is concerned with the Cenozoic planktonic foraminifera obtained from the sites, with emphasis on the biostratigraphic zonation, and a comparison of some of the taxa with records published in Australia and New Zealand. An account of the planktonic foraminifera for each site is given in the Site Report chapters (this volume).

This study of samples was undertaken for the following purposes; (a) determination of the total planktonic foraminiferal fauna; (b) age resolution of the samples into the established New Zealand zonal scheme; and (c) accurate resolution of zonal boundaries.

Procedures

Samples were washed on a 230-mesh sieve, dried, and sieved into fine, medium, and coarse fractions. Normal-



Figure 1, Location of sites drilled during DSDP Leg 29.

ly, each core-catcher sample was examined. In order to determine the positions of the zonal boundaries, examination was also made of numerous intermediate samples until the boundary was resolved between the closest two samples. Two samples per core section were taken for examination to position the zonal boundaries. Once a boundary had been determined, only the faunas from the two samples approximating the boundary were normally recorded in addition to the core-catcher samples (Tables 1-6).

Most of the taxa encountered on Leg 29 have previously been recorded and illustrated from Australia (Jenkins, 1966) and New Zealand (Jenkins, 1971).

ZONAL SCHEME

It was apparent before Leg 29 began that the New Zealand Cenozoic planktonic foraminiferal zonal scheme would probably be workable to the south of New Zealand. The problem remained as to how far south the scheme would work before the faunas became radically changed. This working hypothesis remained true for all sites except at the southernmost Site 278 at 55°33'S. Unfortunately the water depth at Site 278 was so great during the Oligocene-Pleistocene, compared with the present depth of 3698 meters, that most of the planktonic foraminiferal tests had probably gone into solution. Thus, Site 278, because of extreme water depth, is not regarded as a true test for the zonal scheme at this latitude, and because of the dissolution of tests, three informal zones were used to cover the upper Oligocene-Miocene interval. These were based on the few solution-resistant taxa. The three informal zones, in ascending order, which were devised for Site 278 are: Globigerina (G.) woodi, Globorotalia (T.) conica, and Globigerina (G.) bulloides (Table 7).

The zonal scheme used on Leg 29 was based mainly on previous work by the writer in Australia and New Zealand. The middle Oligocene-upper Miocene sequence of the Lakes Entrance oil shaft, Victoria, Australia, was sub-divided into 11 zones (Jenkins, 1960). Most of these zones were incorporated into a subdivision of the New Zealand Cenozoic into 21 zones (Jenkins, 1966, 1967). The main addition to the Cenozoic zonal scheme has been the subdivision (in ascending order) of the Pliocene-Pleistocene G. (T.) inflata Zone into the G. (T.) puncticulata, G. (T.) inflata, and G. (G.)

 TABLE 1

 Ranges of Planktonic Foraminifera in Selected Samples of Site 277

Globoquadrina	G. dehiscens	G. tripartita	Globorotalia	G. (A.) acarinata	G (A.) mckannai	G. (A.) soldadoensis	G. (G.) truncatulinaides	G. (M.) aequo rex	G. (M.) croter croter	G (M.) dolabrata	Globorotalia (P.) australiformis	G. (P.) cf. chapman!	G.(P.) cf. pseudomenardii	G. (T.) sp 1	G. (T.) aculeata	G. (T.) gemma	G. (T.) inflata	6. (T.) munda	G.(T.) nana nana	G. (T.) nana pseudocontinuosa	G. (T.) opima	G. (T.) pachyderma	G. (T.) reissi	G. (T.) scitula	Gioborotaloides	G. suteri	G. testarugosa	G. turgida	G. unicava	Guembelitria	G. stavensis	Orbuling	O. universa	Pseudogloboquadrina	P. primitiva	Truncorotaloides	T Sp 1	T, collacted	T pseudotopitensis	Zeauvigerina	Z. parri	Z. teuria	Z. zelandica
_		_	_				_								•	_		_		_	_			_	_					_	_		_	_	•	\square		•			\rightarrow		-
_													_		•											•									_	\square					_		
		_																	•							•															$ \dashv$		
_	_	_																					_	_		•				_					_						\dashv		
_		_											_			•					<u>.</u>			-		•				_		_	_			\dashv			\square		\dashv		\square
		_														•										•									_						$ \rightarrow$		
_	_	_	_				_		-	-		-				•	_				<u>.</u>	_	_	-		•					_		_	_		\square				\square	\dashv	\square	-
_		_						-		-		-	_			•				_	-	-	_		_	ct		-			_	_	_	_	_	\vdash			\square	\square	\dashv	\square	\neg
_		_		_												•										•							-		_						\dashv		\neg
_							_									•										•											\square				4		
-		-	-		-	-	-	-	-	-	-	-	-			•	-	-		_	-	-	-	-	-	•		-		-	_			-	_	\vdash	Η	\square	-		-	-	-
_	_	_	-	-	-	-	-	⊢	┝	┝		-		\vdash		•		•			_					•		-	-		_	_	_	_	_	\vdash	H	-	_		+	-	-
-		_		\vdash	-	-	-	⊢	⊢	-	-	-		\vdash				•		-	_	_			_	•		-			_	_	_	_	_	\vdash	Н	Н	\dashv		-	\neg	_
-		_	-	-	-		-	⊢	-	⊢	-	-	-				-	•		_	_					•		-			_	-	_		_	\square			\square		\dashv	\square	
_		_			-	-		⊢	-	⊢	-	-		\vdash				•			_							-				_		_	_	\square		\square			\rightarrow		_
_		_	_	-		-		┝	+	-	-							٠		_	_					_					_		_			\square	\square	\square			\rightarrow	\dashv	_
-						-		⊢		1	-	-				_		٠		_	_					•		-	_		_		_	_					\square		\rightarrow	\square	-
-		_	-	-	-	-	-	-	-	⊢	-	-	-			_		•		_	_					•	-	-	-		_		_	_		\square			\square		\rightarrow		_
-		_		-	-	-		-	-	-		-						•		_														_	-	\square		\square			4	\square	
-	-	_		-	-	-	-	┝	┝	-		-		•				ct								•		-				_			_	\square	\vdash	\square	\square	\square	\dashv	\square	
		_	-	-	-	\vdash	-	+	-	-	-	-	-					ct.			_			-		•	•							_	-	\vdash				\square	4	\square	
_				-	⊢	\vdash	1	⊢	┢	┢	-	1		•				•									•	1			_			_	_	\square		\square	\square		\dashv	\square	
_		_		-	-	-		⊢	⊢		-	-	_					•	•		ct						•								_	\square			\square		\dashv		-
_					1			⊢	1					•				۰	•		_						•				_			_									
_				-		-		⊢				-	-	•				٠	•	_	-			_			•		_				_		_	\square					\neg	\square	
-		_									-	-						•	•								•				•										4		
_	-	_		-	-	-			-			-						•	•								•														\rightarrow		
_		_		-	-	1		⊢	+		-							•	•	•	c						•				•					\square			\square		\rightarrow	\dashv	_
_	-	•		1	-	1	-	⊢	1		-	-				01		•	•	•	ct								•		•					\square	\square				\downarrow	\square	
-				1	-	1		1	1		-							•	•	•							•									Ц					4		
_	5	ci		1		1		⊢			-	-						cf.	•	•	of						•							_							4		
_							•										•							۰									•									\Box	

TABLE 1 – Continued

	AGE	ZONE	CORE	SECTION	CENTIMETERS cc = core catcher	Cassigerinella	C chipolensis	Chiloguembelina spp.	C. cubensis	C waiparaensis	C. wilcoxensis	Globanomalina	G. micro	G. wilcoxensis	Globigerina	G. (G.) sp. 1	G. (G.) ampliapertura	G. (G.) boweri	G (G.) bradyi	G. (G.) brevis	G. (G.) bulloides	6. (G.) ciperoensis angustiumbilicata	G. (G.) evapertura	G. (G.) Juvenilis	G. (G.) labiacrossata	G. (G.) ovachitaensis	G. (G.) praeturritilina	G. (G.) quinquelobo	G. (G.) spiralis	G. (S.) angiporoides angiporoides	G. (S.) angiporoides minima	G-{S.} linaperta	G (S.) triloculmoides	Globigerinatheka	G. (G.) index barri	G. (G.) index index	Globigerinita	G. dissimilis	6. glutinata	G unicava
		ides	46	4	38																								•											
	ШN	ulino	45		20																								•				•							
	OCE	riloc	44		00			•			•																						•							
	ALE	(S.) 1			20			•			•																		•				•							
	a	.9	43	2	159						•																			Į I			•							
		nsis		N	31									•																5			cf.							
	ш	ICOXe	N		20					cf.																							•							
6	CEN	G. W.	4	ю	82																												ct.							
4	Ш		41		00			•																																
51	œ	crote	40		20								•	cf.				cf.															•							
s	OVE	ter	39		20			•						cf.																			•							
E	Ľ	cra	38		00			•					ct.	cf.																			•							
S		(M.	N		00								•					cf.																						
~		0	m	N	52								•																				•							
52		DA,	36		55			•					•					cf.																						
ш		rimit			20			•					•					cf.																						
517	ш.	P. P	35		104																																			
_	EN			2	53								•					cf.																		•				
29	00	yex	34		20																															•				
0		X II	33		20																										•	•				•	5			
Ē	ш	opui	32		00																											•				•				
	DOIL	(0)	Ē		20								•																		•	•				•				
	2	G.	0		20																									ct.		•								
		0	m	5	001																											•								
	N H	spice	8		20								•																	cf.		•								
	LOCE	ncon	28		22				•				•																	cf.		•				•				
			27		20																									•		•				•				

