PLANKTIC FORAMINIFERA
OF THE CRETACEOUS AND PALEOCENE - EOCENE

PART 2: PALEOCENE - EOCENE

Course given by
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at Universidad Central de Venezuela
Caracas

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Contents

AGE		PLANKTIC FORAMINIFERAL ZONES and SUBZONES	
HOL.		*Globorotalia truncatulinoides truncatulinoides*	● *Gr. fimbriata*
PLEISTOCENE			● *Gg. bermudezi*
			● *Gg. calida calida*
			● *Gr. hessi*
			● *Gr. crassaf. viola*
PLIOCENE	L	● *Globorotalia tosaensis tosaensis*	
	M	● *Globorotalia miocenica*	● *Gr. exilis*
			● *Gs. trilob. fistulosus*
	E	*Globorotalia margaritae*	*Gr. marg. evoluta*
			Gr. marg. margaritae
MIOCENE	L	*Globorotalia humerosa*	
		Globorotalia acostaensis	
	M	*Globorotalia menardii*	
		Globorotalia mayeri	
		Globigerinoides ruber	
		Globorotalia fohsi robusta	
		Globorotalia fohsi lobata	
		Globorotalia fohsi fohsi	
		Globorotalia fohsi peripheroronda	
	E	*Praeorbulina glomerosa*	
		Globigerinatella insueta	
		Catapsydrax stainforthi	
		Catapsydrax dissimilis	
		Globigerinoides primordius	
OLIGOCENE	L	*Globorotalia kugleri*	
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	E	*Cassig. chipolensis/Pseudohast. micra*	
EOCENE	L	*Turborotalia cerroazulensis* s.l.	
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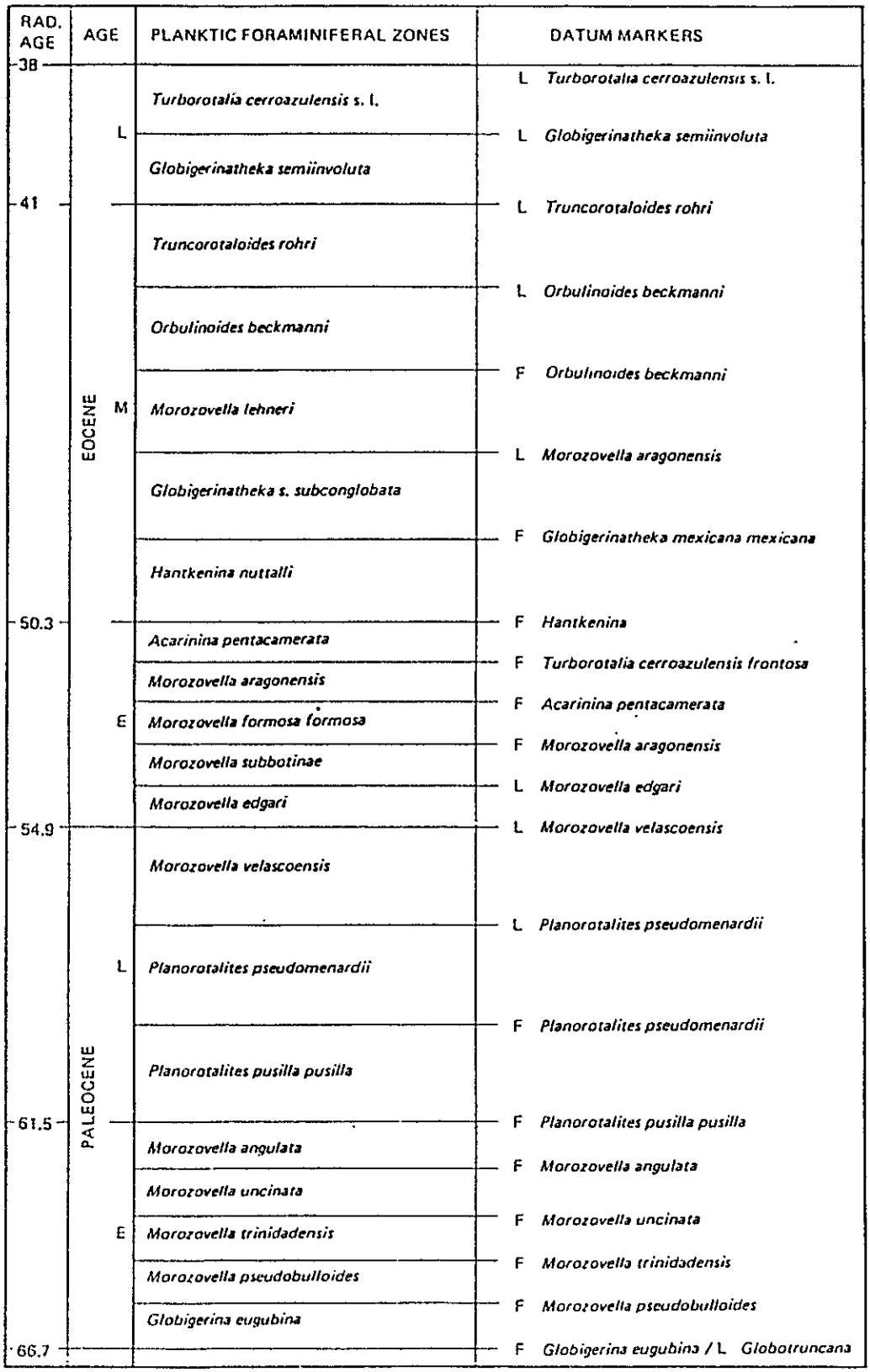
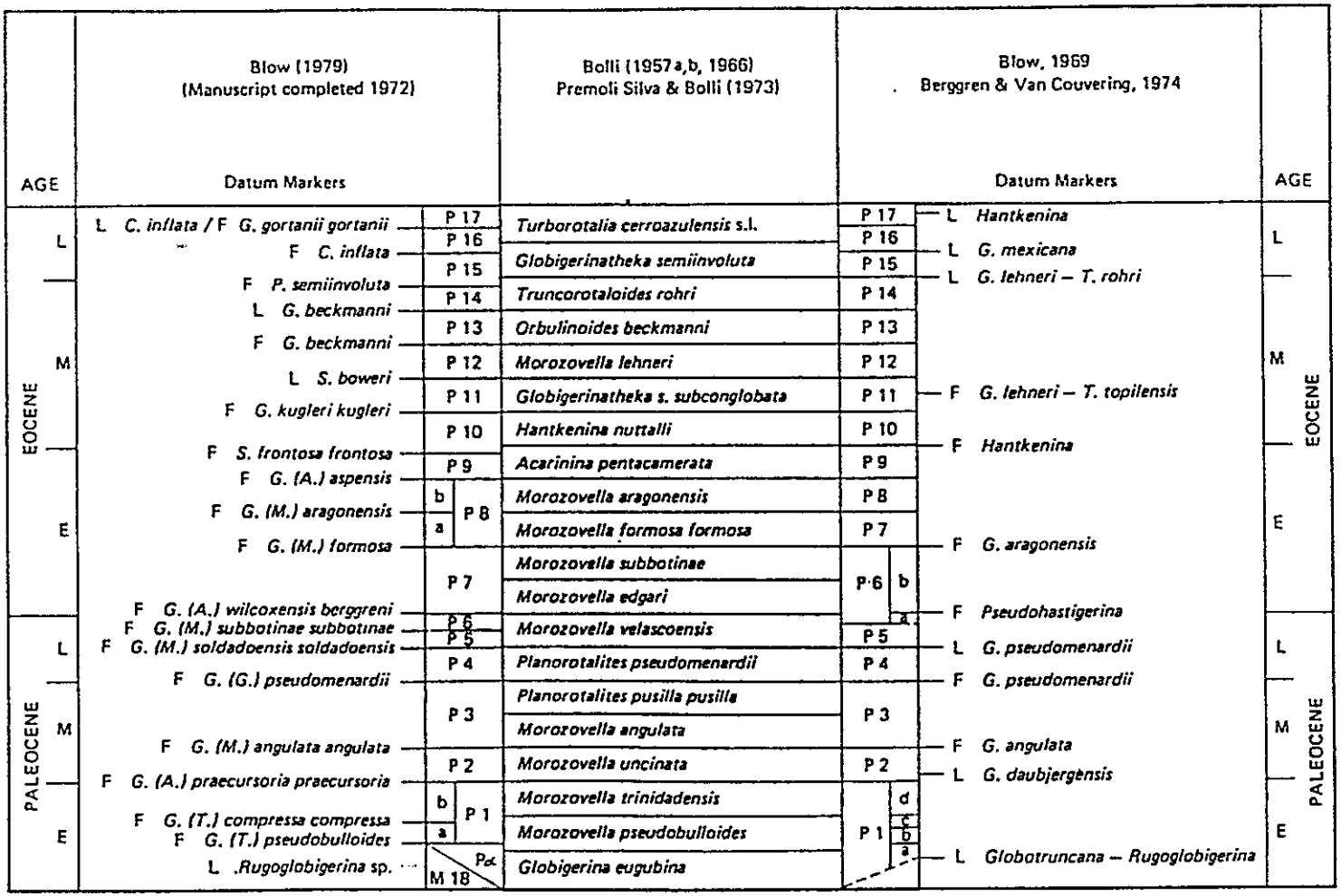
	M	*Truncorotaloides rohri*	
		Orbulinoides beckmanni	
		Morozovella lehneri	
		Globigerinatheka s. subconglobata	
		Hantkenina nuttalli	
	E	*Acarinina pentacamerata*	
		Morozovella aragonensis	
		Morozovella formosa formosa	
		Morozovella subbotinae	
		● *Morozovella edgari*	
PALEOCENE	L	*Morozovella velascoensis*	
		"Planorotalites" pseudomenardii	
	M	*"Planorotalites" pusilla pusilla*	
		Morozovella angulata	
		Morozovella uncinata	
		"Morozovella" trinidadensis	
	E	*"Morozovella" pseudobulloides*	
		"Globigerina" eugubina	


RAD. AGE
AGE
PLANKTIC FORAMINIFERAL ZONES
DATUM MARKERS
38
41
50.3
54.9
61.5
66.7
EOCENE
PALEOCENE
L
M
E
L
E
Turborotalia cerroazulensis s. l.
Globigerinatheka semiinvoluta
Truncorotaloides rohri
Orbulinoides beckmanni
Morozovella lehneri
Globigerinatheka s. subconglobata
Hantkenina nuttalli
Acarinina pentacamerata
Morozovella aragonensis
Morozovella formosa formosa
Morozovella subbotinae
Morozovella edgari
Morozovella velascoensis
Planorotalites pseudomenardii
Planorotalites pusilla pusilla
Morozovella angulata
Morozovella uncinata
Morozovella trinidadensis
Morozovella pseudobulloides
Globigerina eugubina
L Turborotalia cerroazulensis s. l.
L Globigerinatheka semiinvoluta
L Truncorotaloides rohri
L Orbulinoides beckmanni
F Orbulinoides beckmanni
L Morozovella aragonensis
F Globigerinatheka mexicana mexicana
F Hantkenina
F Turborotalia cerroazulensis frontosa
F Acarinina pentacamerata
F Morozovella aragonensis
L Morozovella edgari
L Morozovella velascoensis
L Planorotalites pseudomenardii
F Planorotalites pseudomenardii
F Planorotalites pusilla pusilla
F Morozovella angulata
F Morozovella uncinata
F Morozovella trinidadensis
F Morozovella pseudobulloides
F Globigerina eugubina / L Globotruncana

		Bolli (1957a,b,1966), Premoli Silva & Bolli (1973), this volume	Krasheninnikov (1965, 1969)		Hillebrandt (1974)	Blow, 1969 Berggren & van Couvering (1974)			Blow (1979)		
EOCENE	Late	*T. cerroazulensis* s. l.	*G. corpulenta*		*G. cerroazulensis*	P 17		*G. gortanii/G. centralis*	P 17		*G. g. gortanii/G. (T.) centralis*
						P 16		*C. inflata*	P 16		*C. inflata*
		G. semiinvoluta			*G. semiinvoluta*	P 15		*G. mexicana*	P 15		*P. semiinvolutus*
	Middle	*T. rohri*	*T. rohri*		*T. rohri*	P 14		*T. rohri - G. howei*	P 14		*G. (M.) sp. spinulosa*
		O. beckmanni	*H. alabamensis*		*O. beckmanni*	P 13		*O. beckmanni*	P 13		*G. beckmanni*
		M. lehneri	*A. rotundimarginata*		*G. lehneri*	P 12		*G. lehneri*	P 12		*G. (M.) lehneri*
		G. s. subconglobata	*A. bullbrooki*	*G. kugleri*	*G. s. subconglobata*	P 11		*G. kugleri*	P 11		*G. kugleri/S. frontosa boweri*
		H. nuttalli		*H. aragonensis*	*H. aragonensis*	P 10		*H. aragonensis*	P 10		*S. f. frontosa/G. (T.) pseudomayeri*
	Early	*A. pentacamerata*	*G. aragonensis*	*A. pentacamerata*	*G. caucasica*	P 9		*A. densa*	P 9		*G. (A.) aspensis/G. lozanoi prolata*
					G. palmerae						
		M. aragonensis		*G. aragonensis*	*G. aragonensis*	P 8		*G. aragonensis*	P 8	b	*G. (M.) aragonensis/G. (M.) formosa*
		M. formosa formosa	*G. subbotinae*	*G. marginodentata*	*G. formosa/A. angulosa*	P 7		*G. formosa*		a	*G. (M.) formosa/G. (M.) lensiformis*
		M. subbotinae			*G. lensiformis*	P 6	b	*G. subbotinae/P. wilcoxensis*	P 7		*G. (A.) wilcoxensis berggreni*
		M. edgari		*G. subbotinae*	*G. marginodentata/G. subbotinae*						
PALEOCENE	Late	*M. velascoensis*	*G. velascoensis*	*G. velascoensis*	*G. velascoensis*		a	*G. velascoensis/G. subbotinae*	P 6		*G. (M.) s. subbotinae/G. (M.) velascoensis acuta*
						P 5		*G. velascoensis*	P 5		*M. s. soldadoensis/G. (M.) velascoensis pasionensis*
		P. pseudomenardii		*G. pseudomenardii*	*G. pseudomenardii*	P 4		*G. pseudomenardii*	P 4		*G. (G.) pseudomenardii*
	Middle	*P. pusilla pusilla*	*G. angulata*	*G. conicotruncata*	*G. pusilla*	P 3		*G. pusilla/G. angulata*	P 3		*G. (M.) a. angulata*
		M. angulata		*G. angulata*	*G. angulata*						
		M. uncinata	*A. uncinata*		*G. inconstans/G. uncinata*	P 2		*G. uncinata/G. spiralis*	P 2		*G. (A.) p. praecursoria*
	Early	*M. trinidadensis*	*G. triloculinoides/ G. pseudobulloides*		*G. trinidadensis*	P 1	d	*G. compressa/G. inconstans/ G. trinidadensis*	P 1	b	*G. (T.) c. compressa/E. eobulloides simplissima*
		M. pseudobulloides			*G. edita*		c	*G. pseudobulloides*			
							b	*G. triloculinoides*		a	*G. (T.) pseudobulloides/G. (T.) archaeocompressa*
			E. eobulloides				a	*G. eobulloides*	Pα / M 18		*G. (T.) longiapertura* / *R. hexacamerata*
		G. eugubina									


AGE
Blow (1979)
(Manuscript completed 1972)
Datum Markers
Bolli (1957a,b, 1966)
Premoli Silva & Bolli (1973)
Blow, 1969
Berggren & Van Couvering, 1974
Datum Markers
AGE
EOCENE
PALEOCENE
L
M
E
L. C. inflata / F. G. gortanii gortanii
F C. inflata
F P. semiinvoluta
L G. beckmanni
F G. beckmanni
L S. boweri
F G. kugleri kugleri
F S. frontosa frontosa
F G. (A.) aspensis
F G. (M.) aragonensis
F G. (M.) formosa
F G. (A.) wilcoxensis berggreni
F G. (M.) subbotinae subbotinae
F G. (M.) soldadoensis soldadoensis
F G. (G.) pseudomenardii
F G. (M.) angulata angulata
F G. (A.) praecursoria praecursoria
F G. (T.) compressa compressa
F G. (T.) pseudobulloides
L .Rugoglobigerina sp.
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P 5
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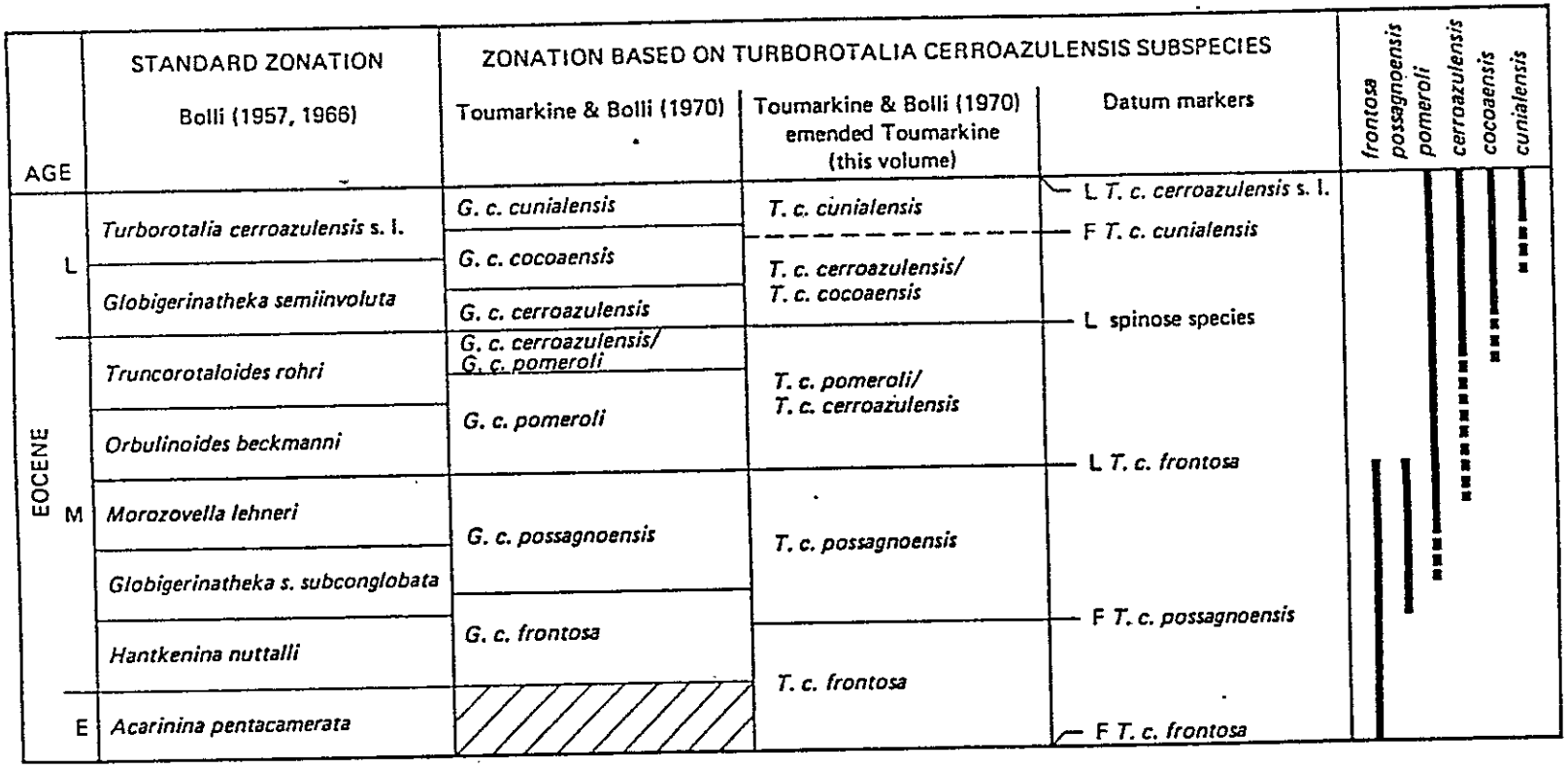
M 18
Turborotalia cerroazulensis s.l.
Globigerinatheka semiinvoluta
Truncorotaloides rohri
Orbulinoides beckmanni
Morozovella lehneri
Globigerinatheka s. subconglobata
Hantkenina nuttalli
Acarinina pentacamerata
Morozovella aragonensis
Morozovella formosa formosa
Morozovella subbotinae
Morozovella edgari
Morozovella velascoensis
Planorotalites pseudomenardii
Planorotalites pusilla pusilla
Morozovella angulata
Morozovella uncinata
Morozovella trinidadensis
Morozovella pseudobulloides
Globigerina eugubina
L Hantkenina
L G. mexicana
L G. lehneri – T. rohri
F G. lehneri – T. topilensis
F Hantkenina
F G. aragonensis
F Pseudohastigerina
L G. pseudomenardii
F G. pseudomenardii
F G. angulata
L G. daubjergensis
L Globotruncana – Rugoglobigerina


AGE
STANDARD ZONATION
Bolli (1957, 1966)
ZONATION BASED ON TURBOROTALIA CERROAZULENSIS SUBSPECIES
Toumarkine & Bolli (1970)
Toumarkine & Bolli (1970) emended Toumarkine (this volume)
Datum markers
frontosa
possagnoensis
pomeroli
cerroazulensis
cocoaensis
cunialensis
EOCENE
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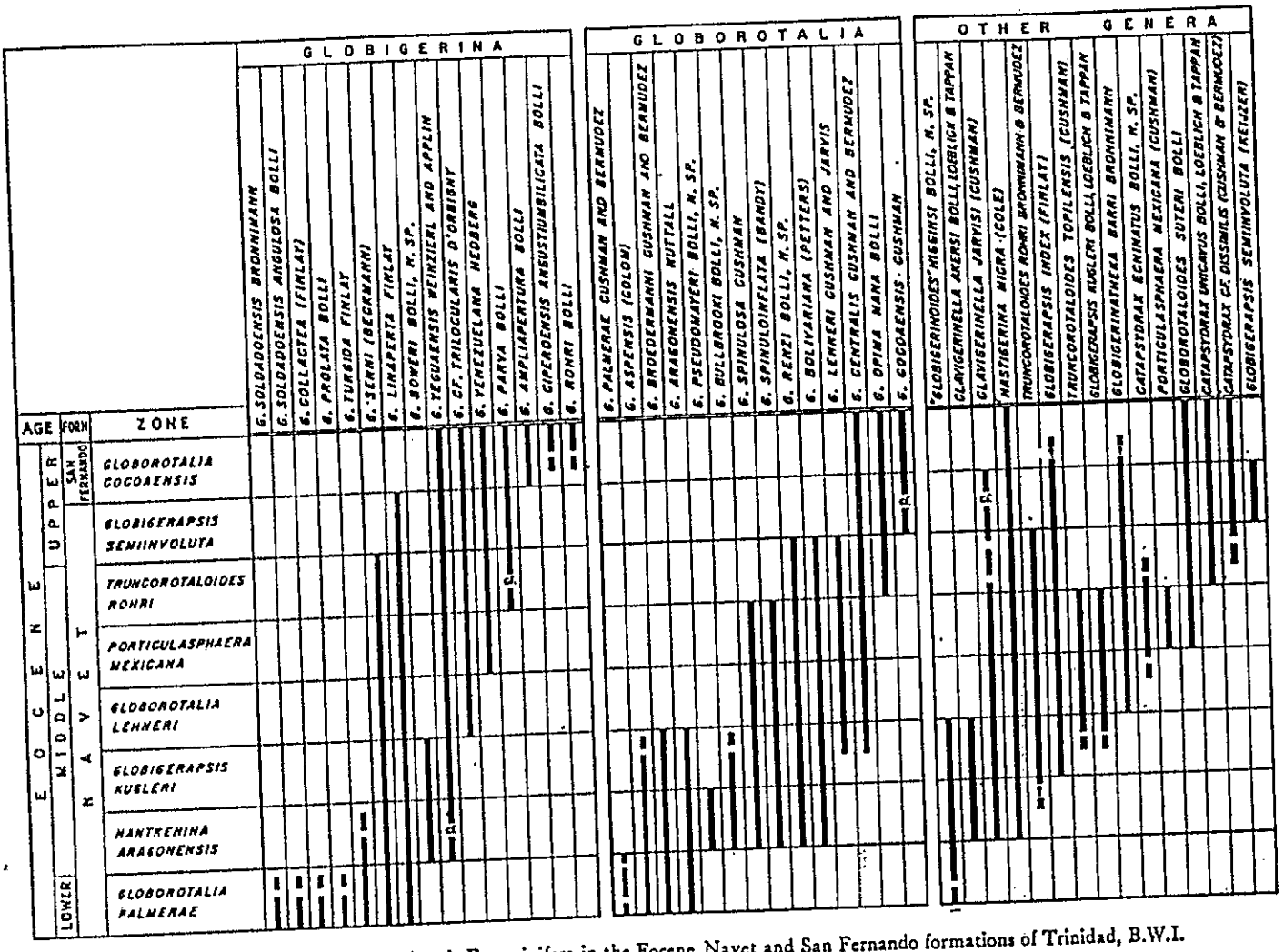
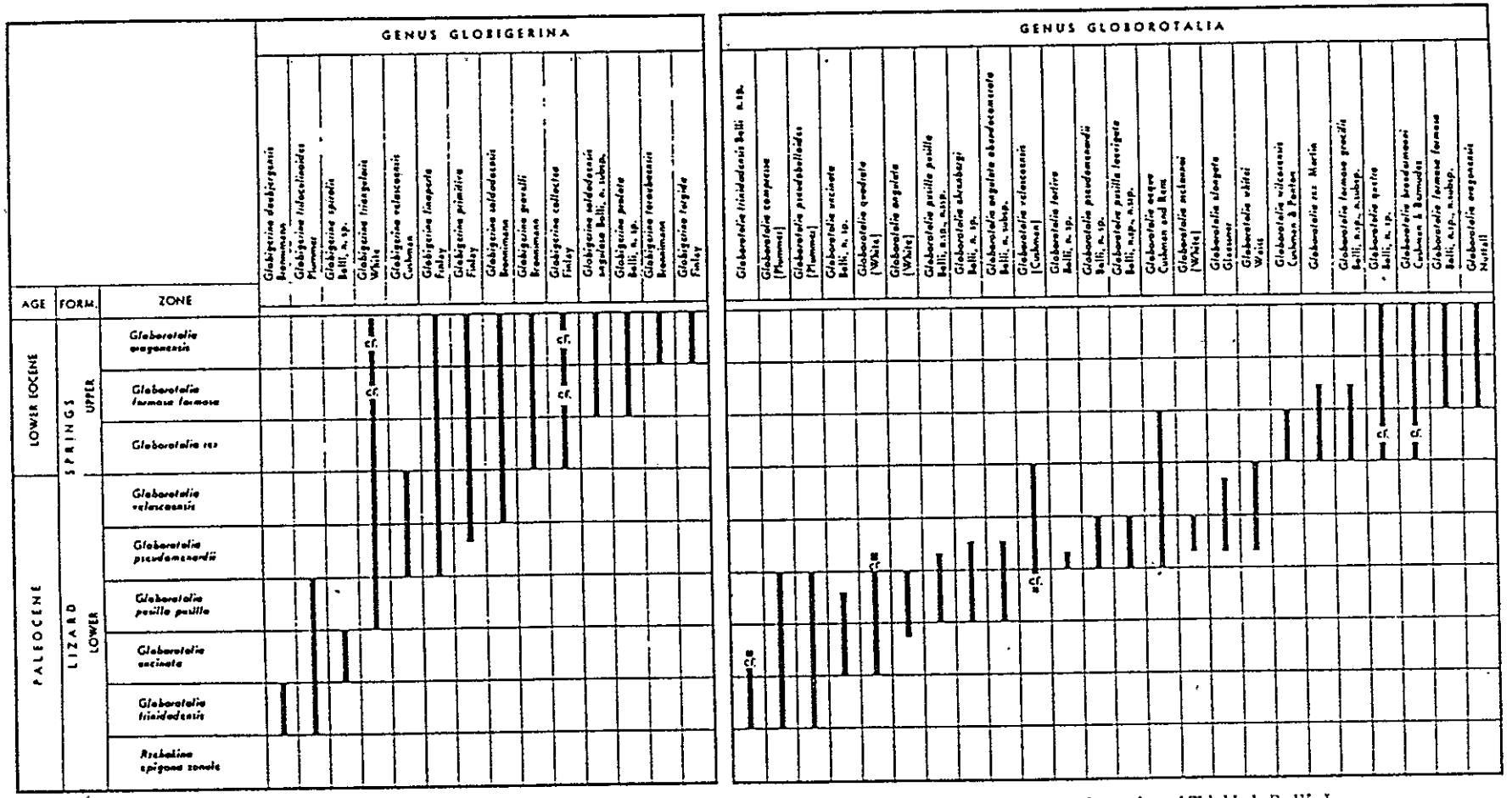
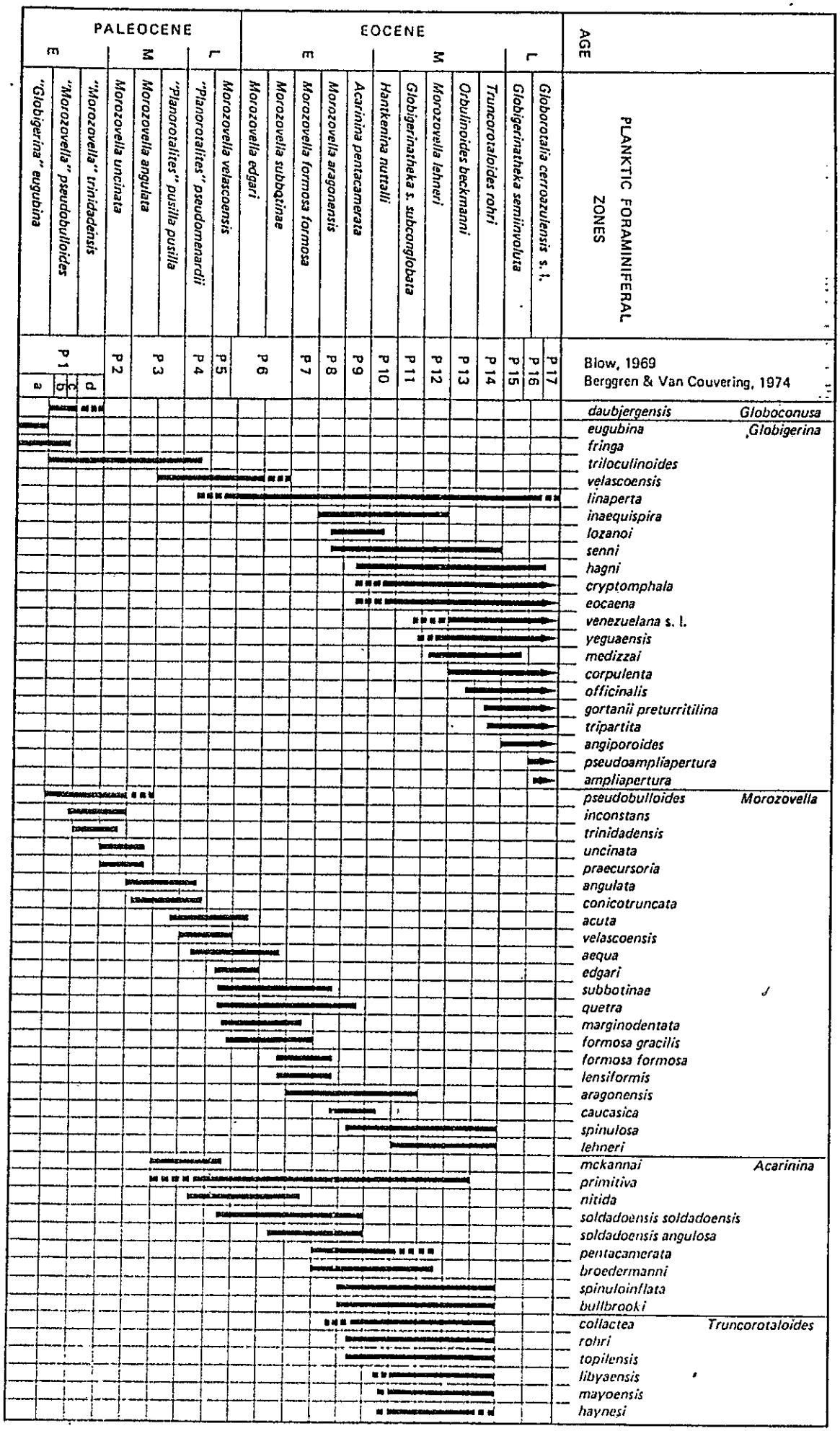
Turborotalia cerroazulensis s. l.
Globigerinatheka semiinvoluta
Truncorotaloides rohri
Orbulinoides beckmanni
Morozovella lehneri
Globigerinatheka s. subconglobata
Hantkenina nuttalli
Acarinina pentacamerata
G. c. cunialensis
G. c. cocoaensis
G. c. cerroazulensis
G. c. cerroazulensis/ G. c. pomeroli
G. c. pomeroli
G. c. possagnoensis
G. c. frontosa
T. c. cunialensis
T. c. cerroazulensis/ T. c. cocoaensis
T. c. pomeroli/ T. c. cerroazulensis
T. c. possagnoensis
T. c. frontosa
L T. c. cerroazulensis s. l.
F T. c. cunialensis
L spinose species
L T. c. frontosa
F T. c. possagnoensis
F T. c. frontosa



Distribution of planktonic Foraminifera in the Eocene Navet and San Fernando formations of Trinidad, B.W.I.