TABLE 1 - Continued

	_	-	-	1000	1.000	6 m 1 5 1			-	/				1.1.1.1.1.1	1.2	1.7													1-1-2	-						-	Concession of the local division of the loca	1.	1.00		-	-	
																				nosa																							
						s	oides		oter		form		rdii							ocontin																							
				ata	iouu	doensi	atulin	rex	r cri	brata	ustrali	inor	menal		10				ouou	pseud	omi	dermo					0							DU					lensis				
0	cens	rtita		acarii	mcka	solda	trunc	aequi	crate	dola	o (d)	chapn	seudo	1 . ds	aculec	gemme	inflato	munda	pupu	pupu	ct. op	pachy	reissi	citul	58		rugo	op	DAD		nsis		rsa	nadri	tiva	des		ictea	dotop			0	ndica
adrin	dehis	tripa	talia	(4.)	(7.)	(7)	(1.9)	(W.)	('W)	(·W)	alia	(2)	(6)	(<i>T.</i>)	(1:)	(1.)	(1)	(1.)	(1)	E	E	(1)	1:1	(1)	aloid	suter	testa	turg	unic	litria	stave		unive	ogoit	primi	010101	5p. 1	colle	pseu	erino	parr	teur	2010
nboqo,	0	9	lobord	ė	9	e	6	9	9	હ	oporol	e	ö	9	0	6	Ś	0	6	0	5	6	9	હ	borot	9	9	0	9	embe	G	pulina	0	seudo	σ,	uncor	к	ĸ	к	eauvig	N.	N	2
0	_	_	0		_	_				╞	6							-	-	\vdash	-			H	610			-	_	GL	-	ò	-	ď	\vdash	Te	Н	\vdash	Н	2	\vdash	Н	-
Ē	-	-	-		_		-			┝	┢	\vdash	-						\vdash	\vdash	\vdash	-		\vdash	_	-		×	_	-	-	-			Η		Η		Η		Η	•	-
				-	•					\vdash	•	c.	•						\vdash	\vdash	\vdash							0							cf.				Η			Ē	•
											•	ct.	ct.										cf.												•						cf.		•
										•	•	cf.	et.																												۲		•
_				-							•		ct	_																					•						•	\square	•
_		_	_		•	•		•		5	•	┝						\vdash																	•		\square	•			•	\square	•
-		-	-	-	-			-			•	┝			-	-	-	\vdash	-	-	-	-	-	\vdash	-	-	-	ct.	_	_	_	-	-		•	_	Η	-	-		-	Н	
7		-	-	-		-		-				⊢	-		⊢	\vdash	\vdash	\vdash	\vdash	┝	┝	-		\vdash		\vdash						-				-	Η		-		-	Н	-
						•			•			\vdash		\vdash	\vdash	\vdash		\vdash	\vdash	\vdash	┢		-														Η	•				Η	
					•	•			•	•	•	T							\vdash	\vdash	t														•		•	•	•				
								•	•	•																									•		•	•					•
_					_				•		•																	cf.							•		•	•					•
_		_		_	_	•				⊢	•			-						\vdash						cf.				_	_		_		•		•	C.	•		•	\square	•
_	_	-		\vdash			\vdash	-	⊢	┝	•	┝			\vdash	-	\vdash	\vdash	\vdash	\vdash	┢	-	-	\vdash			-	•		-	_	-	-				•		•	\vdash	-	Н	
-		-	H	-	-	-	\vdash	\vdash	⊢	┝	-	+		-	-	-	-	\vdash	\vdash	\vdash	-	-		\vdash	-	Η	-			-	-	-	-	-		-		-		H		Η	-
									\vdash	\vdash	+	\vdash							\vdash	\vdash	\vdash							-							•		•		-			Η	•
										T										\vdash	\vdash		t												•			cf.			•		•
																																			•								•
																																			•			•			•		
_				_																															•			•			•	Ц	•
_						-			-	-	-	-	-	_	•				-	_						cf.	_		_	_	_		-	-	•		\vdash	cf.		\vdash	•	\vdash	•
4								-	\vdash	┝	-	\vdash		-		-	-	\vdash	\vdash	-	-	-	-		-	ct	_				-	-		-			Η	-	H	Η		Η	-
+						-			-	┢	\vdash	\vdash	-	-	-	-	-	\vdash	\vdash	\vdash	\vdash	\vdash	-	\vdash			-	-			-	-	-	\vdash	\vdash		Η		Η	Η	-	Η	-
_	_		_		_		1		1	L .	I	1		-	-				1							-			-			1				_		-					_

 TABLE 1 - Continued

				LE	EG	2	29		SI	ITI	ES	5	2	78	, 2	27	8 A		С	OF	RE	S	1-	-3	4					
PL	EIS	тос	EN	Ε	PL	100	EN	E			ł						N	110	CEN	١E						21	20	LIG	OCE	JE AGE
G. I tuli	G.) tr	unca. Is	- 6	s (T.)	10	G .(T.) pu	inctio	cula	to		G.((G.) I	bullo	ides		G.(T.)	conic	a			G. (6	;) n	rood	G	(S.) ang	angi ipor	poro oide:	ZONE
T	IA	24	1	2	3	4	5	6	7	1	в	9	10	н	12	13	17	18	19	20	21	22	23	25	26	31	32	33	34	CORE
1																													3	SECTION
-			150	CC	cc	cc	cc	00		22	S	cc	CC	cc	CC	cc	cc	υu	cc	cc	CC	cc	cc	cc	CC	cc	CC	cc	98	CENTIMETERS cc = core catcher
																														Globigerina
•	•				•																									G. (G.) bradyi
•	•	•	•		•				•				•	•	•	٠					cf.			_				-		G. (G.) bulloides
																														G. (G.) cipercensis angustiumbilicata
Γ									Τ		Τ	Τ														•				G (G.) juvenilis
•					•																									G (G.) quinqueloba
																	•	•	•		•			•		•	cf.			G. (G.) woodi woodi
																													•	G. (S.) angiporoides angiporoides
																					•	•	•	cf.	cf.	cf.	cf.			Globigerinita dissimilis
	•									T																•				G. glutinata
																														Globorotalia
•										Т																				G. (G.) truncatulinoides
																	•			•										G. (T.) conica
	•								Τ	Т	Τ																	l		G. (T.) inflata
									T																		cf.			G. (T.) nana nana
											T	1									•									G. (T.) nana pseudocontinuosa
•	•		•	•	•	•	•	•	•										1											G. (T.) pachyderma
											0	1.																		G (T.) puncticulata
						•			Τ		T	T																		G. (T.) scitula

TABLE 2 Ranges of Planktonic Foraminifera in Selected Samples of Site 278

truncatulinoides zones; these zones have been used informally by the writer in New Zealand (Table 7). The taxa used to delineate the zonal boundaries are shown in Table 8; the zones penetrated at the various sites are shown in Table 9.

The lack of certain taxa and paucity of others made it necessary to make a few minor amendments to the New Zealand zonal scheme:

1) Because of the total absence of *Globorotalia* (T.) *inconspicua* at Site 277, it was decided to follow the precedent of micropaleontologists from South Australia (Ludbrook and Lindsay, 1969), and refer the zone as *Globorotalia* (T.) *aculeata* Zone.

2) Globigerina (G.) brevis was found to be very rarrre at Site 277 and absent at Site 282. This led to the redefinition of the zone based on the total range of Globorotalia (T.) gemma which has the same range as G. (G.) brevis in New Zealand (Jenkins, 1966).

SYSTEMATIC PALEONTOLOGY

Cassigerinella chipolensis (Cushman and Ponton)

C. chipolensis was found to be very rare, and was only recorded in the G. (G.) euapertura Zone at Site 277. In New Zealand C. chipolensis occurs as far south as the Clifden section at about 46° S (Jenkins, 1971).

Chiloguembelina cubensis (Palmer)

C. cubensis was found generally in abundance in samples at Site 277 from the G. (T.) aculeata Zone to the lower G. (G.) euapertura Zone. C. cubensis is less abundant at its lower stratigraphic range.

C. wilcoxensis (Cushman and Ponton)

At Site 277 C. wilcoxensis was found to be a useful marker in the Paleocene G. (S.) triloculinoides Zone.

Globanomalina micra (Cole)

Specimens of G. micra were obtained at Site 277 from the lower part of the G. (M.) crater crater Zone to about the middle of the G. (G.) brevis Zone. G. micra was found to be very rare towards the upper Eocene-lower Oligocene.

G. wilcoxensis (Cushman and Ponton)

A few specimens of G. wilcoxensis were obtained from the G. wilcoxensis Zone, with transitional forms linking it to G. micra in the G. (M.) crater crater Zone.

Globigerina (G.) ciperoensis angustiumbilicata Bolli

Very rare specimens were found at Sites 277, 279, and 281, but were a little more common at Site 282. It is probable that its rarity in the southern sites was due to temperature control.

G. (G.) bradyi Weisner

G. (G.) bradyi was found to be fairly common at some sites such as 279 and 284, but rare at other sites.

G. (G.) bulloides d'Orbigny

G. (G.) bulloides was common at most sites examined and seems to have a relatively solution-resistant test at Site 278. It is fairly common at Site 279 where it seems to replace G. (G.) woodi woodi in the middle Miocene as the most common Globigerina within their size range.

G. (G.) eamesi Blow

The occurrence of G. (G.) eamesi at sites of Leg 29 is sporadic: absent at Sites 277 and 278; very rare at Sites 279 and 282; and fairly common in the G. trilobus trilobus-G. (G.) woodi connecta zones at Site 281. This distribution is hardly explained by assuming a temperature control, but, within its stratigraphic range, it is fairly common in continental shelf deposits in New Zealand.

G. (G.) labiacrassata Jenkins

At Site 277, G. (G.) labiacrassata found in the G. (S.) angiporoides angiporoides-G. (G.) euapertura zones resembles G. (G.) woodi woodi, but has a thicker apertural lip, and has less coarse wall ornamentation. A few specimens found at Site 282 in faunas of low diversity suggests that G. (G.) labiacrassata has a relatively solution-resistant test.

G. (G.) nepenthes Todd

It is probable that the paleogeographic distribution of G. (G.) *nepenthes* was temperature controlled. During Leg 29 it was found in only one sample from Site 282 and one doubtful specimen from Site 284. It is therefore concluded that sites drilled on Leg 29 were south of its original distribution.

G. (G.) ouachitaensis Howe and Wallace

G. (G.) ouachitaensis has a sporadic distribution in the area drilled: one specimen occurred in the G. (G.) euapertura Zone at Site 277; one specimen in the G. (G.) woodi connecta Zone at Site 279; and a few specimens in the G. (G.) brevis-G. (S.) angiporoides angiporoides zones at Site 282.

G. (G.) quinqueloba Natland

As expected from its Recent distribution, G. (G.) quinqueloba was found to be common in the Miocene-Pleistocene at Sites 279, 281, and 284.

G. (G.) woodi connecta Jenkins

Most of the specimens in the G. trilobus trilobus Zone at Site 279 are thick walled and approach the morphology of Sphaeroidinella cellata Subbotina. Also at Site 279 G. (G.) woodi connecta ranges into the upper part of G. trilobus trilobus Zone, well above its recorded range in New Zealand (Jenkins, 1971).

G. (G.) woodi woodi Jenkins

Well-preserved specimens of G. (G.) woodi woodi were obtained from the upper Oligocene-Miocene of Site 278 in a low-diversity fauna which had probably been caused by selective solution of tests. At Site 279 G. (G.) woodi woodi is well-developed in the lower Miocene with some of the thick-walled specimens resembling Sphaeroidinella cellata Subbotina. Also at Site 279 it is the commonest Globigerina in the G. (G.) woodi connecta-G. trilobus trilobus zones, but is replaced by G. (G.) bulloides as the dominant form in the middle Miocene. A similar change in dominance was also noted at Site 281.

G. (G.) woodi decoraperta Takayanagi and Saito

G. (G.) woodi decoraperta was found to be rare in the G. (T.) mayeri mayeri Zone at Site 279; one was recorded in the G. (G.) miotumida miotumida Zone at Site 282. It was found to be much more common in the lower latitude Site 284 (40°30'S) in the G. (G.) miotumida miotumida-G. (T.) inflata zones.

G. (S.) angiporoides angiporoides Hornibrook

Within its upper Eocene-middle Oligocene stratigraphic range G. (S.) angiporoides angiporoides is fairly common at Sites 277, 278, 281, and 282. It appears to have had a solution-resistant test.

G. (S.) linaperta Finlay

G. (S.) linaperta is present in the middle upper Eocene at Site 277. From its presence in the upper Eocene of Sites 281 and 282 it is postulated that it has a tough solution-resistant test.

G. (S.) triloculinoides Plummer

It is quite common within its stratigraphic range of G. (S.) triloculinoides-G. (M.) crater crater zones at Site 277.

Globoquadrina altispira (Cushman and Jarvis)

A few specimens were found in the G. (G.) miozea conomiozea and G. (T.) inflata zones at Site 284.

G. dehiscens (Chapman, Parr, and Collins)

Within the G. (G.) woodi connecta to G. (T.) mayeri mayeri zones at Site 279, G. dehiscens is fairly common, but the tests appear to be less quadrate than usual in New Zealand. At Site 282 it was also fairly common in the G. (G.) woodi woodi-G. (G.) miotumida miotumida zones. It is noteworthy that G. dehiscens was not recorded in the upper Miocene-Pliocene of Site 284.

G. tripartita (Koch)

From its paleogeographic distribution in New Zealand it has been assumed that *G. tripartita* was a warm-water form. If this postulate is true, then its occurrence in the *G. (G.) woodi connecta-G. trilobus trilobus* zones at Site 279 could indicate warmer water conditions.

Globigerinatheka (G.) index index (Finlay)

The stratigraphically lowest, rare specimens in the G. (G.) index index Zone at Site 277 resemble New Zealand specimens of this zone, with only one aperture. Thereafter in the zone, it became more common with specimens having multiple apertures.

Deduced from its occurrence in upper Eocene sediments at Site 282, G. (G.) index index appears to have had a robust, solution-resistant test.

Globigerinella aequilateralis (Brady)

It occurs sporadically at Site 281, south of the subtropical convergence, in the G. (T.) puncticulata-G. (G.) truncatulinoides interval. The occurrence of G. aequilateralis at Site 281 without warmwater forms such as Globigerinoides tends to suggest that it is more tolerant of cooler water than the latter genus. Well within the subtropical belt at Site 284, G. aequilateralis is common in the G. (G.) miotumida miotumida-G. (G.) truncatulinoides zones.

Globigerinita dissimilis (Cushman and Bermudez)

G. dissimilis is rare in the G. (G.) euapertura Zone at Site 277, and in the G. (G.) woodi woodi Zone at Site 278. At both sites 279 and 281, G. dissimilis appears to have become extinct later than in New Zealand. This extinction is before the initial appearance of G. (G.) miozea miozea. Some of the specimens in the G. (G.) woodi connecta Zone at Site 279 have exceptionally thick tests, and its general occurrence at other sites suggests that it has a solution-resistant test.

Globigerinoides altiaperturus Bolli

At Sites 279 and 281 it is not present within its known lower Miocene New Zealand range of G. (G.) woodi connecta-G. trilobus trilobus zones, but there is one specimen in the G. (G.) woodi connecta Zone at the more northerly Site 282. It is concluded that its original paleogeographic distribution was probably temperature controlled.

G. trilobus bisphericus Todd

A few doubtful specimens of *G. trilobus bisphericus* were recorded at Site 279 in the *G. trilobus trilobus* Zone, but it was not present within its known range at Site 281.

G. ruber (d'Orbigny)

A single, doubtful, specimen was recorded in the G. (T.) mayeri mayeri Zone at Site 279. Rare specimens are present in the G. (G.)truncatulinoides Zone at Site 282, and it is fairly common in the G. (G.)miozea conomiozea-G. (G.) truncatulinoides zones at Site 284.

																										L	EG	2	29		SI	TE	2	279	э,	
PLE -C	EISTO	PL	NE ?	N	ID	DLE	E M	010	CE	NE		i I																		LC	WE	R	M	oc	EN	E
G. (G.) tru noides	inf	- G.(7.2	G.(1	naye	oyeri ri	<i>P</i> .	gloi	va	50																			(5. t	rilob	us	trilo	bus	
	1	1	A	1		IA			2	24	_		_	_	3A	_		_		44			5	A				_	64	1		-	L	_	-	7A
1	1	1	2		3	4		1		2		1	2	3	4	5	6		1	2		2	3	4		1	2	3	4	5	6		1	2	3	4
P	8-26	137	135	U U	40	00	v v	8	34	00	8	130	144	147	40	60	40	S	105	130	3	128	86	0	S	102	86	101	33	52	00	cc	00	107	4	127
	Ĩ																F																		Η	
•	•		•	•	•	•	•	•	•		•	•				•				cf.	•					•			•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•		•	•	•		•	•	•	•	•	•	_	•	•	•	•
												•	cf.							•																
-											-	cf.				-										-				_	-	_				
-	•	•	-	•	•	-	•	•	•	-	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•			•	-	•	•	•	-
					-	\vdash	ct.				-		-			-					\vdash	ct		-							cf.	-	\vdash	cf.	\vdash	
F	-	-	-	-			-	-	-	-	-	-	-	-	-		-	-	-				-		cf.	-	-	-	-	-		-		-	\vdash	-
																		•			•						•	•	•							
				•			•		1																											
				•	•	۲	٠	•	•	•	•	•	•	•	•	•	•	•	•	•	•	٠	•	•	•	•	•	•	•	•	•	۲	•	•	•	•
																										_						_			cf.	_
	-	•		•	•	•		•	•	•	•	•	•		•	•	•	•	-	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•
⊢	-	-	\vdash	┝	-	-	-	-	-	-	-		-	-	-	-		-	-	-		-	\vdash		-		_	-	-	cf.	_	-	\vdash		of.	•
-			\vdash	\vdash	-	\vdash	-	-	\vdash	-	\vdash		-	\vdash					-			-	\vdash		-			-	-		-	-		\vdash	\vdash	-
				\vdash		\vdash	\vdash			\vdash			-	\vdash			\vdash		-							-	H	-	-		-	-	Η	Η	\vdash	-
				\vdash	cf.	\vdash	\vdash	\vdash	+			-		\vdash					-									-								
						F			\vdash												ct.															
									cf.		•														•											
				•	•	•	•		•			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•	_	•			
-					-	-	-		-				_							_		cf.	cf.			-	_	_	_			_		_		_
-		-				\vdash	-		\vdash				-	-	-	-	-	_			H		\vdash		_	_	-	-	-	_	cf.	-	\square		\square	_
⊢				et.		\vdash	-	\vdash	-		\vdash			\vdash				-					\vdash		-	-	-	-	-	-	-	-	Η			-
\vdash						\vdash		\vdash	\vdash	\vdash				\vdash				-			H		\vdash			-			Η	Η	Η	-	\neg			
				•			-		\vdash	t				\vdash							Η															
				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•
					d.	•	•																													
					•	•		•	•		•	•			cf.	cf.																				
•	•																															_				
-	-											•	-			-				-					_	_			_		_	_		$ \dashv$		
-	-		-		-			\vdash		\vdash		-	-	-	-	-	-		-	-	~		\vdash	-	0{.	of.	-	-	-	-	-	_	Η	\neg	\vdash	-
									CF.			CI.			87.										_					- 1			i 1			