Species distribution of *Globigerina* and *Globorotalia* in the Paleocene - lower Eocene Lizard Springs formation of Trinidad, B. W. I.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PLANKTIC FORAMINIFERAL ZONES
PALEOCENE
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Globorotalia cerroazulensis s. l.
Globigerinatheka semiinvoluta
Truncorotaloides rohri
Orbulinoides beckmanni
Morozovella lehneri
Globigerinatheka s. subconglobata
Hantkenina nuttalli
Acarinina pentacamerata
Morozovella aragonensis
Morozovella formosa formosa
Morozovella subbotinae
Morozovella edgari
Morozovella velascoensis
"Planorotalites" pseudomenardii
"Planorotalites" pusilla pusilla
Morozovella angulata
Morozovella uncinata
"Morozovella" trinidadensis
"Morozovella" pseudobulloides
"Globigerina" eugubina
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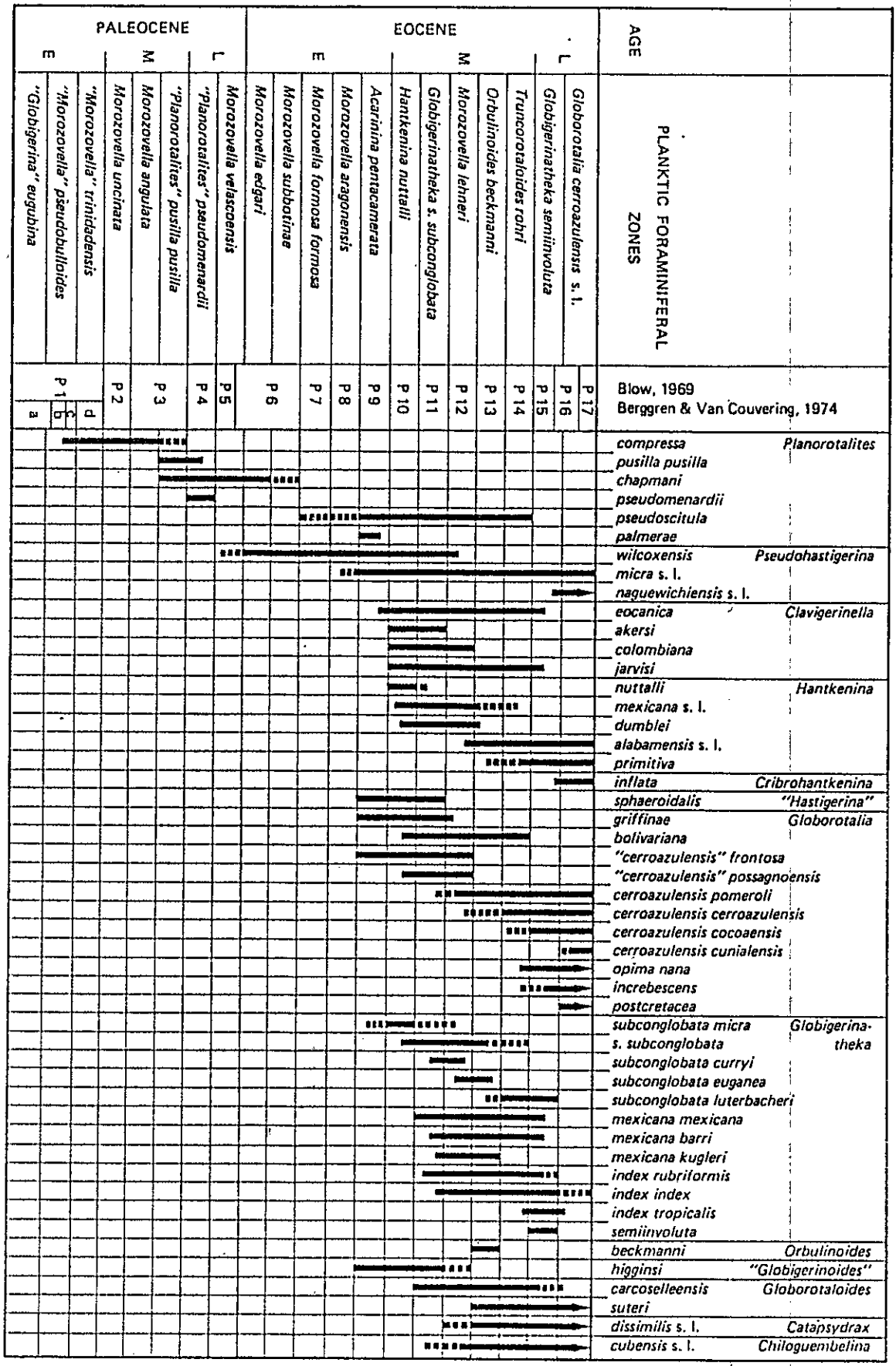
Blow, 1969
Berggren & Van Couvering, 1974
daubjergensis
Globoconusa
eugubina
Globigerina
fringa
triloculinoides
velascoensis
linaperta
inaequispira
lozanoi
senni
hagni
cryptomphala
eocaena
venezuelana s. l.
yeguaensis
medizzai
corpulenta
officinalis
gortanii preturritilina
tripartita
angiporoides
pseudoampliapertura
ampliapertura
pseudobulloides
Morozovella
inconstans
trinidadensis
uncinata
praecursoria
angulata
conicotruncata
acuta
velascoensis
aequa
edgari
subbotinae
quetra
marginodentata
formosa gracilis
formosa formosa
lensiformis
aragonensis
caucasica
spinulosa
lehneri
mckannai
Acarinina
primitiva
nitida
soldadoensis soldadoensis
soldadoensis angulosa
pentacamerata
broedermanni
spinuloinflata
bullbrooki
collactea
Truncorotaloides
rohri
topilensis
libyaensis
mayoensis
haynesi


AGE
PALEOCENE
EOCENE
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PLANKTIC FORAMINIFERAL ZONES
Globorotalia cerroazulensis s. l.
Globigerinatheka semiinvoluta
Truncorotaloides rohri
Orbulinoides beckmanni
Morozovella lehneri
Globigerinatheka s. subconglobata
Hantkenina nuttalli
Acarinina pentacamerata
Morozovella aragonensis
Morozovella formosa formosa
Morozovella subbotinae
Morozovella edgari
Morozovella velascoensis
"Planorotalites" pseudomenardii
"Planorotalites" pusilla pusilla
Morozovella angulata
Morozovella uncinata
"Morozovella" trinidadensis
"Morozovella" pseudobulloides
"Globigerina" eugubina
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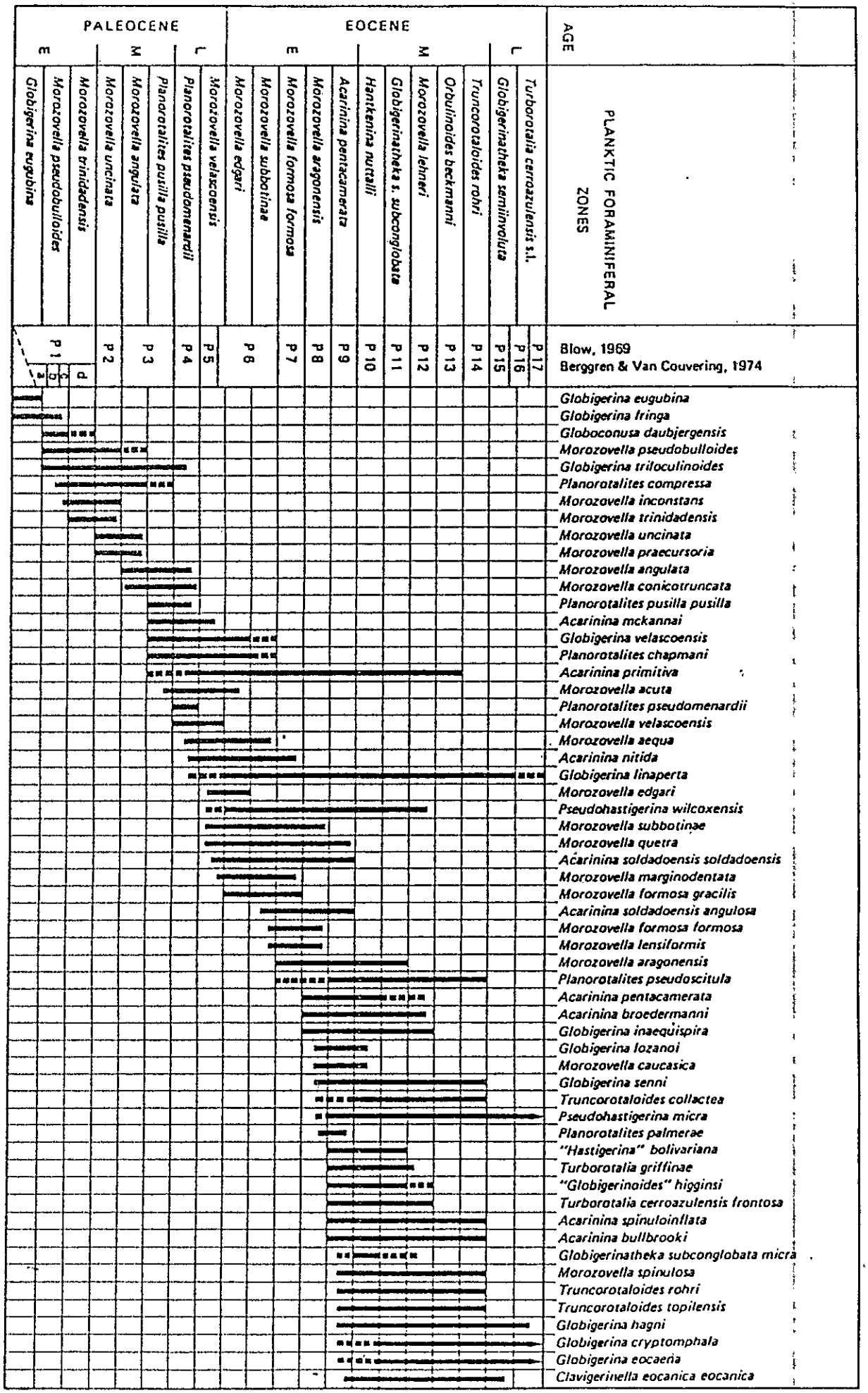
Blow, 1969
Berggren & Van Couvering, 1974
compressa
pusilla pusilla
chapmani
pseudomenardii
pseudoscitula
palmerae
Planorotalites
wilcoxensis
micra s. l.
naguewichiensis s. l.
Pseudohastigerina
eocanica
akersi
colombiana
jarvisi
Clavigerinella
nuttalli
mexicana s. l.
dumblei
alabamensis s. l.
primitiva
Hantkenina
inflata
Cribrohantkenina
sphaeroidalis
"Hastigerina"
griffinae
bolivariana
"cerroazulensis" frontosa
"cerroazulensis" possagnoensis
cerroazulensis pomeroli
cerroazulensis cerroazulensis
cerroazulensis cocoaensis
cerroazulensis cunialensis
opima nana
increbescens
postcretacea
Globorotalia
subconglobata micra
s. subconglobata
subconglobata curryi
subconglobata euganea
subconglobata luterbacheri
mexicana mexicana
mexicana barri
mexicana kugleri
index rubriformis
index index
index tropicalis
semiinvoluta
Globigerina-theka
beckmanni
Orbulinoides
higginsi
"Globigerinoides"
carcoselleensis
suteri
Globorotaloides
dissimilis s. l.
Catapsydrax
cubensis s. l.
Chiloguembelina