TABLE 3 Ranges of Planktonic Foraminifera in Selected Samples of Site 279

 TABLE 3 – Continued

2	79	A		CC	DR	ES	ŀ	- 11	l																			
																												AGE
																			G.	(G.)	woo	odi	con	nect	a			ZONE
				84	1					9A						1	OA				1			IIA				CORE
- 5	6		1	4		5	1	2	3	4	5	6		ī	2	3	4	5	6	Γ	1	2	3	4	5	6		SECTION
106	100	cc	105	8	1	150	00	60	102	102	115	40	3	134	Ē	8	135	8	103	cc	50	50	35	75	40	00	cc	CENTIMETERS cc = core catcher
																												Globigerina
•	•	•	•	•	•	•	•		•	•	•	•	•		1		•	•	•	•	•	•		•		•	•	G. (G.) bradyi
•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•		•	•	•		G. (G.) bulloides
			۲																					•				G. (G.) ciperoensis angustiumbilicata
																												G. (G.) eamesi
•	•			•	•	•		•	•	•	•	•	•	•	•		•	•	•				•		•	•		G. (G.) juvenilis
_																	L								cf.			G. (G.) ouachitaensis
۰				cf.			cf.		cf.	cf.		cf.	cf.	cf.	cf.	cf.	of.	ef.	cf.	cf.	of.			•			d.	G. (G.) quinqueloba
		•																										G. (G.) venezuelana
			•			•							•					•	•	•		•	•	•	•	•	•	G. (G.) woodi connecta
																												G. (G.) woodi decoraperta
٠	•	۲	•	•	•	•	•	•	•	•	•	•	•	•		•		•		•		•	•	•	•	•		G. (G.) woodi woodi
																												Globigerinita
		۲		•			•	•	•	•	•	•	•	•		•	•	•	•	•	•	•		•	•	•		G. dissimilis
•	•	•	•	•	•	•	•	•		•	•	•	۲	•	•	•	•		•	•		•	•	•	•	•	•	G. glutinata
of.																							cf.					G. suteri
																												G. unicava
																												Globigerinoides
				- 4											•													G. apertasuturalis
																												G. ruber
																												G. trilobus bisphericus
۲			cf.	•					•		•				of.	•												G. trilobus trilobus
																												Globoquadrina
	•	•		•	•	•			•	•	•			•	•			•	•	•		•	•	•	•	•		G. dehiscens
																												Ġ. larmeui
					cf.					ct.	•	cf.	•		cf.	•	•					cf.			cf.			G. tripartita
																												Globorotalia
																												G. (G.) explicationis
																												G. (G.) miotumida miotumida
																												G. (G.) miozea conoidea
•	•																											G. (G.) miozea miozea
																												G. (G.) panda
																												G. (G.) praemenardii
																												G. (G.) truncatulinoides
																												G. (T.) sp. nov.
																												G. (T.) bella
																												G. (T.) conica

PLEIST MIDDLE MIDDLE	
6. ft: //b marcetu-16 (T/) mayeri P. glomeroso curva Curva 6. trilabus reliabus 1 1 1 1 2 3 4 5A 6A 1 1 1 1 1 2 3 4 5A 5A 6A 1 1 1 1 2 3 4 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 5 6 1	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
1 1 1 2 3 4 1 2 1 2 3 4 5 6 1 2 2 3 4 1 2 3 4 5 6 1 2 2 3 4 5 6 1 2 2 3 4 1 2 3 4 5 6 1 2 2 3 4 1 2 3 4 5 6 1 2 2 3 4 1 2 3 4 5 6 1 2 2 3 4 1 2 3 4 5 6 1 2 2 3 4 1 2 3 4 5 6 1 2 3 4 5 6 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 1	A
	1 5
	10
cr. .	<u>v</u> <u>o</u>
et •	
• • • • • • • • • • • • • • • • • • •	
• • • • • • • • • • • • • • • • • • •	\perp
	\perp
	•
c. .	+
cf. c	
cf. c	+-
• • • • <	+
	+-
cf. c	+
ct.	
	+-
	+
	+
	+

TABLE 3 – Continued

G. trilobus trilobus (Reuss)

Generally, G. trilobus trilobus was found to be rare within the drilled area, but was commonest within its zone at Site 279.

Globorotalia (G.) miotumida explicationis Jenkins

It is very well developed in the G. (G.) miotumida miotumida Zone and lower part of the G. (G.) miozea conomiozea Zone at Site 284. In New Zealand, G. (G.) miotumida explicationis has been recorded from the top of the G. (T.) mayeri mayeri Zone to the top of the G. (G.) miotumida miotumida Zone (Jenkins, 1971).

G. (G.) miotumida miotumida Jenkins

At Site 284 it has a range from the G. (G.) miotumida miotumida Zone to the lower part of the G. (T.) puncticulata Zone. This is very similar to its range in New Zealand (Jenkins, 1971).

G. (G.) miozea conomiozea Kennett

There appears to be a transition in morphology between it and G. (G.) miotumida miotumida at Site 284 in Sample 284-17, CC.

G (G.) miozea miozea Finlay

It is fairly common in the G. (T.) mayeri mayeri Zone at Site 279 where the populations are sinistrally coiled and specimens are thick walled. The evolutionary change from G. (T.) praescitula to G. (G.) miozea miozea may have occurred earlier at Site 279 compared to the transition in New Zealand. Consideration should be given to the possibility that G. (G.) miozea miozea is a deep-water ecophenotype and may therefore appear earlier in deep water deposits compared to the continental shelf deposits of New Zealand.

G. (G.) panda Jenkins

Rare specimens occur in the G. (T.) mayeri mayeri Zone at Site 279.

ORE	S	1.	- 1	1																							
MIOCE	NE																										AGE
1.2																	G. (<i>s</i> , ,	*000	ti d	onne	ecta					ZONE
			8	А					94						1	OA						I	II A				CORE
6		T	4	1	5	1	2	3	4	5	6		T	2	3	4	5	6		1	2	3	4	5	6		SECTION
100	cc	105	100	117	150	00	601	102	102	115	40	cc	134	31	001	135	100	103	cc	50	50	35	75	40	00	cc	CENTIMETERS cc=core_catcher
_																											Globorotalia
																						*					G. (T.) crassaformis
																											G. (T.) inflata
_	_																										G. (T.) mayeri continuosa
						°																					G. (T.) mayeri mayeri
•	٠	•	•	•	•	•	•	•		•	•	cf.			•	•	•	•	•	cf.			cf.	•	•		G. (T.) minutissima
•		•	۲	•	•	۲	•	•	•	•			•		•	•	•	•	•	•	•	•	•	•	•	•	G. (T.) nana pseudocontinuosa
									•			•	•	•						cf.						•	G. (T.) nana nana
										cf.	•	•		•	•	•		•							•		G. (T.) nana semivera
_																											G. (T.) obesa
																											G.(T.) pachyderma
																											G. (T.) peripheroronda
																											G. (T.) praefohsi
•	•	•	•	•	•	۰	•	•	•	•	•	•	۲	•	•	•	•	•	•				•				G. (T.) praescitula
_																											G. (T.) puncticulata
																											G. (T.) scitula
•	•	•	٠	•	•	•	•		•	•	•	•			cf.												G. (T.) zealandica
_																											Orbulina
																											O. suturalis
																								-3-			O. universa
			_																								Praeorbulina
																											P. glomerosa curva
																											Sphaeroidinella
_					•									cf.					cf.				cf.				S. disjuncta
																											Turborotalita
						•																					T. sp. nov.

TABLE 3 – Continued

G. (G.) truncatulinoides (d'Orbigny)

Various morphological forms were found at the sites drilled on Leg 29 including morphotypes of G. (T.) tosaensis at Sites 275 and 284. Well-developed, keeled, sinistrally coiled specimens of G. (G.) truncatulinoides were found at Sites 280, 281, 282, and 284.

G. (M.) crater crater Finlay

Typical forms were found in its zone at Site 277, but the populations did not yield G. (M.) crater caucasica Glaessner with 6-7 chambers in the final whorl, which is found in New Zealand (Jenkins, 1971).

G. (T.) aculeata Jenkins

G. (T.) aculeata was found to be fairly common within its upper Eocene range at Site 277 where it appears to have had a later extinction, compared with this event in New Zealand (Jenkins, 1971).

G. (T.) conica Jenkins

It is much better developed at Sites 278, 279, and 281 compared with its records in Australia (Jenkins, 1960) and New Zealand (Jenkins, 1971). It is postulated that $G_{\cdot}(T_{\cdot})$ conica was possibly a cooler water taxon which made brief incursions into the Australian and New Zealand waters during the middle Miocene.

G. (T.) crassaformis (Galloway and Wissler)

Large specimens of G. (T.) crassaformis were obtained in Pleistocene-Recent sediments from Sites 279 and 284; some from Site 284 have well-developed keels.

G. (T.) gemma Jenkins

At Sites 277 and 282, G.(T.) gemma has been used as a zonal marker for the G.(G.) brevis Zone. There is evidence in the samples from Site 282 that G.(T.) gemma had a solution-resistant test.

G. (T.) inflata (d'Orbigny)

It normally formed a dominant part of the Pliocene(?)-Pleistocene planktonic foraminiferal faunas at most sites. G. (T.) inflata, the only species present at Site 283, appears to have a solution-resistant test.

TABLE 4A
Ranges of Planktonic Foraminifera in Selected Samples of Site 281

	-							-						_		1	LE	G	2	9		SI	TE		28	1	cc	R	ES	1/	A -	- 16	6		_												_				
1	LEIS	TO	CEN	E	Τ			PL	10	CEN	IE							1				UP	PEF	2	MIC	OCE	NE			<u>.</u>		1		L	.ow	ER	M	100	EN	E			LOWE	R OI	IGOC	ENE	CEN	E			AGE
G 1G	trunc	atul	noide	s	6	(T.)	inflo	ta		G.1	T) D	uncti	culo	ata	60	(G.)	mio. nioze	200		G.	(G.) n	miot	umit	da 2	_	G.(mo	T.) m yeri	nayer). sut	uralis	P. 6	G. 1	rosa	cui us fr	rva	15	G.10	G) w	roodi	con	necto	7	2	<i>G</i> .	(5.)	linap	erte	,			ZONE
IA	1			2						3				3	A		4		5		6	7	8		_	9		Τ	IC)		1	1			L	2			13	3	_			14		P	5	16		CORE
		1 2	2 3	4	5	6		1		2	3		1		2		Τ	1	Γ	2	Τ	T		2	3	4		3	3 4		1	1	4			3	4		3	5	5			2	3	4	T	6	5		SECTION
° C	20	4	00	20	20	20	cc	20	20	100	20	cc	45	20	135	2 0	00	20	cc	45	CC	cc	00	001	00	202	CC	204	106	cc	20	102	20	cc	20	100	20	cc	96	8	146	S	8	0	20	2	3	200	3	S	CENTIMETERS cc = core catcher
																																																			Chiloguembelina
																																																			C. cubensis
																																																			Globigerina (G.)
																																																			G. (G.) apertura
																									\perp				\perp										21		_		ct.	_	_		_				G. (G.) ampliapertura
•							۲				۲	۲	۲		•			•		•			•			•	•				۲	۲	•	•	•			•	•	•											G. (G.) bradyi
•							•	•	•	•		•							•	•												۲					•	•	•	•											G. (G.) bulloides
										1																										1															G. (G.) ciperoensis angustiumbilicata
			1									6																							۲		•	•	•	•	•										G. (G.) eamesi
																																											cf.								G. (G.) euapertura
•	•			•	•				•		۲		•	•					•							1					۲	۲	•				•	۲	•	•	•										G. (G.) juvenilis
•	•				•	۲	۲	•		•		۰			•				•	•			•	•						•	۲	•	•	•					۲	•											G. (G.) quinqueloba
			1							Ľ.		1										1																•		•	•							1			G. (G.) woodi connecto
												۲	•	cf.	cf				•																						_			_							G. (G.) woodi decoraperta
																										-		•		•	۲	•	•	•	•		•	•	•	•	•	•								-	G. (G.) woodi woodi
																													_																						Globigerina (S.)
																																									_		•	_	_	_	•			9	G. (S.) angiporoides angiporoides
																																												ct.		•		•			G. (S.) linaperta
																																																			Globigerinatheka (G.)
																						1													1	1											1		1		G. (G.) index index
																																																			Globigerinella
											•									cf.																															G. aequilateralis
																																																			Globigerinita
																																			cf.		cf.	•		•	•										G. dissimilis
	•					•	•	•	•		•									•											•				•	•			•	•	•										G. glutinata
																																		Ĩ					cl.												G. suteri
															Γ																																				Globigerinoides
																																	۲		•	•															G. trilobus trilobus
																																																			Globoquadrina
																																		•				•													G. dehiscens
																																		cf.														1		1	G. lormevi
	T																																			•	•	•													G. tripartita

TABLE 4A - Continued

		_					_		-	_		_	_	_	_		1	E	G	29)	9	IT	E	2	81	, 2	8	Α	1	СС	R	ES		1 -	- 10	6		_	-		_					-	-	-	-			٦		
	LEI	STO	CE	NE							P	LIC	CE	NE										UP	PER	2	MIC	CE	NE						LO	WE	R	MIC	OCE	NE					LC	WER	OL	GOC	CEN	2			T	А	GE
G 16) tru	ncatu	lino	ides	5	G.(1	r) in	flot	a		G	(T)	ound	cticu	lato	,	G (G.) I	mioz	00 10	Τ	G 1	G) i mio	miotu tumi	da	10		G.(T. ma	l may yeri	verit	sutur	ralis	P.	glan G.	trilo	sa bus	curv tril	obus	G	(G)) wood	di c	onne	cto	2	6	15	1 11	ape	rta			T	Z	ONE
1A	1				2	-					3	ä	_	T	. 1	3A		T	4	5		6		7	8		5	9			10				11		Τ		12		Τ		Ľ	3		T		14		15	Ī	16	T	CC	DRE
		1	2	3	4	5	6		1	Τ	2	3			1	2	T	T		1		2		1		2	3	4		3	4		1	1	4			3	4		3	5 5	5		Τ	2	3	4			e		T	S	ECTION
0	0	4	0	8	0	0	0	0	0	0	C	20		0 1	0		22	U		0	0	5	U	0	0	8	0	0	U	0	90	0	0	0	10		, 0	S	c		2 4			2	, ,	, _	0	0	0		2	20	,	CI	ENTIMETERS
0	0	-	=	Ĕ	2	N.	3	0	2	0	1	~	1	0 1	4 0	V	2	0	ũ	2	0	4	0	0	0	Ĕ	ž	ŝ	0	ŝ	Ĭ	0	2	=	0	1 0		1 4	~	1 4	0 0				, ,	<u>'</u>	0		-		-	0	1	cc =	core catcher
-	\rightarrow	+	-	_			_	-	-	+	+	+	+	+	+	+	-	+	_	-	-	-	-	-	_	-	_	-		-			-	-	+	+	+	⊢	+	+	+	+	+	+	+-	+	┝	⊢	⊢	+	⊢	-	-	Globorotalia	(G.)
\vdash	+	+	+	-	-	-	-	-	+	+	+	+	+	+	+	+	cf.	ef.	+	•	+		cf.	•	-	+	-	•	_	•		-	-	\vdash	+	+	+	+	+	+	+	+	+	+	+	+	+	┝	⊢	+	┢	+	+	G. (G.) m	iotumida miotumida
	-	+	+	-	-	-	-	-	+	+	+	+	+	+	+	+	-		+	+	cf.	•	•	•	•	-	-	-	4		-	-	-	-	┝	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	G (G.) n	niozea conoidea
	-	+	+	-			-	-	+	+	+	+	+	+	+	-			+	•	•	+	cf.	+	-	-	-		-	-	_	-	-	-	-	-	+	+	+	+	+	+	+	+	-	+	+	-	-	+	⊢	-	+	G. (G.) m	niozea conomiozea
	-	+	+	-	-	-	-	-	⊢	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	-	-	-		-		•	-		-	-	+	+	+	+	+	+	+	-	+	+	+	⊢	⊢	⊢	+	+	G. (G.) m	niozea miozea
	-	+	+	-	_		-	-	-	+	+	+	+	+	+	+	+	+	cf.	+	•	+	+	+	_	+	-	-	-	_	_	_	-	-	+	+	+	+	+	+	+	+	+	+	-	+	+	-	+	+	⊢	-	+	G. (G.) m	iozea sphericomiozea
	-	-	-	-				-	╞	+	+	+	+	+	+	+	+	+	+	+	-+	+	-	cf.	•	4	-		_		_	_	_	-	+	-	+	+	+	+	+	+	+	+	+	+	+	+	-	-	⊢	1	+	G. (G.) 4	panda
•	•		•	•			_	_	-	+	+	+	+	+	-	+	+	+	-	+	+	+	-	-	-	-	_	-	_	_	_	_	_	-	-	-	+	+	-	+	+	+	+	+	-	+	-	-	-	-	+	-	+	G. (G.) I	runcatulinoides
-	-	-	-	-		_	_	-	-	╞	+	-	+	+	-	+	+	+	+	+	+	+	-	-	_	+	-	-	_		_	_	-	-	+	-	-	+	-	+	+	+	+	+	+	-	-	+	-	-	⊢	-	6	Globorotalia	(7.)
	-	\rightarrow	_	_						1	+	-	+	+	-	+	-	+	\rightarrow	1		-	_	-	_	4	_	_					_		+	_	-	1	-	+	+	+	+	+	+	-	-	+	1	-	1	1	+	G. (T.) SI	01
	\rightarrow	\rightarrow	_	_						⊢			\perp			+		_	_	\rightarrow	-	•	•	•	_	\rightarrow	_		_						1					-					1	1			L		⊢		\perp	G. (T.) s	p 2
														-		_			_		_	_	_	-	_	_									1	_				-				1	1		-				\vdash	cf.	1	G. (T.) a	culeata
	_		_							1			1			1					1									•	•	•			cf.					1														G. (T.) C	onica
•	_	•	•	cf.	ct.	•	•	•	•	•	•		•					1	•		ct.																																	6. (T.) c.	rassaformis
															C	1		1.											_																									G. (T.) C	rassula
	ct	ct		cf.		ct.	ct.						ci	1			0	f,																																				G. (T.) de	itertrei
•	•			•	•		•	•	•	•																																												G. (T.) in	aflata
																																1.0														cf.	cf.	cf.	ct.	cf.	cf.	cf.		G. (T.) in	solita
												ct.	C	1		T		6	1.		ct		et														1																T	G. (T.) m	argaritae
													T			T						Τ					•	•														T		T			\square						T	G. (T.) m	ayeri continuosa
																T												•	•													T	1	T									T	G. (T.) m	ayeri mayeri
													T													•	•	•									1		T	1	1	T		T	1	1							T	G. (T.) m	ayeri nympha
										\square		1	T			T						1							cf.	cf.				cf.	cf.								1	$^{+}$		\top	\square						+	G. (T.) mi	nutissima
												T	T			T					1	1															1			1	+	T	\top	t	1	\top	\square	\square		\top			T	G. (T.) no	ina nana
	1		1							T		1	t	1	1	T	1	+		1	1	1		1	1	1									T									t	T	1							t	G. (T.) no	ana pseudocontinuosa
	-								t	\uparrow	+		T	+		+	+	+		1	-	1		+							•		-			1	1	1	1	1	+	+	1	t	+	+	1	\mathbf{t}	-	1	\vdash		+	G. (T.) ob	esa
			-										t												1	+					-		-	\vdash	\vdash		t	\vdash	1	+	+	+	+	+	+	+	\vdash			F			t	G. (T.) 00	chyderma
-	-	-	+	-	-	-	-	-	-	F	1	1	$^{+}$	f	-	+	-	+	-	+	-	-	-	-+	1																			+	+	+	\vdash	+		+	\vdash	+	+	G (T) a	raessitula
	+	+	+																	+	+	+	+	+	+	+	-		-	-	-		-	F	1	F	ľ	1	1	1	+	ť	1	+	+	+	\vdash	\vdash	-	+	\vdash	+	+	6 /11 -	vesticulata
				-							f	1	-		+	+						ct.				cl.				-	-	-	-		+	-	+	+	+	+	+	+	+	+	+	+	+	\vdash	-	+	\vdash	-	+	G (T) -	citula
-	-	-	-	1	-	-	-	-	F	f	+	t	t	+	+	+	Ť	+	-	f	-	+	-	+	-		-	-	-				-		t			+	\vdash	+	+	+	+	+	+	+	\vdash			+	F		+	6. (T.)	alandica
	+	+	+	-			-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-		-		-	-		+	1	-	\vdash	1	+	+	+	+	+	+	+	\vdash	\vdash	-	+	\vdash	+	t	Claboration of the	
-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-			-	-	\vdash	\vdash	-	+	+	+	+	+-	+	+	+	+	+	+	\vdash	-	+	\vdash	-	10	Signature and a	
	+	+	+	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	-	-		-	-	-	-	+	-	+	+	+	+	+	+	+	+	+	+	+	+	-	+	\vdash	-	+	G. suferi	
_			1				_										1				-					1										1	1											1				1		G. testar	ugosa