PALEOCENE
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PLANKTIC FORAMINIFERAL ZONES
Blow, 1969
Berggren & Van Couvering, 1974
Globigerina eugubina
Morozovella pseudobulloides
Morozovella trinidadensis
Morozovella uncinata
Morozovella angulata
Planorotalites pusilla pusilla
Planorotalites pseudomenardii
Morozovella velascoensis
Morozovella edgari
Morozovella subbotinae
Morozovella formosa formosa
Morozovella aragonensis
Acarinina pentacamerata
Hantkenina nuttalli
Globigerinatheka s. subconglobata
Morozovella lehneri
Orbulinoides beckmanni
Truncorotaloides rohri
Globigerinatheka semiinvoluta
Turborotalia cerroazulensis s.l.
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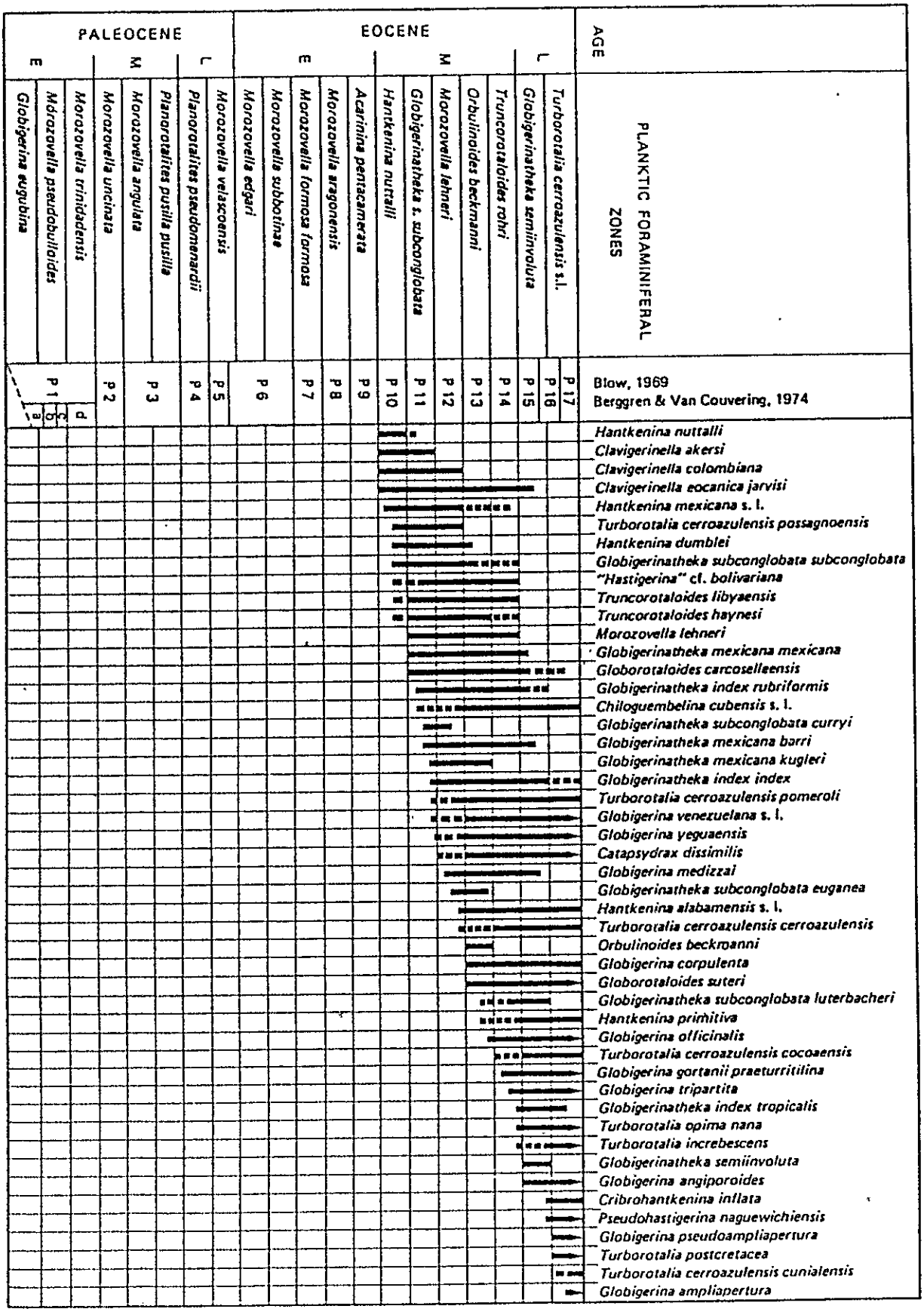
Globigerina eugubina
Globigerina fringa
Globoconusa daubjergensis
Morozovella pseudobulloides
Globigerina triloculinoides
Planorotalites compressa
Morozovella inconstans
Morozovella trinidadensis
Morozovella uncinata
Morozovella praecursoria
Morozovella angulata
Morozovella conicotruncata
Planorotalites pusilla pusilla
Acarinina mckannai
Globigerina velascoensis
Planorotalites chapmani
Acarinina primitiva
Morozovella acuta
Planorotalites pseudomenardii
Morozovella velascoensis
Morozovella aequa
Acarinina nitida
Globigerina linaperta
Morozovella edgari
Pseudohastigerina wilcoxensis
Morozovella subbotinae
Morozovella quetra
Acarinina soldadoensis soldadoensis
Morozovella marginodentata
Morozovella formosa gracilis
Acarinina soldadoensis angulosa
Morozovella formosa formosa
Morozovella lensiformis
Morozovella aragonensis
Planorotalites pseudoscitula
Acarinina pentacamerata
Acarinina broedermanni
Globigerina inaequispira
Globigerina lozanoi
Morozovella caucasica
Globigerina senni
Truncorotaloides collactea
Pseudohastigerina micra
Planorotalites palmerae
"Hastigerina" bolivariana
Turborotalia griffinae
"Globigerinoides" higginsi
Turborotalia cerroazulensis frontosa
Acarinina spinuloinflata
Acarinina bullbrooki
Globigerinatheka subconglobata micra
Morozovella spinulosa
Truncorotaloides rohri
Truncorotaloides topilensis
Globigerina hagni
Globigerina cryptomphala
Globigerina eocaena
Clavigerinella eocanica eocanica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PALEOCENE
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PLANKTIC FORAMINIFERAL ZONES
Globigerina eugubina
Morozovella pseudobulloides
Morozovella trinidadensis
Morozovella uncinata
Morozovella angulata
Planorotalites pusilla pusilla
Planorotalites pseudomenardii
Morozovella velascoensis
Morozovella edgari
Morozovella subbotinae
Morozovella formosa formosa
Morozovella aragonensis
Acarinina pentacamerata
Hantkenina nuttalli
Globigerinatheka s. subconglobata
Morozovella lehneri
Orbulinoides beckmanni
Truncorotaloides rohri
Globigerinatheka semiinvoluta
Turborotalia cerroazulensis s.l.
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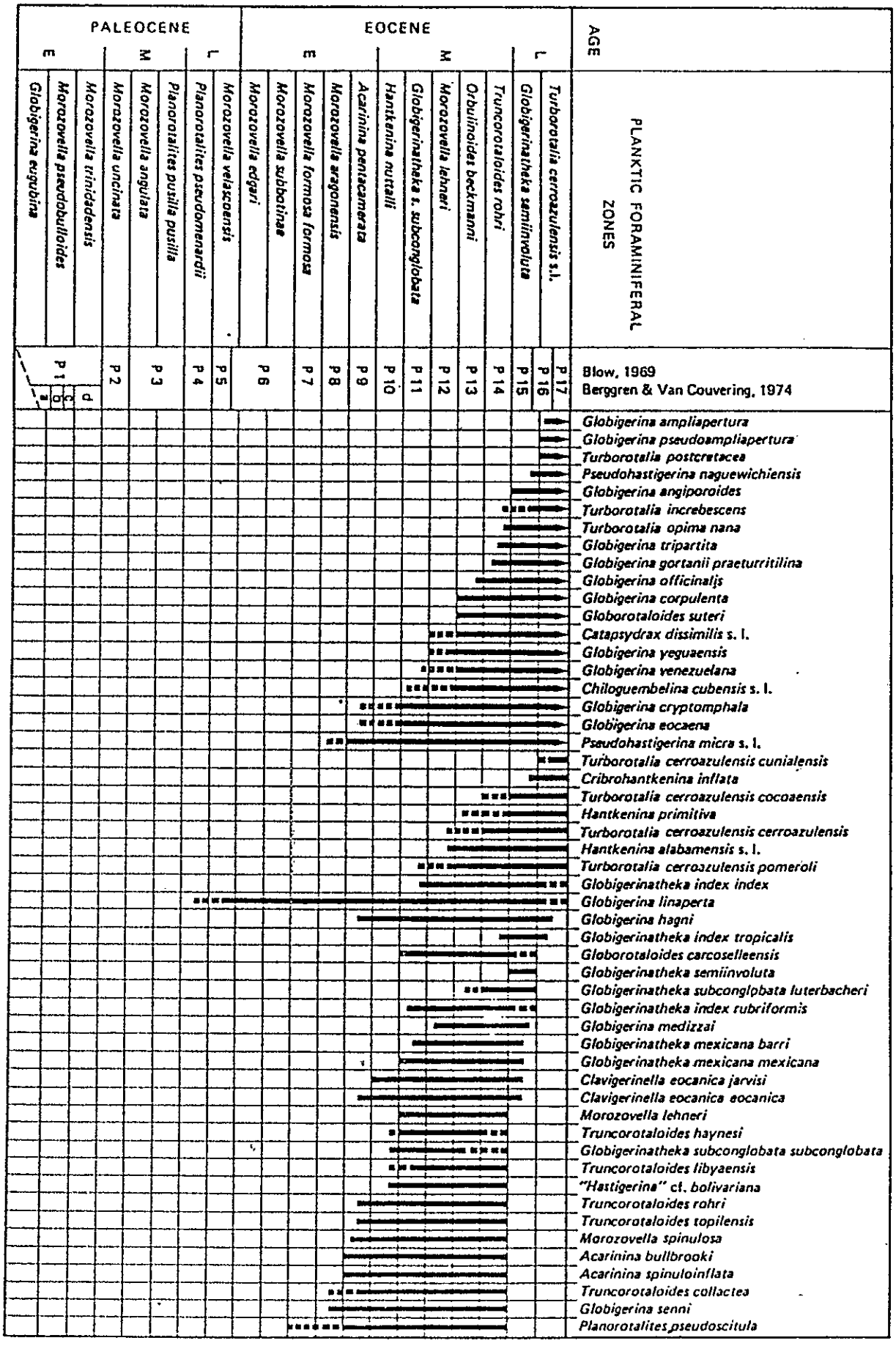
Blow, 1969
Berggren & Van Couvering, 1974
Hantkenina nuttalli
Clavigerinella akersi
Clavigerinella colombiana
Clavigerinella eocanica jarvisi
Hantkenina mexicana s. l.
Turborotalia cerroazulensis possagnoensis
Hantkenina dumblei
Globigerinatheka subconglobata subconglobata
"Hastigerina" cf. bolivariana
Truncorotaloides libyaensis
Truncorotaloides haynesi
Morozovella lehneri
Globigerinatheka mexicana mexicana
Globorotaloides carcoselleensis
Globigerinatheka index rubriformis
Chiloguembelina cubensis s. l.
Globigerinatheka subconglobata curryi
Globigerinatheka mexicana barri
Globigerinatheka mexicana kugleri
Globigerinatheka index index
Turborotalia cerroazulensis pomeroli
Globigerina venezuelana s. l.
Globigerina yeguaensis
Catapsydrax dissimilis
Globigerina medizzai
Globigerinatheka subconglobata euganea
Hantkenina alabamensis s. l.
Turborotalia cerroazulensis cerroazulensis
Orbulinoides beckmanni
Globigerina corpulenta
Globorotaloides suteri
Globigerinatheka subconglobata luterbacheri
Hantkenina primitiva
Globigerina officinalis
Turborotalia cerroazulensis cocoaensis
Globigerina gortanii praeturritilina
Globigerina tripartita
Globigerinatheka index tropicalis
Turborotalia opima nana
Turborotalia increbescens
Globigerinatheka semiinvoluta
Globigerina angiporoides
Cribrohantkenina inflata
Pseudohastigerina naguewichiensis
Globigerina pseudoampliapertura
Turborotalia postcretacea
Turborotalia cerroazulensis cunialensis
Globigerina ampliapertura


PALEOCENE
EOCENE
E
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AGE
PLANKTIC FORAMINIFERAL ZONES
Blow, 1969
Berggren & Van Couvering, 1974
Globigerina eugubina
Morozovella pseudobulloides
Morozovella trinidadensis
Morozovella angulata
Morozovella uncinata
Planorotalites pusilla pusilla
Planorotalites pseudomenardii
Morozovella velascoensis
Morozovella subbotinae
Morozovella edgari
Morozovella formosa formosa
Morozovella aragonensis
Acarinina pentacamerata
Hantkenina nuttalli
Globigerinatheka s. subconglobata
Morozovella lehneri
Orbulinoides beckmanni
Truncorotaloides rohri
Globigerinatheka semiinvoluta
Turborotalia cerroazulensis s.l.
P 1 a b c d
P 2
P 3
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P 11
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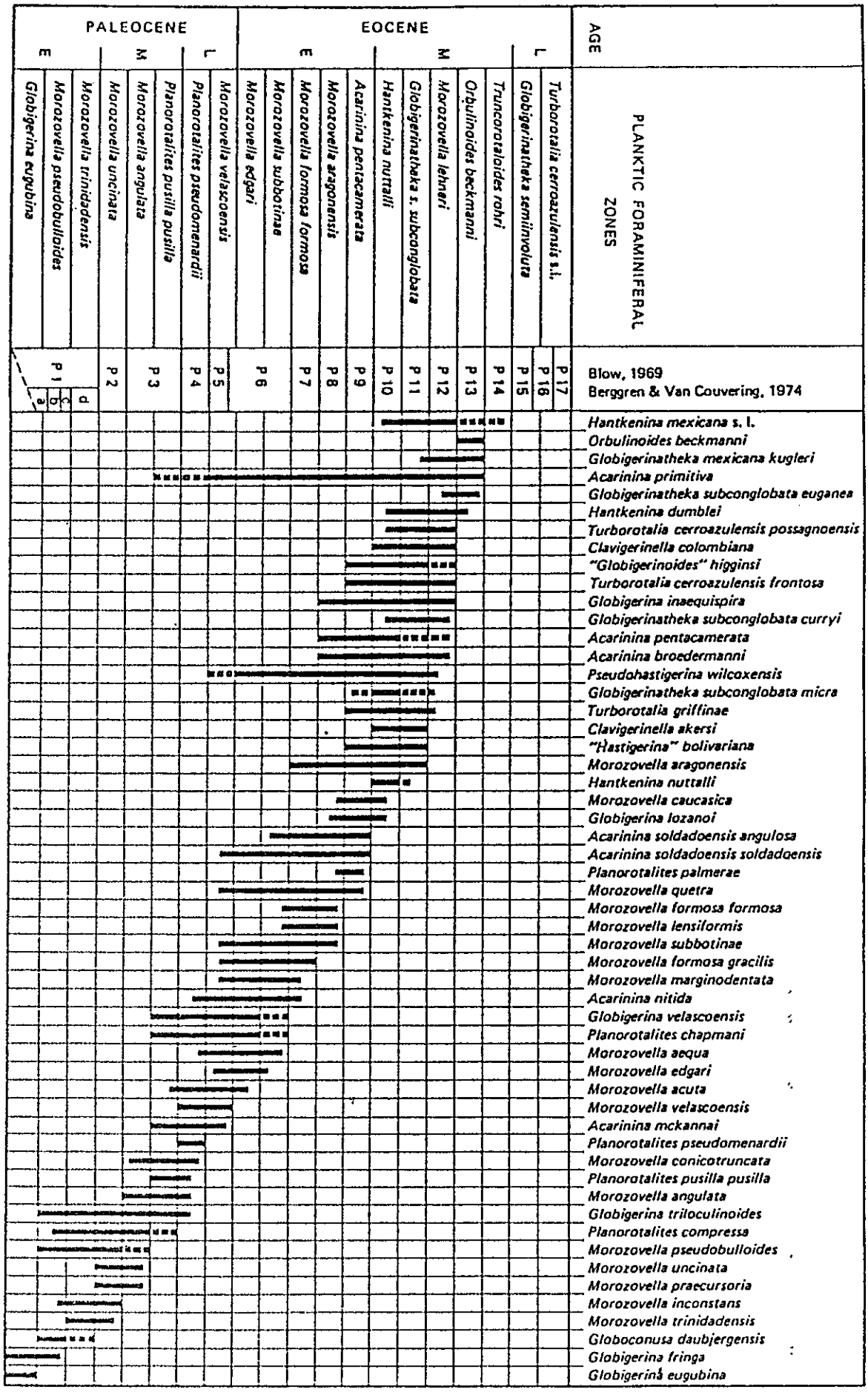
P 13
P 14
P 15
P 16
P 17
Globigerina ampliapertura
Globigerina pseudoampliapertura
Turborotalia postcretacea
Pseudohastigerina naguewichiensis
Globigerina angiporoides
Turborotalia increbescens
Turborotalia opima nana
Globigerina tripartita
Globigerina gortanii praeturritilina
Globigerina officinalis
Globigerina corpulenta
Globorotaloides suteri
Catapsydrax dissimilis s. l.
Globigerina yeguaensis
Globigerina venezuelana
Chiloguembelina cubensis s. l.
Globigerina cryptomphala
Globigerina eocaena
Pseudohastigerina micra s. l.
Turborotalia cerroazulensis cunialensis
Cribrohantkenina inflata
Turborotalia cerroazulensis cocoaensis
Hantkenina primitiva
Turborotalia cerroazulensis cerroazulensis
Hantkenina alabamensis s. l.
Turborotalia cerroazulensis pomeroli
Globigerinatheka index index
Globigerina linaperta
Globigerina hagni
Globigerinatheka index tropicalis
Globorotaloides carcoselleensis
Globigerinatheka semiinvoluta
Globigerinatheka subconglobata luterbacheri
Globigerinatheka index rubriformis
Globigerina medizzai
Globigerinatheka mexicana barri
Globigerinatheka mexicana mexicana
Clavigerinella eocanica jarvisi
Clavigerinella eocanica eocanica
Morozovella lehneri
Truncorotaloides haynesi
Globigerinatheka subconglobata subconglobata
Truncorotaloides libyaensis
"Hastigerina" cf. bolivariana
Truncorotaloides rohri
Truncorotaloides topilensis
Morozovella spinulosa
Acarinina bullbrooki
Acarinina spinuloinflata
Truncorotaloides collactea
Globigerina senni
Planorotalites pseudoscitula