														LE	G	2	9	5	SIT	E	2	81	, 2	81	А		С	OR	ES	5	1	-	16																	
PL	EIST	roci	ENB	E.			_			P	LIO	CE	NE					1				UP	PER	t	MIC	DCE	NE							LO	NER	2 1	NIO	CEN	E			LOW	ER	OLIO	PER	NE 2	EN	E		AGE
G it	i) tra	incal	tulin	oide		6	.(1)	inti	lata	6.	(1)	pune	neul	ara	6.	16.1 20	mii nom	ozeo ioze	0	G.	(6) m	miot iotun	umid nida	ta		G. (may	T.) m eri	oyer St	iture	O.	P. gi	G tz	ilabi	curv	e Tobus		G. (G.)	-	d/ co	nne	eta	2	G	15)	lina	perto				ZONE
IA	1			;	2			Τ		3			Τ	3	A		4	T	5		6	7	8			9			10			11		T		12		T	1	3				1	4	1	5	16	5	CORE
		1	2	3 4	4 :	5 6	T	1		S	3		ĵ,	Γ	2	Γ	Γ	T	Γ	2				2	3	4		3	4		1	1	4		3	1	4	3	5	5			2	3	4	Π	T	6		SECTION
CC	00	4	011	8	202	20	20	00	200	00	20		45	20	135	00	0.0	20	CC	45	cc	cc	cc	100	100	20	00	50	901	cc	20	102	20	00	200	001	2	96	100	146	CC	CC	0	20	20	cc	cc	100	cc	CENTIMETERS cc=core_catcher
																																																		Orbulina
												T																•	•	•																				O. suturalis
•	•																		•			•																												O universo
				T			T	Τ	T			Γ	T					T		Γ																		T									Τ			Praeorbulina
																								1							•																T			P. glomerosa curva
												T						T																																Sphoeroidinello
						T		T		T	1	T		1																•							cl										T		T	5 disjuncta

TABLE 4B Ranges of Planktonic Foraminifera in Selected Samples of Hole 281A

G. (T.) mayeri continuosa Blow

It is present at Sites 279, 280, 281, and 284, and at Sites 279, 280 and 281, it is clearly related to G. (*T.*) mayeri mayeri. A transitional form between G. (*T.*) mayeri continuosa and G. (*T.*) pachyderma exists at Site 281 in the G. (*G.*) miotumida miotumida Zone, as previously reported from New Zealand (Jenkins, 1971).

G. (T.) mayeri mayeri Cushman and Ellisor

It is a common species within its zone at Sites 279, 280, and 281, and at Sites 279 and 281, G.(T.) mayeri mayeri is cryptogenic, appearing without its immediate ancestor G.(T.) mayeri peripheroronda. G.(T.) mayeri mayeri appears to have a tough, solution-resistant test.

G. (T.) mayeri nympha Jenkins

In New Zealand it became extinct in the upper part of the G.(T.) mayeri mayeri Zone, but at Site 281 it survived into the lower part of the succeeding G.(G.) miotumida miotumida Zone.

G. (T.) minutissima Bolli

It is a common form in the G. (G.) woodi connecta-G. trilobus trilobus zones at Site 279 where specimens have an aperture which is slightly larger than illustrated for the holotype from Trinidad.

G. (T.) munda Jenkins

At Site 277 there is some evidence that it may have evolved from G. (T.) gemma. G. (T.) munda has a juvenile form with regular chambers, but with a higher arched aperture than G. (T.) gemma. It is possible that G. (T.) gemma evolved into G. (T.) munda by increasing the test size, with a concomitant increase in the height of the aperture.

G. (T.) nana nana Bolli

It is fairly rare at Sites 277 and 279, but was found to be a useful marker in the upper Eocene at Site 282.

G. (T.) nana pseudocontinuosa Jenkins

It is fairly common at certain intervals in the G. (G.) woodi connecta-G. trilobus trilobus zones at Site 279; it is much more common at Sites 281 and 282.

G. (T.) nana semivera (Hornibrook)

It is fairly rare in the G. (G.) woodi connecta-G. trilobus trilobus zones at Site 279, with only a few specimens at Site 281.

G. (T.) pachyderma (Ehrenberg)

Dominantly sinistrally coiled specimens were found in a foraminiferal sand injected into (?)Upper Cretaceous-Paleocene sediment at Site 275. Also sinistrally coiled forms were found at Site 278 in the upper Miocene-Pleistocene, where the robust tests have survived solution effects, resulting in depleted faunas. G. (T.) pachyderma occurs in fairly large numbers in the Pleistocene-Recent at Site 279, but is rare at Site 280. A good record of the taxon occurs in the upper Miocene-Pleistocene at Site 281 where the populations are mainly sinistral, but there are both sinistral and dextral populations at Site 284.

G. (T.) praescitula Blow

There is a good record of G.(T.) praescitula at Site 279 from the G.(G.) woodi connecta Zone through to the G.(T.) mayeri mayeri Zone, but it is very rare at its cryptogenic initial appearance.

G. (T.) puncticulata (Deshayes)

A sample at Site 276 yielded specimens of G.(T.) puncticulata with distinctly angled peripheral margins. Its presence at Site 278 in very deep-water sediments suggests that it has a relatively strong solution-resistant test. Good faunas of G.(T.) puncticulata were obtained from Sites 281 and 284. At Site 284 there could be a transition between it and G.(G.) miozea sphericomiozea in the G.(G.) miozea conomiozea Zone.

G. (T.) scitula (Brady)

Very rare specimens were recorded in the G. (T.) puncticulata Zone at Site 278 and in the G. (G.) truncatulinoides zone at Site 279. G. (T.) scitula is much more common in the Miocene-Pleistocene G. (T.) mayeri mayeri-G. (G.) truncatulinoides zones at Sites 281 and 284.

G. (T.) tosaensis Takayanagi and Saito

Morphotypes of G. (T.) tosaensis exist in the Pleistocene G. (G.) truncatulinoides populations at Site 284.

G. (T.) zealandica Hornibrook

It is very rare in the lower Miocene G. trilobus trilobus Zone at Site 279 but numbers increase in the middle of the zone where it is quite common. From its range in southeast Australia (Jenkins, 1960) and New Zealand (Jenkins, 1971) G. (T.) zealandica is considered to be a good marker for the G. trilobus trilobus Zone.

Globorotaloides extans (Jenkins)

Typical specimens were obtained from the $G_{-}(G_{-})$ evapertura Zone at Site 282.

G. turgida (Finlay)

At Site 277 G. turgida was very rare in the P. primitiva-G. (T.) aculeata zones compared with its normal relative abundance in the Paleocene-Eocene of New Zealand.

G. testarugosa (Jenkins)

It was found to be common in the upper G. (S.) angiporoides angiporoides-G. (G.) euapertura zones at Site 277.

G. suteri Bolli

At Site 277 G. suteri appears to evolve into the coarser walled G. testarugosa in the upper part of the G. (S.) angiporoides angiporoides Zone.

PLE	ISTO	CEN	E	MIOCI	ENE	L	EG	2	29	5	SIT	E	2	82		со	RE	S	1	_	18					
G.(G) mie	niotu	LOV	VER	MIOC	ENE	:			-	OL	IGO	CE	NE				-			UP	PER	R		NE	AGE
G.(G)tru-	mid	G./0	G.(0	odi c	onne odi w	cta		-	-	G.(s.) a	ngipo	proid	es a	naip	oroid	es		G	G) br	evis	EL	G.I	S.J	ZONE
oide	s	ľ	2	3	4		6.(G	.) eu	aperi			7	8	9	10	L.	12	13	14		-	5		Inna	18	CORE
	Ē			F				2	Г				-	-			-	1	-		2		3	Г	1	SECTION
		0				0	~	~			0						\vdash			6	~		5	\vdash	1	CENTIMETERS
	9	ŏ	ŭ	ő	ő	E	3	_ 5	ŏ	ő	Ē	ő	ő	8	ő	ő	S	ő	8	12	2	ø	Ē	ő	800	cc = core catcher
																										Chiloguembelina
									•	•	•	•				•				•	•	•	•	•		C. cubensis
																										Globigerina (G.)
														of.			cf.				cf.					G. (G.) ampliapertura
	•	•	•	۲	•	•	•	•	•	•										_						G. (G.) bulloides
				cf																						G. (G.) bradyi
				•		•	•	cf.	•	•		•					۰									G. (G.) ciperoensis angustiumbilicata
					cf.																					G. (G.) eamesi
						cf.		cf.	cf.	cf.																G. (G.) euapertura
			•	•	•				•																	G. (G.) juvenilis
									•	•		•				•										G. (G.) labiacrassata
		•																								G. (G.) nepenthes
													2			•					•	cf.	cf.			G. (G.) ouachitaensis
	•																									G. (G.) guinqueloba
			•																							G. (G.) woodi connecta
		•																								G. (G.) woodi decoraperta
			•	•	•	•																				G. (G.) woodi woodi
											•	•	•	•	•	•	•	•	•	•	•	•	cf	•		G. (S.) angiporoides angiporoides
																				cf.	•	•		•		G. (S.) linaperta
																										Globigerinatheka
																					•			•		G. (G.) index index
																										Globoquadrina
		•	•	•	•	•																				G. dehiscens
																										Globigerinella
	•																									G. aequilateralis
																										Globigerinita
			•	•	•	•		cf.	•	•	•	•	•	•	•			cf.		cf.						G. dissimilis
	•			•	•	•		-																		G. glutinata
	-																									Globigerinoides
	-		•					-											-			-				G. altiaperturus
	•		-											-		-										G. ruber
	-																									6 trilabus trilabus
	-	-						-			-			-		-	-			-						Glaboratalia (G)
	cf		-	-	-			_	\vdash			-	-	-		-		\square	-					-		G (G) bireuta
			-	-	\vdash	-			-			-	-	_		-	-	\square		-			-	-		G (G) mistumida
	+	-	-	-		_		-	-			-	-	-			-	-		-		-	-	-		G. (G.) miozen considen
	+	-	-	-	Η				\vdash			-	-	-		-	-			-	-	-	-	-	-	
		-	-	-		_		_	-		_	-	-	-		_	-		-	-	-	-		_	_	
-				-					-			- 1								- H						G. (G.) Truncarulinolaes

TABLE 5 Ranges of Planktonic Foraminifera in Selected Samples of Site 282

PLE	STO		ERM	NIOCE	ENE	1	LEC	3	29		SI	ГΕ	2	282	2	C	DR	ES		I –	15				
G.IG., tumia	mio la mi	_ +	LO	WER	мюс	ENE	1				OL	GO	CEN	ΙE							UPF	PER	EOCE	ENE	AGE
G.(G.) ncah	tru-	-ida ↓	G.(0	.) woo) woo	onne odi w	oodi				G. (s.) ai	ngipo	roide	es a	ngipo	proid	9 5	1	G.(G	Jbre	vis	G.(S aper) lin ta	ZONE
oide	×1	Ī.	2	3	4		<i>G.(G</i>) eu	apert	6		7	8	9	10	п	12	13	14		1	5			CORE
	Т					1	2	2			1									1	2	3	3		SECTION
	61	cc	cc	cc	cc	130	22	102	cc	cc	130	cc	cc	cc	3	c	cc	cc	3	126	127	9	135	cc	CENTIMETERS cc = core catcher
																									Globorotalia (T.)
																				•	•	•	•	cf.	G.(T.) gemma
	•																								G. (T.) inflata
																									G. (T.) mayeri continuosa
		•																							G. (T.) mayeri nympha
										cf.	•		cf.	cf.		•									G.(T.) munda
					•				cf.	•	•										•			•	G.(T.) nana nana
				•	•	•	•	٠	•	•		•													G. (T.) nana pseudocontinuosa
					•					•															G. (T.) nana semivera
	•																								G. (T.) pachyderma
	•																								G.(T.) scitula
																				_					Globorotaloides
								•	cf.	cf.															G. extans
							cf.													•	•	cf.	cf.	cf.	G. suteri
											•					cł.									G. testarugosa
																	cf.								G. unicava
																									Guembelitria
										•															G. stavensis
																									Orbulina
		9,2																							0. suturalis
																									O. universa

TABLE 5 – Continued

Guembelitria stavensis Bandy

At both Sites 277 and 282 G. stavensis was found in well-developed faunas of the G. (G.) euapertura Zone. It is also suggested that a bit-sample obtained from Site 276 with a few specimens of G. stavensis is also from the G. (G.) euapertura zone.

Orbulina suturalis Bronnimann

Rare specimens were obtained from the G.(T.) mayeri mayeri Zone at Sites 279 and 280, and typical specimens from the O. suturalis Zone at Site 281.

O. universa d'Orbigny

Only a few small specimens were recovered from the Pleistocene of the southern Sites 275, 279, 281, and 282, but it is quite common in the G.(G.) miotumida miotumida-G.(G.) truncatulinoides zones of Site 284.

Praeorbulina glomerosa curva (Blow)

A few specimens were obtained from the zone of the same name at Sites 279 and 281. The lack of its descendant taxa *P. glomerosa glomerosa* and *P. glomerosa circularis* at these sites suggests that it penetrated further south than its descendants.

Pseudogloboquadrina primitiva (Finlay)

At Site 277 it was recorded from the Paleocene G. (S.) triloculinoides Zone to the upper Eocene G. (T.) aculeata Zone.

Truncorotaloides collactea (Finlay)

It was found to be fairly common at Site 277 from the G. wilcoxensis Zone to the G. (T.) aculeata Zone.

Zeauvigerina Finlay

The three New Zealand species, Z. parri, Z. teuria, and Z. zelandica, were recorded in the Paleocene-Eocene rocks at Site 277.

REFERENCES

- Jenkins, D. G., 1960. Planktonic foraminifera from the Lakes Entrance oil shaft, Victoria, Australia: Micropaleontology, v. 6, p. 345.
- _____, 1966. Planktonic foraminiferal zones and new taxa from the Danian to Lower Miocene of New Zealand: New Zealand J. Geol. Geophys., v. 8, p. 1088.
- _____, 1967. Planktonic foraminiferal zones and new taxa from the lower Miocene to the Pleistocene: New Zealand J. Geol. Geophys., v. 10, p. 1064.
- _____, 1971. New Zealand Cenozoic planktonic foraminifera: New Zealand Geol. Surv. Paleontol. Bull. 42, p. 1-278.
- Ludbrook, N. and Lindsay, J. M., 1969. Tertiary foraminiferal zones in South Australia: Plankt. Conf. Microfossils, First, Geneva, 1967, Proc., v. 2, p. 366.