PALEOCENE
EOCENE
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AGE
PLANKTIC FORAMINIFERAL ZONES
Blow, 1969
Berggren & Van Couvering, 1974
Globigerina eugubina
Morozovella pseudobulloides
Morozovella trinidadensis
Morozovella uncinata
Morozovella angulata
Planorotalites pusilla pusilla
Planorotalites pseudomenardii
Morozovella velascoensis
Morozovella edgari
Morozovella subbotinae
Morozovella formosa formosa
Morozovella aragonensis
Acarinina pentacamerata
Globigerinatheka s. subconglobata
Morozovella lehneri
Orbulinoides beckmanni
Truncorotaloides rohri
Globigerinatheka semiinvoluta
Turborotalia cerroazulensis s.l.
P 1
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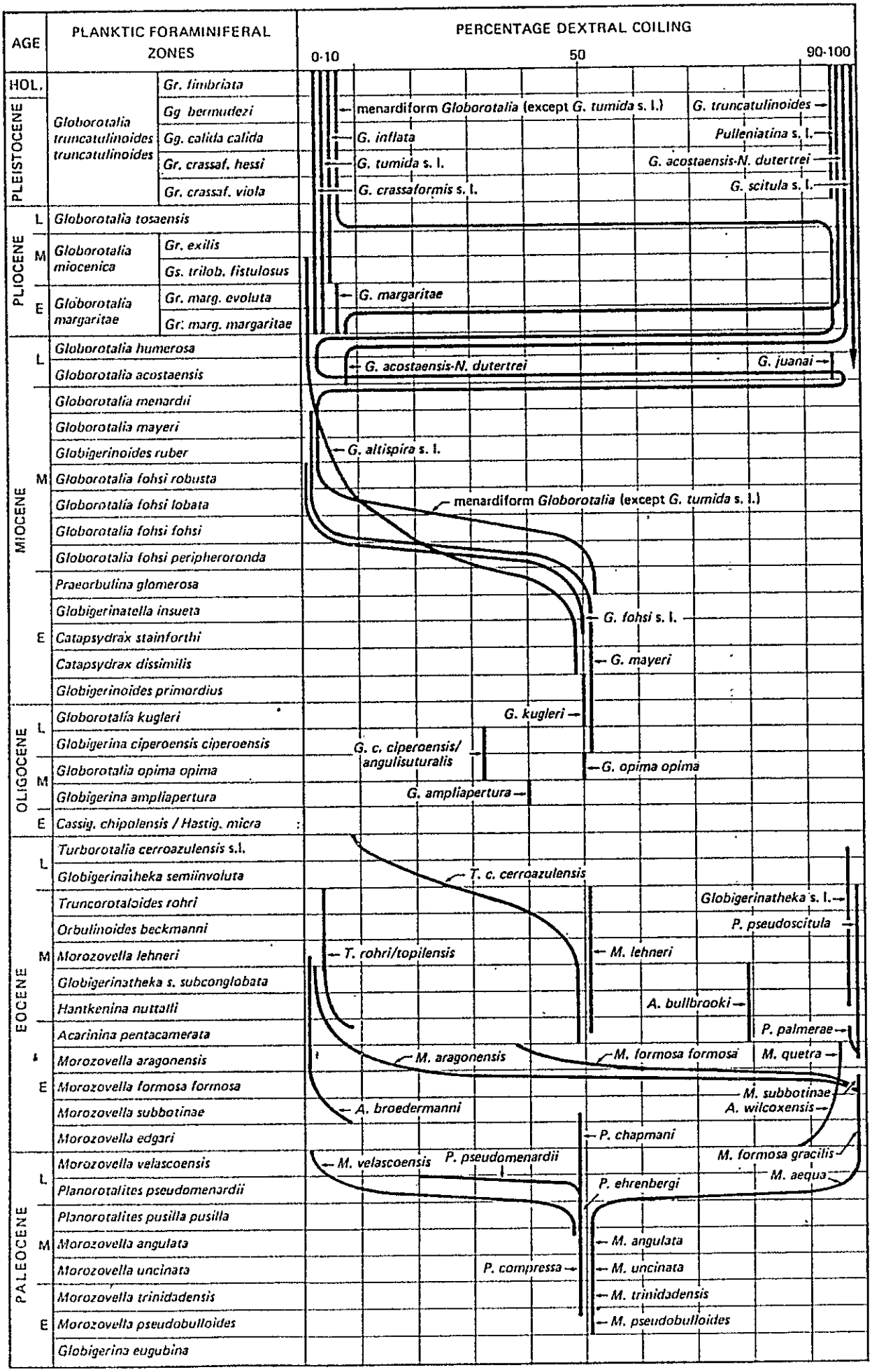
P 4
P 5
P 6
P 7
P 8
P 9
P 10
P 11
P 12
P 13
P 14
P 15
P 16
P 17
Hantkenina mexicana s. l.
Orbulinoides beckmanni
Globigerinatheka mexicana kugleri
Acarinina primitiva
Globigerinatheka subconglobata euganea
Hantkenina dumblei
Turborotalia cerroazulensis possagnoensis
Clavigerinella colombiana
"Globigerinoides" higginsi
Turborotalia cerroazulensis frontosa
Globigerina inaequispira
Globigerinatheka subconglobata curryi
Acarinina pentacamerata
Acarinina broedermanni
Pseudohastigerina wilcoxensis
Globigerinatheka subconglobata micra
Turborotalia griffinae
Clavigerinella akersi
"Hastigerina" bolivariana
Morozovella aragonensis
Hantkenina nuttalli
Morozovella caucasica
Globigerina lozanoi
Acarinina soldadoensis angulosa
Acarinina soldadoensis soldadoensis
Planorotalites palmerae
Morozovella quetra
Morozovella formosa formosa
Morozovella lensiformis
Morozovella subbotinae
Morozovella formosa gracilis
Morozovella marginodentata
Acarinina nitida
Globigerina velascoensis
Planorotalites chapmani
Morozovella aequa
Morozovella edgari
Morozovella acuta
Morozovella velascoensis
Acarinina mckannai
Planorotalites pseudomenardii
Morozovella conicotruncata
Planorotalites pusilla pusilla
Morozovella angulata
Globigerina triloculinoides
Planorotalites compressa
Morozovella pseudobulloides
Morozovella uncinata
Morozovella praecursoria
Morozovella inconstans
Morozovella trinidadensis
Globoconusa daubjergensis
Globigerina fringa
Globigerina eugubina

AGE	MY	LOW LATITUDES ZONES	LOW LATITUDES SUBZONES	N/P ZONES	MEDITERRANEAN ZONES	MEDITERRANEAN SUBZONES	SOUTHERN MID-LATITUDES ZONES
HOL.	0.14	*Globorotalia truncatulinoides truncatulinoides*	*Gr. fimbriata*	N 23			*G. truncatulinoides*
PLEISTOCENE			*Gg. bermudezi*				
			Gg. calida calida	N 22	*G. truncatulinoides excelsa*		
			Gr. crassaf. hessi		*G. cariacoensis*		
			Gr. crassaf. viola				
PLIOCENE L	1.9	*Globorotalia tosaensis*		N 21	*G. inflata*		*G. inflata*
PLIOCENE M	2.4	*Globorotalia miocenica*	*Gr. exilis*		*G. aemiliana*		
			Gs. trilob. fistulosus	N 20			*G. puncticulata*
PLIOCENE E	3.2	*Globorotalia margaritae*	*Gr. marg. evoluta*	N 19	*G. puncticulata*		
					G. punct.-G. margaritae		
			Gr. marg. margaritae	N 18	*G. margaritae*		
	5.1				*S. seminulina s. l.*		
MIOCENE L		*Globorotalia humerosa*		N 17	Non-distinctive Zone		*G. conomiozea*
					G. conomiozea	*G. suterae*	
		Globorotalia acostaensis		N 16	*G. obliquus extremus*	*G. obliquus extremus-G. bulloideus*	*G. miotumida*
	11.3				*G. acostaensis*		
		Globorotalia menardii		N 15	*G. menardii s. l.*		
MIOCENE M		*Globorotalia mayeri*		N 14	*G. siakensis*	*G. siakensis-G. obliquus obliquus*	*G. mayeri*
		Globigerinoides ruber		N 13		*G. subquadratus*	
		Globorotalia fohsi robusta		N 12		*G. altispira altispira*	
		Globorotalia fohsi lobata		N 11			
		Globorotalia fohsi fohsi		N 10	*O. suturalis-G. peripheroronda*	*G. praemenardii-G. peripheroronda*	*O. suturalis*
		Globorotalia fohsi peripheroronda		N 9		*O. universa*	
	14.4					*O. suturalis*	
		Praeorbulina glomerosa		N 8	*P. glomerosa*		*P. glomerosa curva*
		Globigerinatella insueta		N 7	*G. trilobus s. l.*		*G. trilobus*
MIOCENE E		*Catapsydrax stainforthi*		N 6	*G. dehiscens dehiscens-C. dissimilis*	*G. altiaperturus*	
		Catapsydrax dissimilis		N 5			
		Globigerinoides primordius		N 4		*G. dehiscens dehiscens*	
	24.6						
OLIGOCENE L		*Globorotalia kugleri*		P 22/N3	*G. kugleri*		*G. woodi connecta*
		Globigerina ciperoensis ciperoensis			*G. ciperoensis ciperoensis*		*G. woodi woodi*
OLIGOCENE M	32.8	*Globorotalia opima opima*		P 21/N2	*G. opima opima*		*G. dehiscens*
		Globigerina ampliapertura		P 20/N1	*G. sellii*		*G. euapertura*
OLIGOCENE E		*Cassig. chipolensis / Hastig. micra*		P 18/19	*G. ampliapertura-G. euapertura*		*G. angiporoides*
	38						
EOCENE L		*Turborotalia cerroazulensis s.l.*		P 17	*T. cerroazulensis s. l.*	*T. c. cunialensis*	*G. brevis*
				P 16		*T. c. cerroazulensis/cocoaensis*	
	41	*Globigerinatheka semiinvoluta*		P 15	*G. semiinvoluta*		*G. linaperta*
		Truncorotaloides rohri		P 14	*T. rohri*	*T. c. pomeroli/cerroazulensis*	*T. inconspicua*
EOCENE M		*Orbulinoides beckmanni*		P 13	*O. beckmanni*		
		Morozovella lehneri		P 12	*M. lehneri*	*T. c. possagnoensis*	*G. index*
		Globigerinatheka s. subconglobata		P 11	*G. s. subconglobata*		
	50.3	*Hantkenina nuttalli*		P 10	*H. nuttalli*		*A. primitiva*
		Acarinina pentacamerata		P 9	*A. pentacamerata*	*T. c. frontosa*	*M. crater*
		Morozovella aragonensis		P 8	*M. aragonensis*		
EOCENE E		*Morozovella formosa formosa*		P 7	*M. formosa formosa*		*P. wilcoxensis*
		Morozovella subbotinae		P 6	*M. subbotinae*		
		Morozovella edgari			*M. edgari*		
	54.9						
PALEOCENE L		*Morozovella velascoensis*		P 5	*M. velascoensis*		*G. triloculinoides*
		Planorotalites pseudomenardii		P 4	*P. pseudomenardii*		
		Planorotalites pusilla pusilla		P 3	*P. pusilla pusilla*		
PALEOCENE M		*Morozovella angulata*			*M. angulata*		
		Morozovella uncinata		P 2	*M. uncinata*		
	61.5						
PALEOCENE E		*Morozovella trinidadensis*		P 1 d	*M. trinidadensis*		*G. pauciloculata*
		Morozovella pseudobulloides		P 1 c-b	*M. pseudobulloides*		
	66.7	*Globigerina eugubina*		P 1 a	*G. eugubina*		


AGE
PLANKTIC FORAMINIFERAL ZONES
PERCENTAGE DEXTRAL COILING
0-10
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90-100
HOL.
PLEISTOCENE
PLIOCENE
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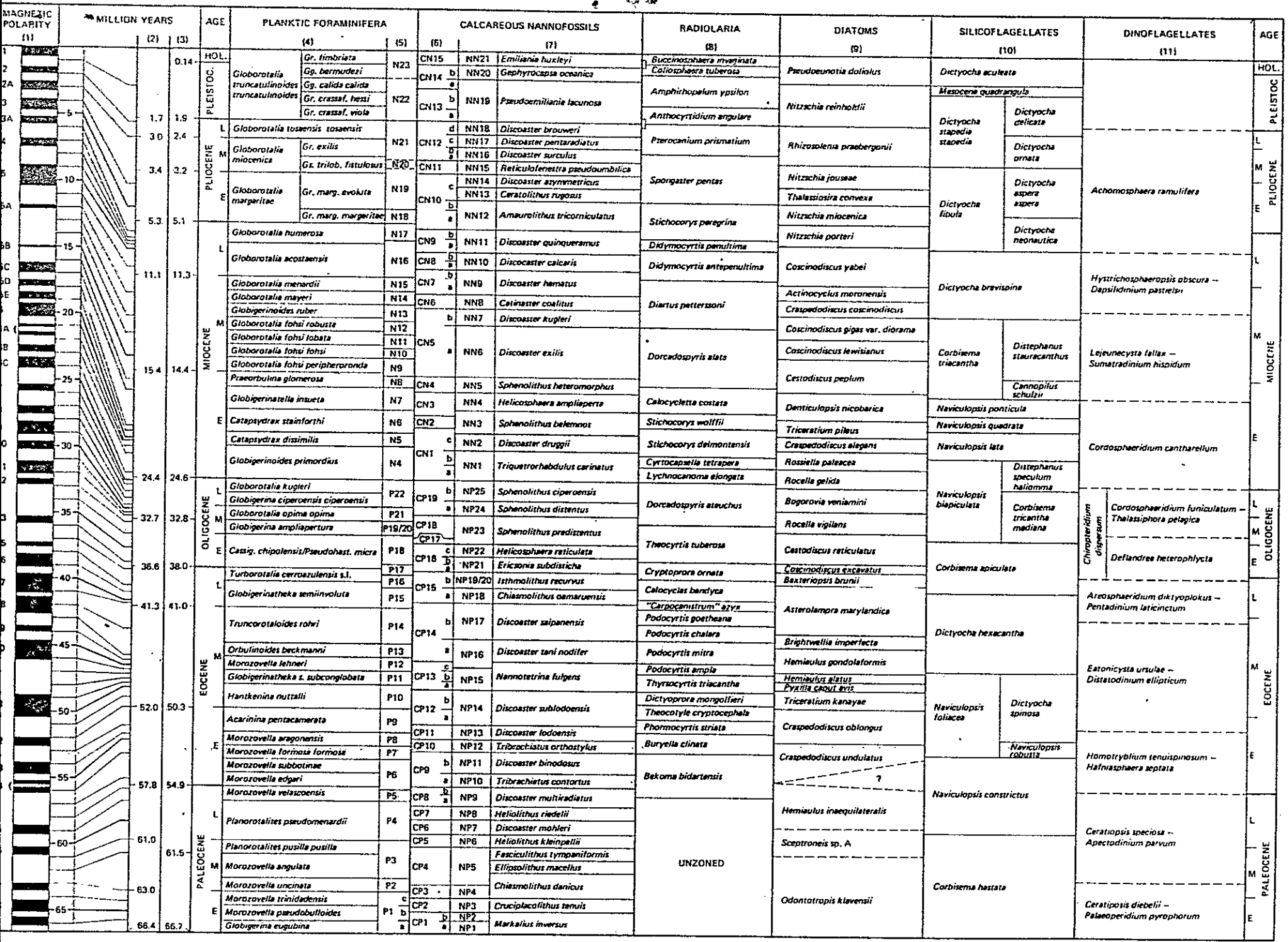
MIOCENE
OLIGOCENE
EOCENE
PALEOCENE
Globorotalia truncatulinoides truncatulinoides
Gr. fimbriata
Gg bermudezi
Gg. calida calida
Gr. crassaf. hessi
Gr. crassaf. viola
Globorotalia tosaensis
Globorotalia miocenica
Gr. exilis
Gs. trilob. fistulosus
Globorotalia margaritae
Gr. marg. evoluta
Gr. marg. margaritae
Globorotalia humerosa
Globorotalia acostaensis
Globorotalia menardii
Globorotalia mayeri
Globigerinoides ruber
Globorotalia fohsi robusta
Globorotalia fohsi lobata
Globorotalia fohsi fohsi
Globorotalia fohsi peripheroronda
Praeorbulina glomerosa
Globigerinatella insueta
Catapsydrax stainforthi
Catapsydrax dissimilis
Globigerinoides primordius
Globorotalia kugleri
Globigerina ciperoensis ciperoensis
Globorotalia opima opima
Globigerina ampliapertura
Cassig. chipolensis / Hastig. micra
Turborotalia cerroazulensis s.l.
Globigerinatheka semiinvoluta
Truncorotaloides rohri
Orbulinoides beckmanni
Morozovella lehneri
Globigerinatheka s. subconglobata
Hantkenina nuttalli
Acarinina pentacamerata
Morozovella aragonensis
Morozovella formosa formosa
Morozovella subbotinae
Morozovella edgari
Morozovella velascoensis
Planorotalites pseudomenardii
Planorotalites pusilla pusilla
Morozovella angulata
Morozovella uncinata
Morozovella trinidadensis
Morozovella pseudobulloides
Globigerina eugubina
menardiform Globorotalia (except G. tumida s. l.)
G. inflata
G. tumida s. l.
G. crassaformis s. l.
G. truncatulinoides
Pulleniatina s. l.
G. acostaensis-N. dutertrei
G. scitula s. l.
G. margaritae
G. juanai
G. altispira s. l.
G. fohsi s. l.
G. mayeri
G. kugleri
G. c. ciperoensis/ angulisuturalis
G. opima opima
G. ampliapertura
T. c. cerroazulensis
Globigerinatheka s. l.
P. pseudoscitula
T. rohri/topilensis
M. lehneri
A. bullbrooki
P. palmerae
M. aragonensis
M. formosa formosa
M. quetra
M. subbotinae
A. wilcoxensis
A. broedermanni
P. chapmani
M. formosa gracilis
M. velascoensis
P. pseudomenardii
M. aequa
P. ehrenbergi
M. angulata
P. compressa
M. uncinata
M. trinidadensis
M. pseudobulloides