LE	Image: Single set of the set of																									
PLE	IST	OCE	NE					-	PL	100	EN	E	-		.,	-		UF	PE	R	MI	oc	ENE	Ξ	-	AGE
G. (G)	trun	ca	6	G. (T.) int	flata	,		G.	(T.)	pun	cti	G.	(G.,) m	ioze	a		G.	(G.)	mia	otumi	ida	-	ZONE
- 1	2	3	2	Δ	5	6	7	0			- 00	II	12	1	con	In	15			,	niot		20	21	22	CORE
÷	-	-	2	4	-	0	ť	0	6			-	12		, 	14	15	10	6	ŕ	10	19	20	21	22	SECTION
	-	-	5	4	-	-		-	0			-	-	1	-		-	-	0	-	-	-				SECTION
S	cc	CC	100	20	S	S	CC	SC	00	CC	cc	cc	0 0	10	S	CC	CC	CC	20	C C	C C	CC	CC	CC	S	cc = core catcher
																										Globigerina
		•				•	•		•	•	cf.	•	•				•	•					•		•	G. (G.) bradyi
•	•				•	•	•	•	•	•			•	•		•	•	•	•	•		•	•	•	•	G. (G.) bulloides
																									1	G. (G.) digitata
•				•	•	•	•		•			٠	•			•				•			•			G. (G.) juvenilis
																cf.										G. (G.) nepenthes
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•		G. (G.) quinqueloba
					•		•	۰	cf.	•	•	۲					•	•		•			٠	•	•	G. (G.) woodi decoraperta
																										Globigerinella
•	•	•	•	•	•	•	•	•	•	•	•		•								•		•	•		G. aequilateralis
																										Globigerinita
		۲	•		•		•	•	•	•		۲		•	•	•		۲	•			•		•		G. glutinata
-	_																									Globigerinoides
	_			•																						G. conglobatus
			•							cf.	•			•	cf.											G. obliquus
•	•	_	•	•	•	•	•		cf.				•		•		_						cf.			G. ruber
	_				_			-	cf.										-							G. sacculifer
						_														•						G. trilobus
	_	_									_		_							_						Globoquadrina
							•								•											G. altispira
	-	_									_		_				_									Globorotalia
			_	_								cf.				_	_									G. (G.) hirsuta
	-		-	_	-		-	-	-	cf.	cf.	•	•	cf.	•	•	_	cf.	_	-	•	•	•	•	•	G. (G.) miotumida miotumida
	_	_		_						-			-	_	_				•	•	-	•	•	•	•	G. (G.) miotumida explicationis
		-	-	-			-	-	-	-	-	_	-		-	_	-	-		•			•		•	G. (G.) miozea conoidea
	_	_		-					-			-	-	-	•	•	•	•	•	cf.	_	_		_		G. (G.) miozea conomiozea
	•			-	-			-	-	-		-			_		cf.	•		_	_	_		-		G. (G.) miozea sphericomiozea
	-									-			-			-				-	-					
-	-	-	-	-	-	-	-	-	C'h	-	-	-	-	-		-	67.	-		-	-		-	_	-	G. (T.) Crossdformis
	•				•					-	-	-	-	-	CT.	-	-		_	-					-	G. (T.) inflata
-	-	-	-	-	-	-	-	-	-	-		-						Η	_	ct		c.f		-		G (T) mayeri continuosa
										-															ef.	C (T) pachudarma
-	-	-	-	-														-		-	-	-	-	-		G. (T.) puncticulata
																	cf.									G (T) scitula
-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	- /-	-	-	-	-	-	-	-	-	Hastigerina
\square	-				-	-						-	-									-		-	-	H pelagica
Н		-			-		-		-	-					-		-			-	_					Orbuling
																		•		-						0 bilobata
•		•	•		•		•	•		•																0 universa
							Ħ		Ē				-		-			-	-	-	-	-		-	-	Sphaeroidinella
	•																									S dehiscens

TABLE 6 Ranges of Planktonic Foraminifera in Selected Samples of Site 284

INTERNATION UNITS	AL	NEW ZEALAND PLANKTONIC FORAMINIFERAL ZONES	LEG 29 ZONES AT SITES 275 277, 279 282, 284	INFORMAL ZONES AT SITE 278
PLEISTOCENE	Ε.	G (G) truncatulinoides	C (G) truncatulinoides	
		G.(T.) inflata	G.(T.) inflata]
PLIOCENE		G. (T.) puncticulata	G (T) puncticulata]
-99	_	G.(G.) miazea sphericomiozea	G.(G.) miazea conomiazea	
	U	G-(G-) miotumida miatumida	G.(G.) miotumida miotumida	G.G. bulivides
		G.(T.) mayeri mayeri	G.(T.) mayeri mayeri	
	м	O. suturalis	O. suturalis	G.(T.) conica
MIOCENE		P glomeroso curvo	P. glomerosa curva	
	L	6. trilobus trilobus	G trilobus trilobus	
	-	5. (6) woodi connecto	G (G.) woodi connecta	6.16.) woodi
		G. (G.) woodi woodi	G (G.) woodi woodi	
		G. dehiscens		
OLIGOCENE		G. (G.) evapertura	G (G.) eupertura	
		G (S) angiporoides angiporoides	G (S-) angiporoides angiporoides	
		6. (G.) brevis	G.(G.) brevis	
	U	G. (S.) linaperta	G (S) linaperta	
		G. (T.) inconspicuo	G.(T) oculeoto	
		G. (G.) index index	5. (6.) index index	
EOCENE	М	P. primitiva	P. primitiva	
1		G.(M.) crater crater	G. (M.) croter croter	
	L	G. wilcoxensis	G. wilcoxensis	
PALEOCENE		G (S.) triloculinoides	G. (S.) triloculinoides	

TABLE 7 Correlation of New Zealand Planktonic Foraminiferal Zones and Zones Used on Leg 29

TABLE 8

Planktonic Foraminiferal Zones Used on Leg 29 and Taxa Used to Delineate the Zonal Boundaries

INTERNATION UNITS	AL	PLANKTONIC FORAMINIFERAL ZONES USED ON LEG 29	TAXA USED TO DELINEATE ZONES
PLEISTOCEN	E	Sloboratalia (G.) truncatulinaides	INITIAL APPEARANCE OF
	-	Globorotalia (T.) inflata	G. (G.) truncatulinaides
PLIOCENE		Globorotalia (T.) puncticulata	G (T) inflata
-77-		Glabaratalia (G.) miazea conomiazea	G (G) miozea conomiozea
	U	Globorotalia (G.) miatumida miatumida	G. IG. J miozea conomiozea
		Globorotalia (T) mayeri mayeri	← EXTINCTION OF G.(T.) mayeri mayeri
	м	Orbulina suturalis	G (T.) mayeri mayeri
MIOCENE		Prosecular demand with	INITIAL APPEARANCE OF O. suturalis
		Proecraalina gamerosa carva	- INITIAL APPEARANCE OF
	L	Globigerinoides frilobus frilobus	INITIAL APPEARANCE OF G. trilobus trilobus
		Glabigerina (G.) waodi connecta	
		Globigerina (G.) waadi woodi	- INITIAL APPEARANCE OF G. (G.) woodi woodi
OLIGOCENE			G. dehiscens
	3	Glabiaerina (S.) anainamides anainamides	← EXTINCTION OF G. (G.) angiparaides angiparaides
			← EXTINCTION OF G. (7.) gemma
		Globigerino (G.) brevis	INITIAL APPEARANCE OF G (T) genung
	U	Globigerina (S.) linaperta	EXTINCTION OF
		Globorotalia (T.) aculeata	- INITIAL APPEARANCE OF
		Globigerinatheka (G) index index	- INITIAL APPEARANCE OF
EOCENE	M	Pseudogloboquadrina primitiva	EXTINCTION OF
		Globorotalia (M.) crater crater	G. (M) croter croter
	L	Globanomalina wilcoxensis	G. (M.) crater crater
PALEOCENE		Globigerina (S.) triloculinoides	G wilcoxensis

INTERNATION	AL	PLANKTONIC FORAMINIFERAL	z	P	LAN	PENET	IC FOR	AMIN	IFERA	L ES	
00115		ZONES USED ON DSDP LEG 29	275	277	27	8 279	280	281	282	283	284
PLEISTOCEN	٧E	Globorotalia (G.) truncatulinoides	275	077		279			282	٩	
		Glaborotalia (T.) inflata	2	211							
PLIUCENE		Globorotalia (T) puncticulata		1							
-??-	_	Globorotalia (G.) conomiozea			oides"						
	U	Globorotalia (G.) miotumida miotumida			(C.) pull						
		Globorotalia (T.) mayeri mayeri			0","61	279					284
MIOCENE	м	Orbulina suturalis			conic						
		Praeorbulina glomerosa curva			"G.(T.)						
	в.	Globigerinaides trilobus trilobus			11						
		Globigerina (G.) woodi connecta) wood	I					
		Globigerina (G.) woodi woodi			"G. (G						
OLIGOCENE	_	Hiatus : G. dehiscens Globigerina (G.) euapertura		277							
		Globigerina (S.) angiporoides angiporoides	276								
	-	Globigerina (G.) brevis									
	υ	Globigerina (S.) linaperta					5	201	282	5 C	
		Globorotalia (T.) aculeata					280	201			
		Globigerinatheka (G.) index index					147			283	
EOCENE	M	Pseudogloboquadrina primitiva									
	-	Globorotalia (M.) crater crater									
	L	Globanomalina wilcoxensis									
PALEOCENE	-	Globigerina (S.) triloculinoides									

 TABLE 9

 Planktonic Foraminiferal Zones Penetrated at Sites Drilled on Leg 29