MAGNETIC POLARITY (1)
MILLION YEARS
(2)
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AGE
PLANKTIC FORAMINIFERA
(4)
(5)
CALCAREOUS NANNOFOSSILS
(6)
(7)
RADIOLARIA
(8)
DIATOMS
(9)
SILICOFLAGELLATES
(10)
DINOFLAGELLATES
(11)
AGE
HOL.
PLEISTOC.
PLIOCENE
MIOCENE
OLIGOCENE
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Globorotalia truncatulinoides truncatulinoides
Gr. fimbriata
Gg. bermudezi
Gg. calida calida
Gr. crassaf. hessi
Gr. crassaf. viola
Globorotalia tosaensis tosaensis
Globorotalia miocenica
Gr. exilis
Gs. trilob. fistulosus
Globorotalia margaritae
Gr. marg. evoluta
Gr. marg. margaritae
Globorotalia humerosa
Globorotalia acostaensis
Globorotalia menardii
Globorotalia mayeri
Globigerinoides ruber
Globorotalia fohsi robusta
Globorotalia fohsi lobata
Globorotalia fohsi fohsi
Globorotalia fohsi peripheroronda
Praeorbulina glomerosa
Globigerinatella insueta
Catapsydrax stainforthi
Catapsydrax dissimilis
Globigerinoides primordius
Globorotalia kugleri
Globigerina ciperoensis ciperoensis
Globorotalia opima opima
Globigerina ampliapertura
Cassig. chipolensis/Pseudohast. micra
Turborotalia cerroazulensis s.l.
Globigerinatheka semiinvoluta
Truncorotaloides rohri
Orbulinoides beckmanni
Morozovella lehneri
Globigerinatheka s. subconglobata
Hantkenina nuttalli
Acarinina pentacamerata
Morozovella aragonensis
Morozovella formosa formosa
Morozovella subbotinae
Morozovella edgari
Morozovella velascoensis
Planorotalites pseudomenardii
Planorotalites pusilla pusilla
Morozovella angulata
Morozovella uncinata
Morozovella trinidadensis
Morozovella pseudobulloides
Globigerina eugubina
CN15 NN21 Emiliania huxleyi
CN14 b NN20 Gephyrocapsa oceanica
CN13 b NN19 Pseudoemiliania lacunosa
CN12 d NN18 Discoaster brouweri
c NN17 Discoaster pentaradiatus
b NN16 Discoaster surculus
CN11 NN15 Reticulofenestra pseudoumbilica
CN10 c NN14 Discoaster asymmetricus
NN13 Ceratolithus rugosus
b NN12 Amaurolithus tricorniculatus
CN9 b NN11 Discoaster quinqueramus
CN8 b NN10 Discocaster calcaris
CN7 b NN9 Discoaster hamatus
CN6 NN8 Catinaster coalitus
b NN7 Discoaster kugleri
CN5 NN6 Discoaster exilis
CN4 NN5 Sphenolithus heteromorphus
CN3 NN4 Helicosphaera ampliaperta
CN2 NN3 Sphenolithus belemnos
CN1 c NN2 Discoaster druggii
b NN1 Triquetrorhabdulus carinatus
CP19 b NP25 Sphenolithus ciperoensis
NP24 Sphenolithus distentus
CP18 NP23 Sphenolithus predistentus
CP17
CP18 c NP22 Helicosphaera reticulata
b NP21 Ericsonia subdisticha
CP15 b NP19/20 Isthmolithus recurvus
a NP18 Chiasmolithus oamaruensis
CP14 b NP17 Discoaster saipanensis
a NP16 Discoaster tani nodifer
CP13 c NP15 Nannotetrina fulgens
CP12 b NP14 Discoaster sublodoensis
CP11 NP13 Discoaster lodoensis
CP10 NP12 Tribrachiatus orthostylus
CP9 b NP11 Discoaster binodosus
CP8 b NP10 Tribrachiatus contortus
CP7 NP9 Discoaster multiradiatus
CP6 NP8 Heliolithus riedelii
CP5 NP7 Discoaster mohleri
CP4 NP6 Heliolithus kleinpellii
CP3 NP5 Fasciculithus tympaniformis
CP2 NP4 Ellipsolithus macellus
CP1 NP3 Chiasmolithus danicus
NP2 Cruciplacolithus tenuis
NP1 Markalius inversus
Buccinosphaera invaginata
Coliosphaera tuberosa
Amphirhopalum ypsilon
Anthocyrtidium angulare
Pterocanium prismatium
Spongaster pentas
Stichocorys peregrina
Didymocyrtis penultima
Didymocyrtis antepenultima
Diartus petterssoni
Dorcadospyris alata
Calocycletta costata
Stichocorys wolffii
Stichocorys delmontensis
Cyrtocapsella tetrapera
Lychnocanoma elongata
Dorcadospyris ateuchus
Theocyrtis tuberosa
Cryptoprora ornata
Calocyclas bandyca
"Carpocanistrum" azyx
Podocyrtis goetheana
Podocyrtis chalara
Podocyrtis mitra
Podocyrtis ampla
Thyrsocyrtis triacantha
Dictyoprora mongolfieri
Theocotyle cryptocephala
Phormocyrtis striata
Buryella clinata
Bekoma bidartensis
UNZONED
Pseudoeunotia doliolus
Nitzschia reinholdii
Rhizosolenia praebergonii
Nitzschia jousaae
Thalassiosira convexa
Nitzschia miocenica
Nitzschia porteri
Coscinodiscus yabei
Actinocyclus moronensis
Craspedodiscus coscinodiscus
Coscinodiscus gigas var. diorama
Coscinodiscus lewisianus
Cestodiscus peplum
Denticulopsis nicobarica
Triceratium pileus
Craspedodiscus elegans
Rossiella paleacea
Rocella gelida
Bogorovia veniamini
Rocella vigilans
Cestodiscus reticulatus
Coscinodiscus excavatus
Baxteriopsis brunii
Asterolampra marylandica
Brightwellia imperfecta
Hemiaulus gondolaformis
Hemiaulus altus
Pyxilla caput avis
Triceratium kanayae
Craspedodiscus oblongus
Craspedodiscus undulatus
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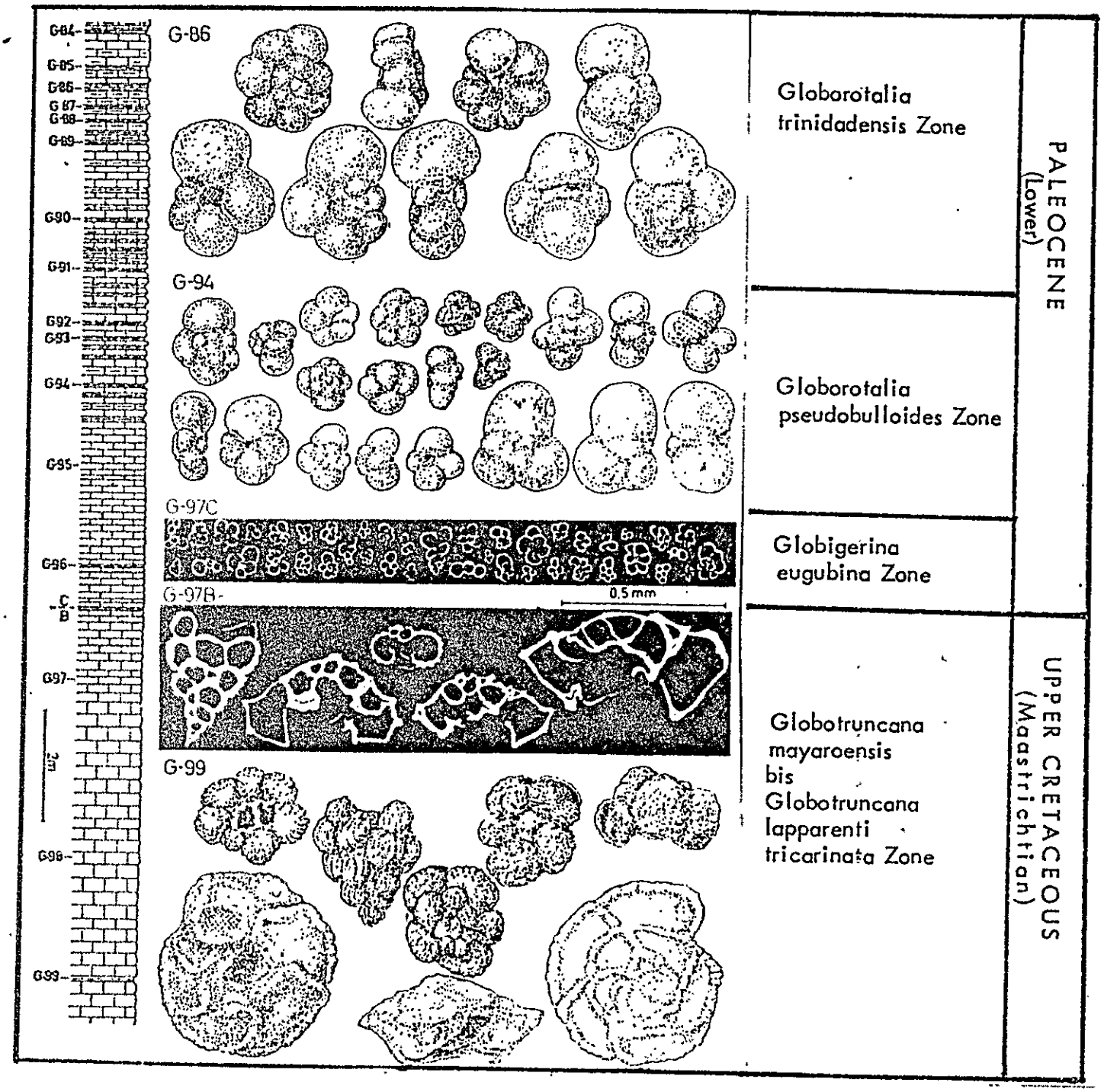
Hemiaulus inaequilateralis
Sceptroneis sp. A
Corbisema hastata
Odontotropis klavensii
Dictyocha aculeata
Mesocena quadrangula
Dictyocha stapedia staedia
Dictyocha delicata
Dictyocha ornata
Dictyocha fibula
Dictyocha aspera aspera
Dictyocha neonautica
Dictyocha brevispina
Corbisema triacantha
Distephanus stauracanthus
Cannopilus schulzii
Naviculopsis ponticula
Naviculopsis quadrata
Naviculopsis lata
Naviculopsis biapiculata
Distephanus speculum haliomma
Corbisema tricantha mediana
Corbisema apiculata
Dictyocha hexacantha
Naviculopsis foliacea
Dictyocha spinosa
Naviculopsis robusta
Naviculopsis constrictus
Corbisema hastata
Achomosphaera ramulifera
Hystrichosphaeropsis obscura – Dapsilidinium pastielsii
Lejeunecysta fallax – Sumatradinium hispidum
Cordosphaeridium cantharellum
Chiropteridium dispersum
Cordosphaeridium funiculatum – Thalassiphora pelagica
Deflandrea heterophlycta
Areosphaeridium diktyoplokus – Pentadinium laticinctum
Eatonicysta ursulae – Distatodinium ellipticum
Homotryblium tenuispinosum – Hafniasphaera septata
Ceratiopsis speciosa – Apectodinium parvum
Ceratiposis diebelii – Palaeoperidium pyrophorum

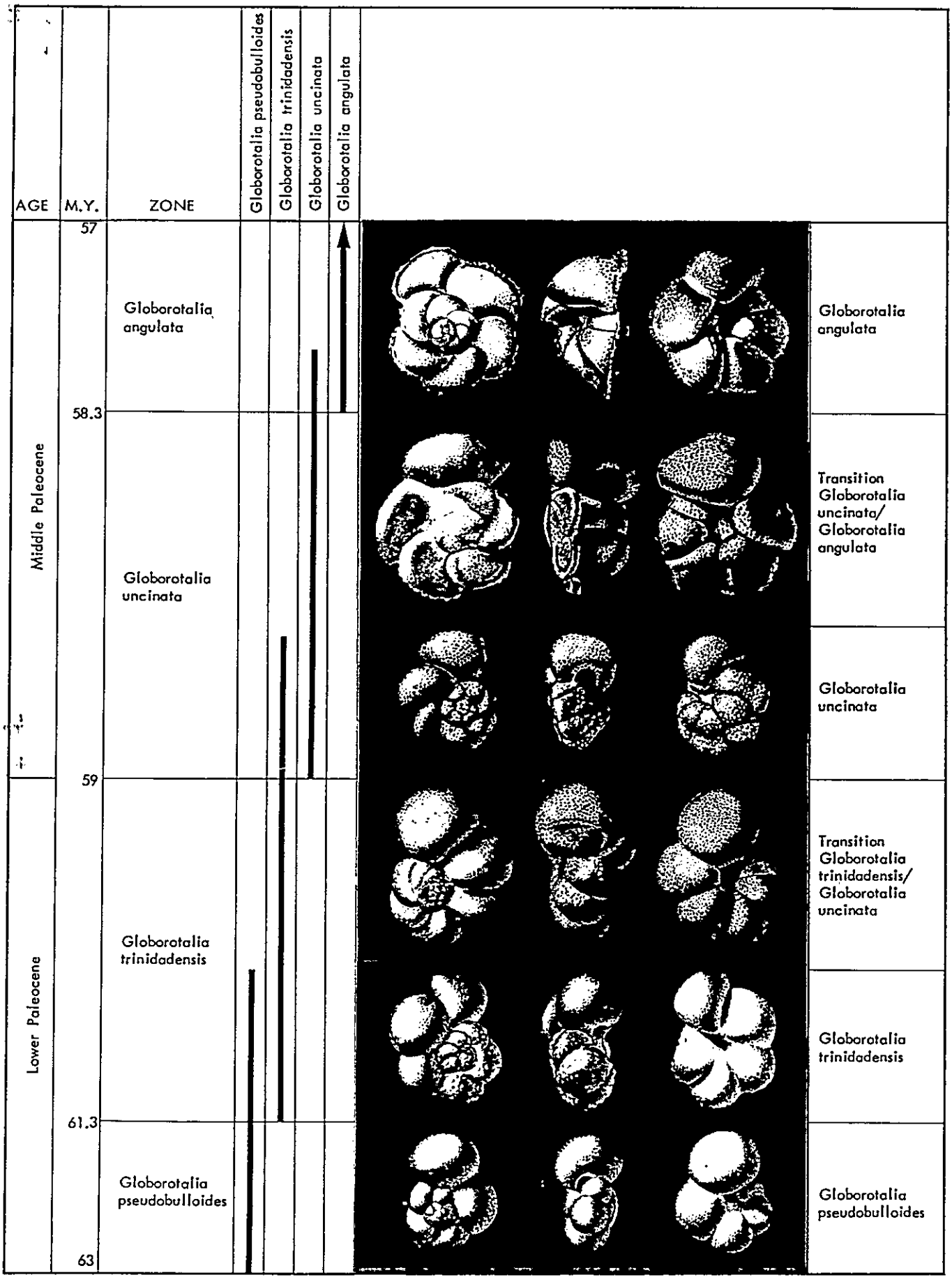
THE CRETACEOUS - TERTIARY BOUNDARY IN THE CENTRAL APPENNINE

Gola del Bottaccione section near Gubbio

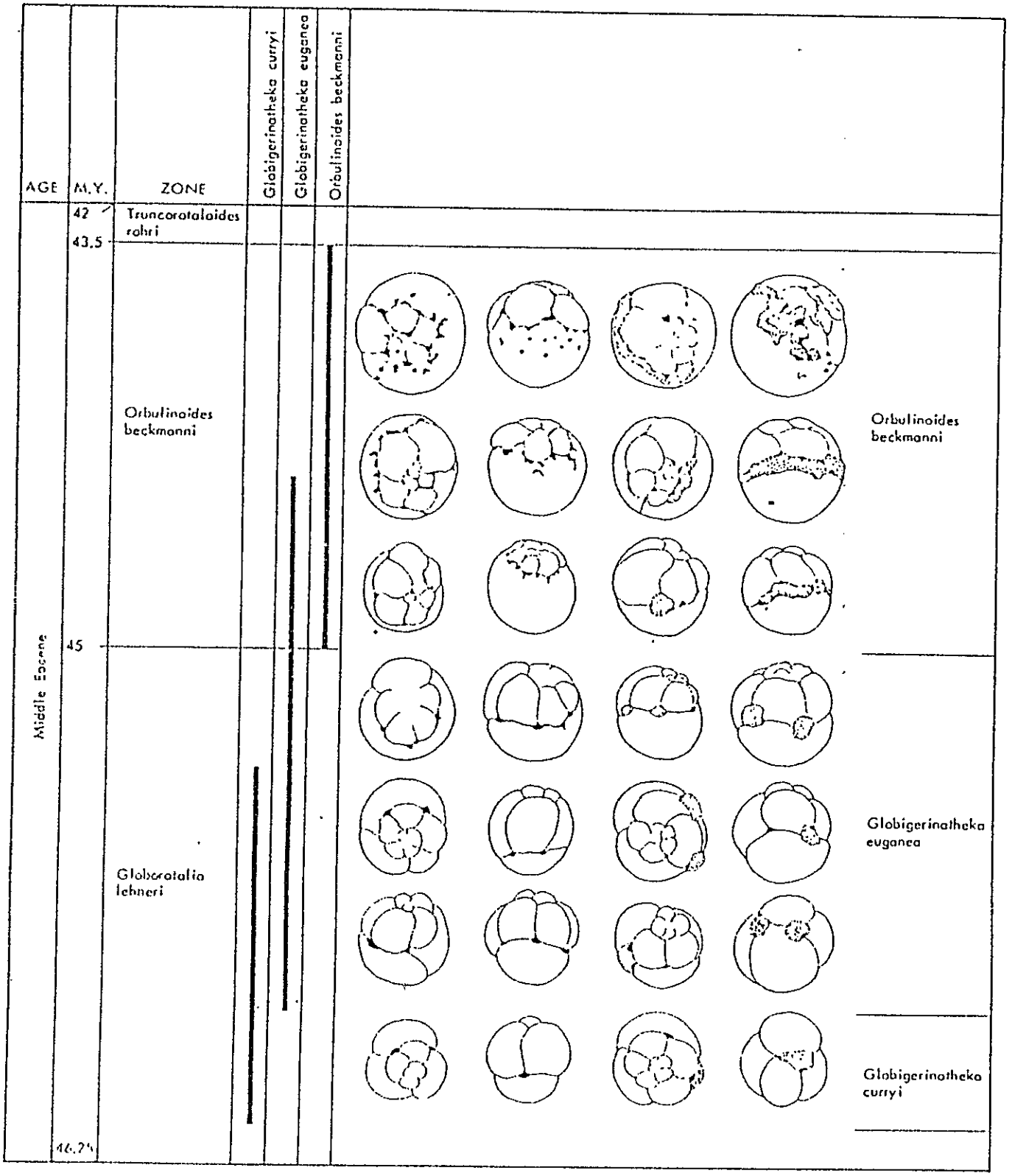
UPPER MAASTRICHTIAN AND LOWER PALEOCENE PLANKTONIC FORAMINIFERA



Luterbacher & Premoli Silva, 1964

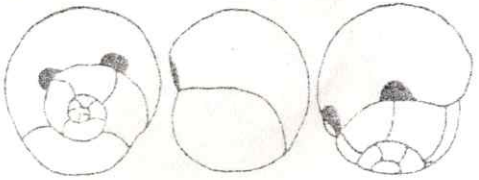


EVOLUTION AND DISTRIBUTION OF GLOBOROTALIA PSEUDOBULLOIDES, G. TRINIDADENSIS, G. UNCINATA AND G. ANGULATA IN THE LOWER AND MIDDLE PALEOCENE, AND THE ZONATION BASED ON THEM



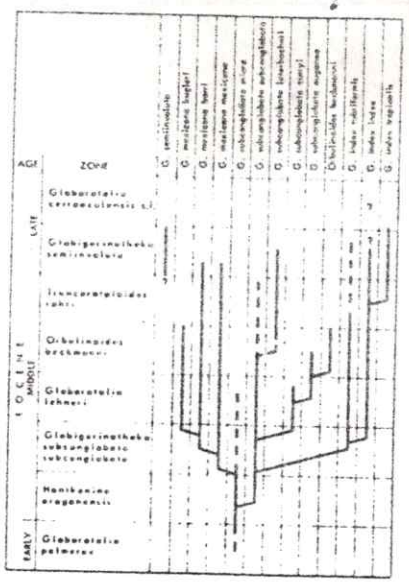
EVOLUTION AND DISTRIBUTION OF GLOBIGERINATHEKA CURRYI - GLOBIGERINATHEKA EUGANEA - ORBULINOIDES BECKMANNI IN THE MIDDLE EOCENE

EVOLUTIONARY TRENDS IN THE GENUS GLOBIGERINATHEKA



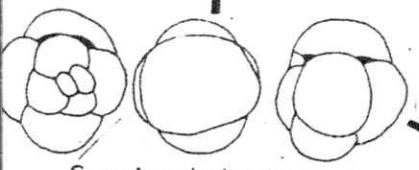
G. semiinvoluta, holotype

?

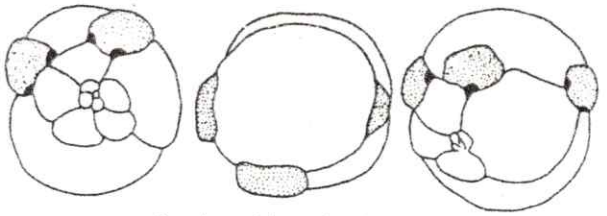


G. mexicana barri, holotype

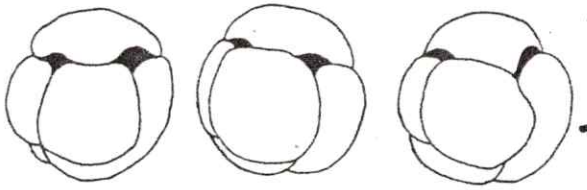
G. mexicana mexicana, holotype



G. mexicana kugleri, holotype



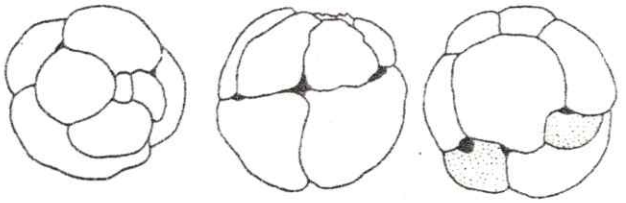
G. subconglobata luterbacheri



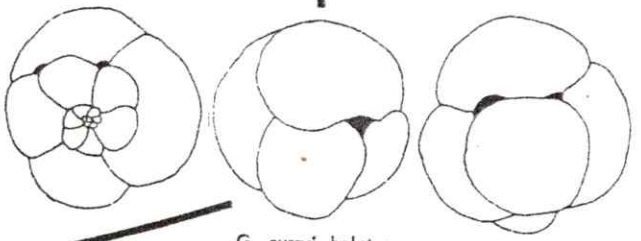
G. subconglobata subconglobata, neotype

G. subconglobata micra, holotype

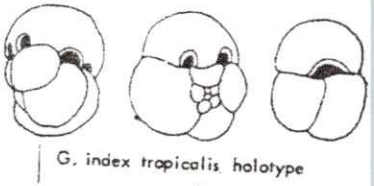
Orbulinoides beckmanni



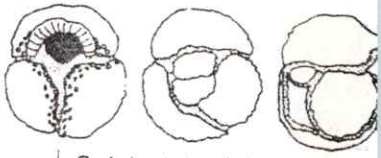
G. euganea holotype



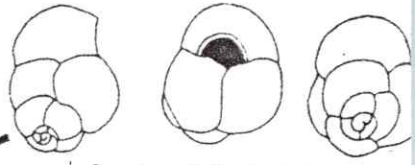
G. curryi, holotype



G. index tropicalis holotype



G. index index, holotype



G. index rubriformis holotype

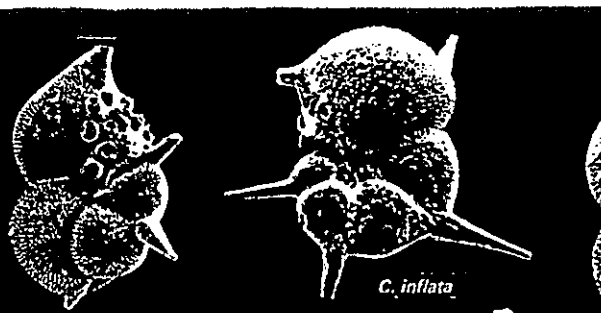
-Comienza en la base del Eoceno medio.-

EVOLUTIONARY TRENDS IN THE GENERA HANTKENINA AND CRIBROHANTKENINA

M.Y.	AGE		PLANKTIC FORAMINIFERAL ZONES	Blow, 1969 Berggren & Van Couvering, 1974
38	EOCENE	L	*Turborotalia cerroazulensis* s.l.	P 17
			Globigerinatheka semiinvoluta	P 16
41			*Truncorotaloides rohri*	P 15
			Orbulinoides beckmanni	P 14
		M	*Morozovella lehneri*	P 13
			Globigerinatheka s. subconglobata	P 12
			Hantkenina nuttalli	P 11
50.3			*Acarinina pentacamerata*	P 10
			Morozovella aragonensis	P 9
		E	*Morozovella formosa formosa*	P 8
			Morozovella subbotinae	P 7
			Morozovella edgari	P 6
54.9	PALEOCENE		*Morozovella velascoensis*	P 5
		L	*Planorotalites pseudomenardii*	P 4
61			*Planorotalites pusilla pusilla*	P 3
		M	*Morozovella angulata*	
			Morozovella uncinata	P 2
63			*Morozovella trinidadensis*	P 1 d
		E	*Morozovella pseudobulloides*	P 1 c
66.7			*Globigerina eugubina*	P 1 a

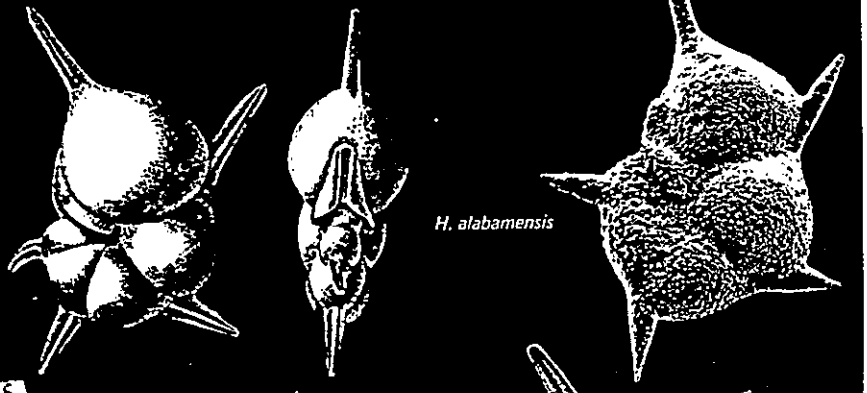
Hantkenina: *nuttalli*, *mexicana* s.l., *dumblei*, *alabamensis* s.l., *primitiva*, *inflata*

Cribrohantkenina: *inflata*

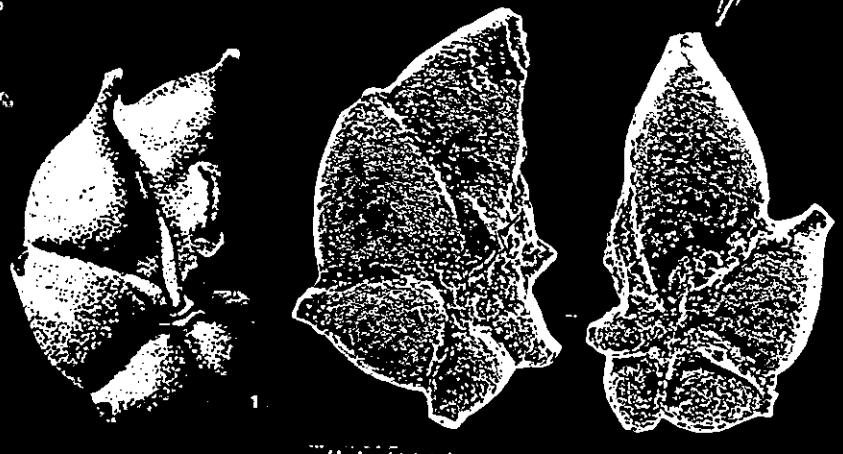


C. inflata

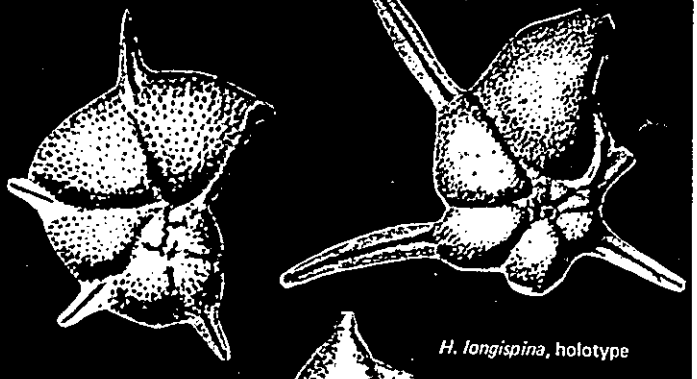
H. primitiva, holotype



H. alabamensis



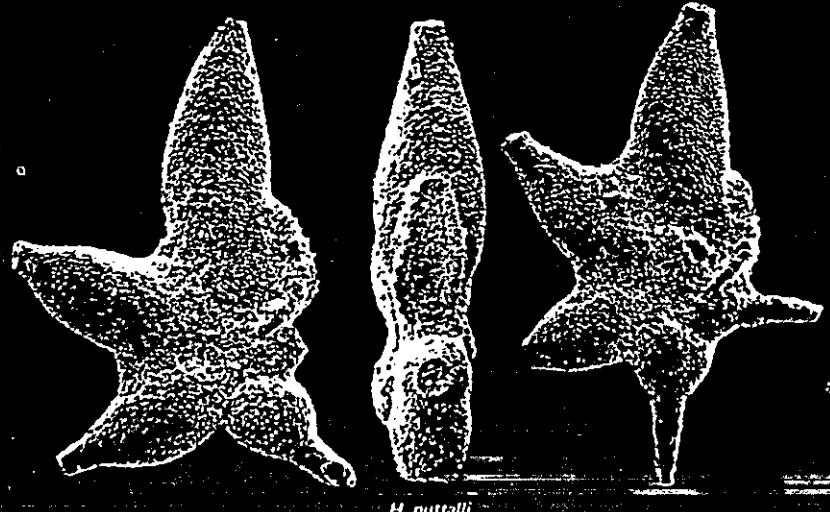
H. dumblei, 1 lectotype



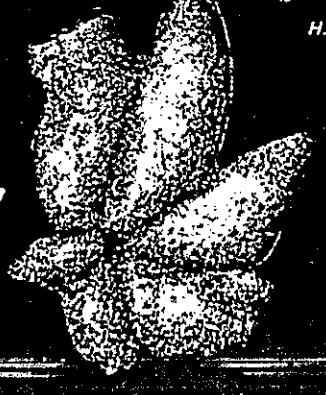
H. brevispina, holotype

H. longispina, holotype

H. aragonensis, lectotype

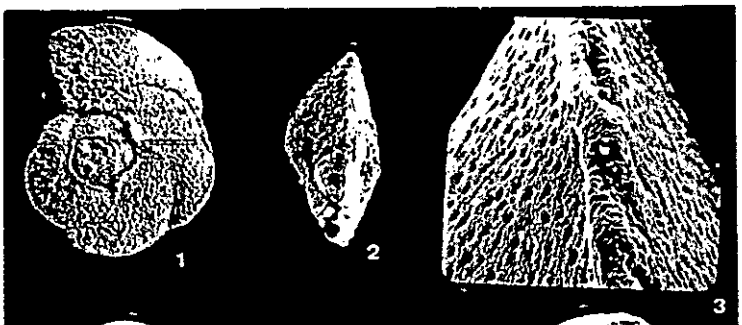


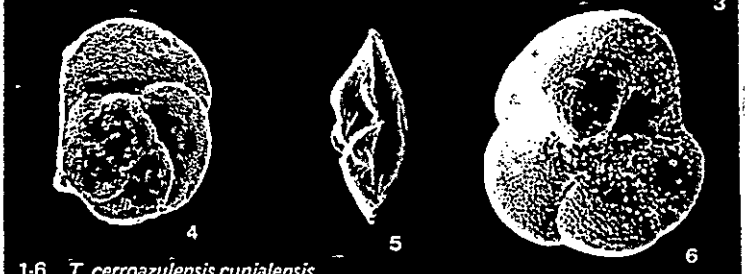
H. nuttalli



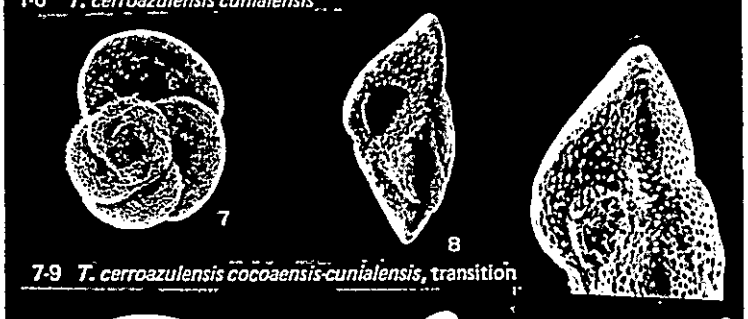
H. lehneri, holotype

H. mexicana, holotype

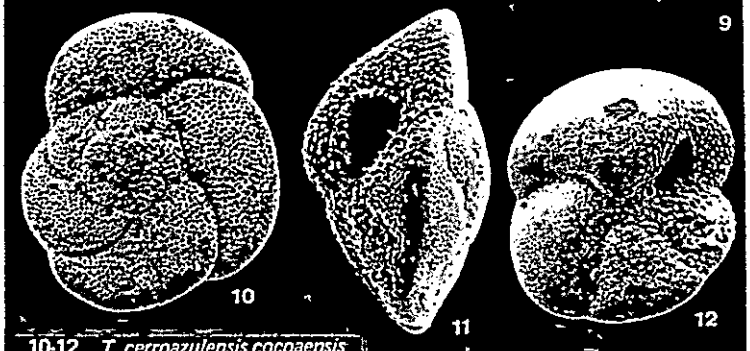




1-6 *T. cerroazulensis cunialensis*

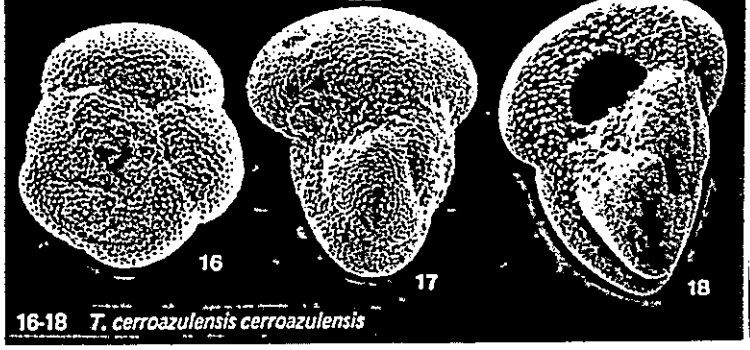


7-9 *T. cerroazulensis cocoaensis-cunialensis*, transition

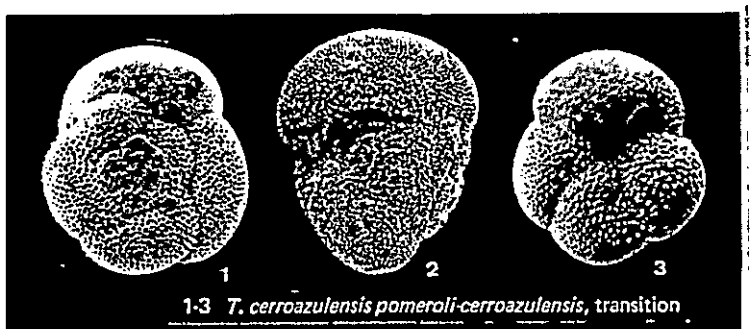


10-12 *T. cerroazulensis cocoaensis*

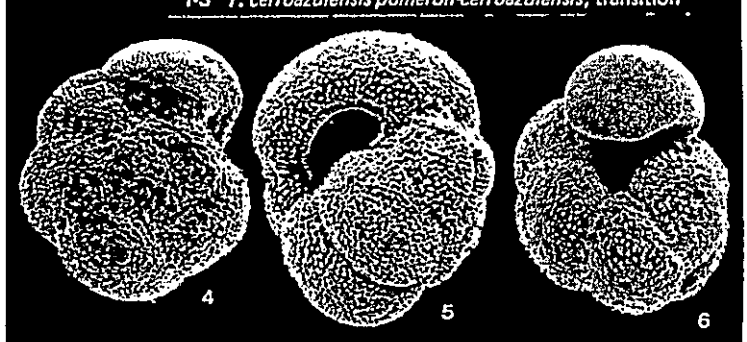
13-15 *T. cerroazulensis cerroazulensis-cocoaensis*, transition

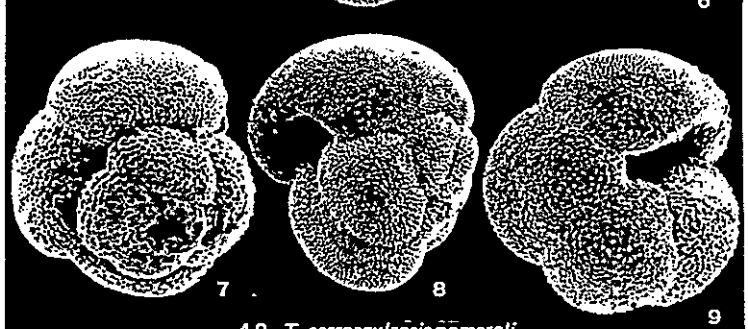


16-18 *T. cerroazulensis cerroazulensis*

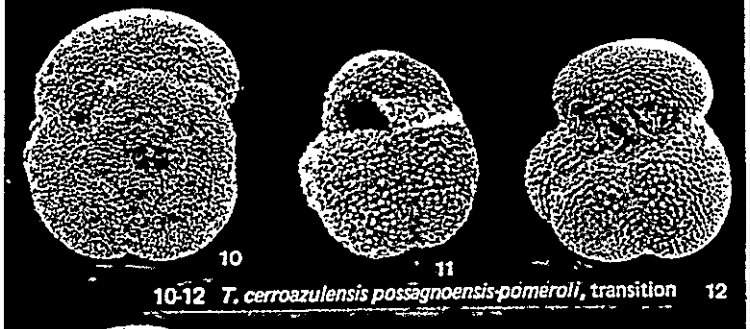


1-3 *T. cerroazulensis pomeroli-cerroazulensis*, transition

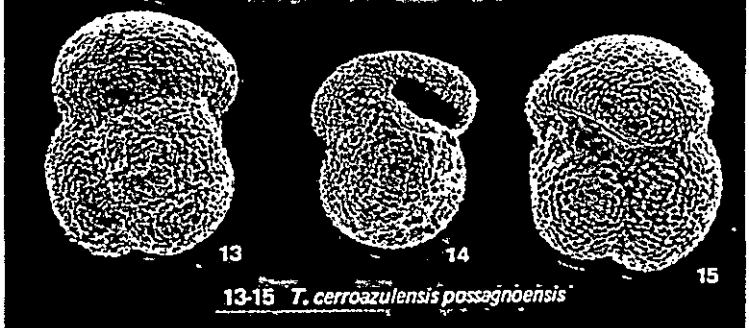




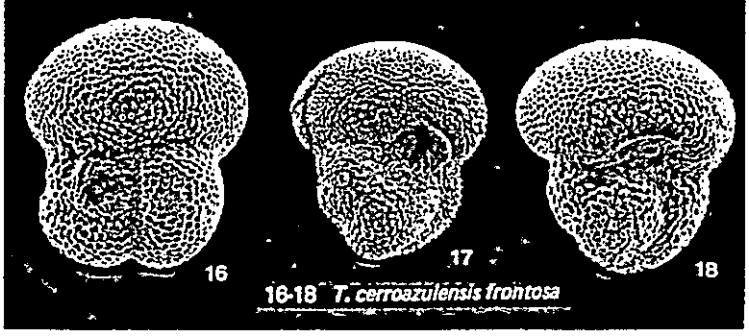
4-9 *T. cerroazulensis pomeroli*



10-12 *T. cerroazulensis possagnoensis-pomeroli*, transition



13-15 *T. cerroazulensis possagnoensis*



16-18 *T. cerroazulensis frontosa*

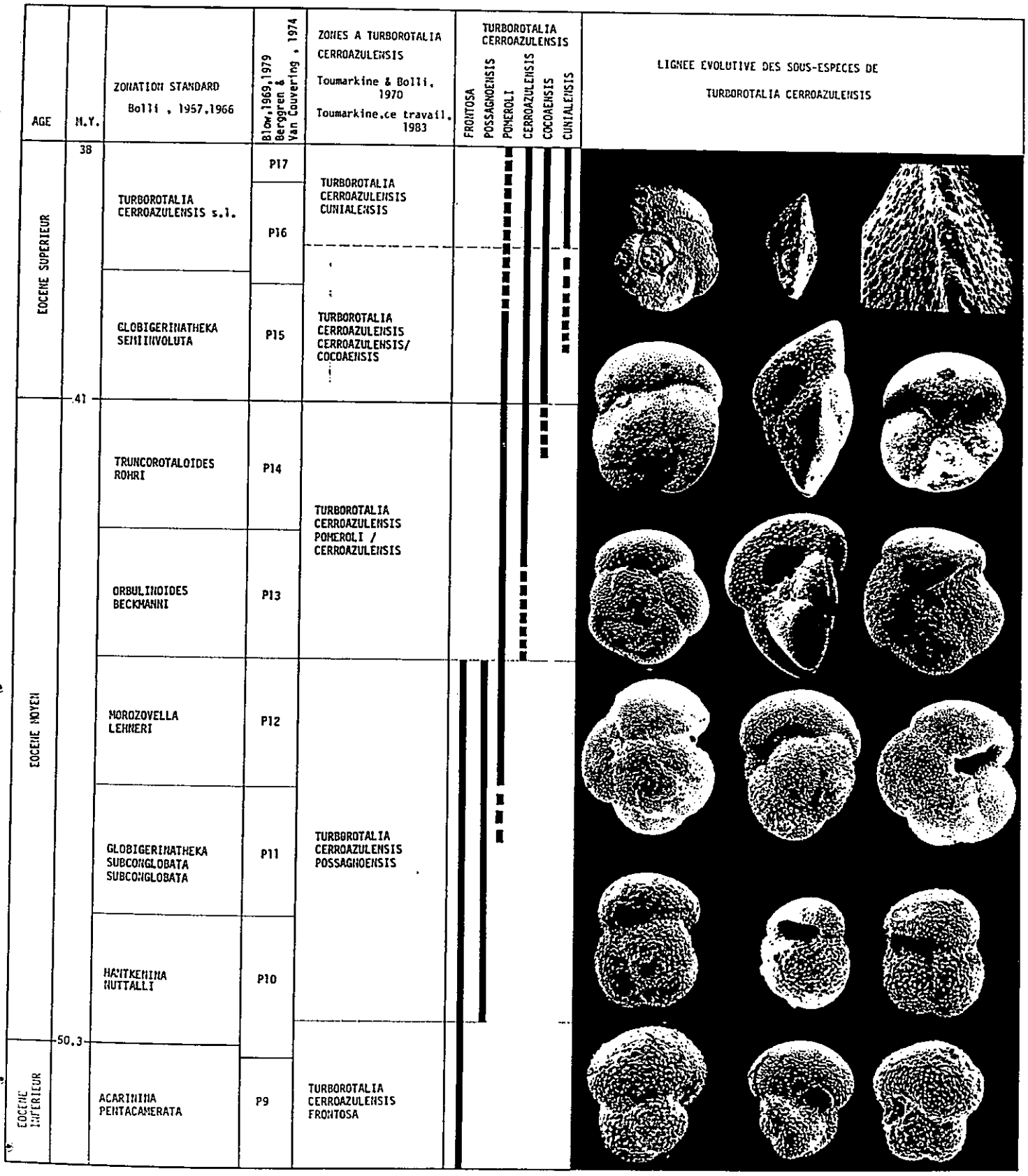

AGE
M.Y.
ZONATION STANDARD
Bolli , 1957,1966
Blow,1969,1979
Berggren &
Van Couvering , 1974
ZONES A TURBOROTALIA CERROAZULENSIS
Toumarkine & Bolli, 1970
Toumarkine,ce travail, 1983
TURBOROTALIA CERROAZULENSIS
FRONTOSA
POSSAGNOENSIS
POMEROLI
CERROAZULENSIS
COCOAENSIS
CUNIALENSIS
LIGNEE EVOLUTIVE DES SOUS-ESPECES DE
TURBOROTALIA CERROAZULENSIS
EOCENE SUPERIEUR
38
TURBOROTALIA CERROAZULENSIS s.l.
P17
P16
TURBOROTALIA CERROAZULENSIS CUNIALENSIS
GLOBIGERINATHEKA SEMIINVOLUTA
P15
TURBOROTALIA CERROAZULENSIS CERROAZULENSIS/ COCOAENSIS
41
EOCENE MOYEN
TRUNCOROTALOIDES ROHRI
P14
ORBULINOIDES BECKMANNI
P13
TURBOROTALIA CERROAZULENSIS POMEROLI / CERROAZULENSIS
MOROZOVELLA LEHNERI
P12
GLOBIGERINATHEKA SUBCONGLOBATA SUBCONGLOBATA
P11
TURBOROTALIA CERROAZULENSIS POSSAGNOENSIS
HANTKENINA NUTTALLI
P10
50,3
EOCENE INFERIEUR
ACARININA PENTACAMERATA
P9
TURBOROTALIA CERROAZULENSIS FRONTOSA

Fig. Ebi- - - -

EXPLANATION OF PLATE 1 (11)

Figures — Page

1-9. **Globigerina soldadoensis** Bronnimann, n. sp. 3

Rz. 287; T.L.L., Cat. No. 50506. Lower zone of Lizard Springs formation, south Trinidad. Holotypes, figures 4-6.

10-12. **Globigerina primitiva** (Finlay) 11

Rz. 287; T.L.L., Cat. No. 50506. Lower zone of Lizard Springs formation, south Trinidad.

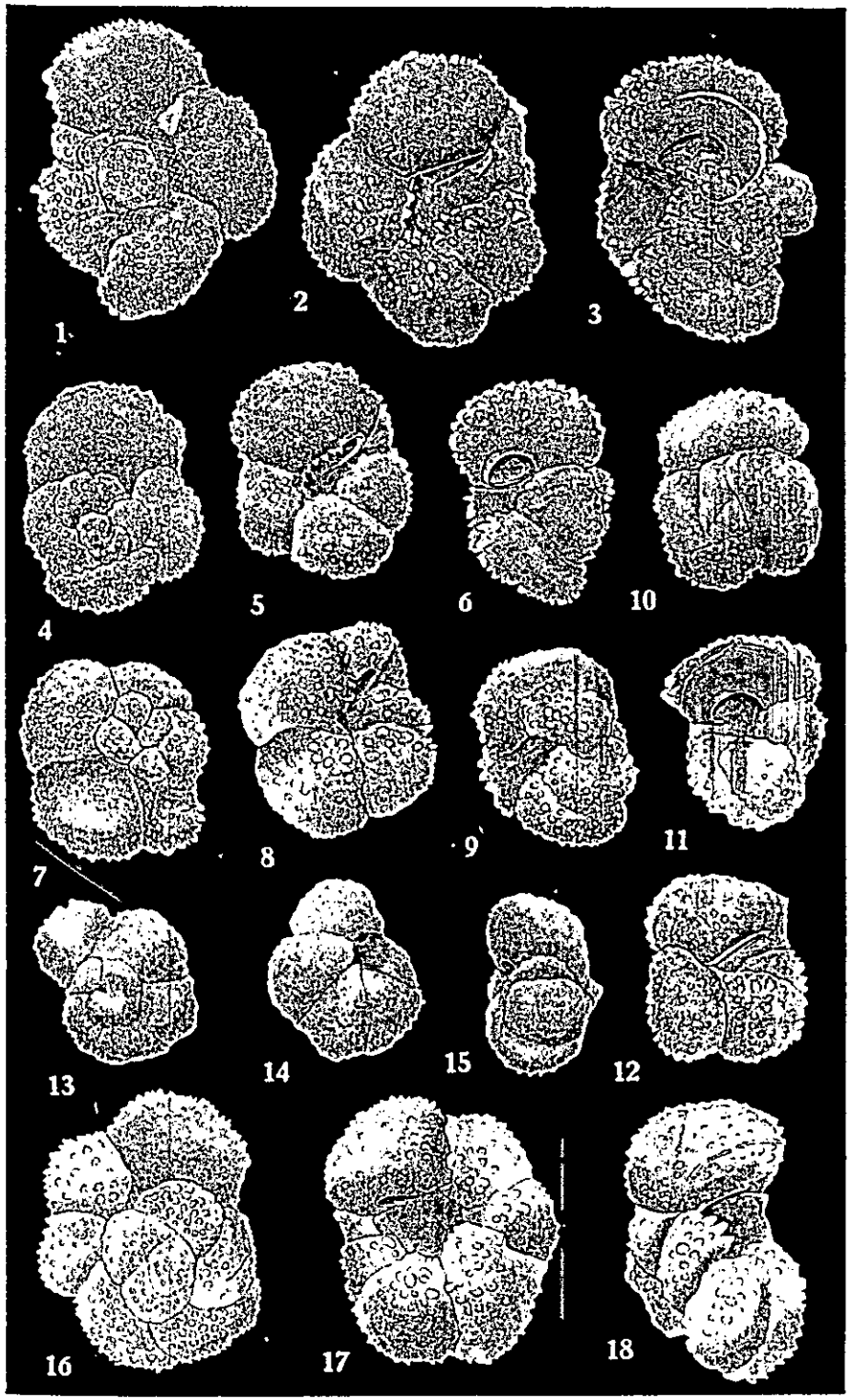
13-15. **Globigerina collactea** (Finlay) 13

Rz. 413; T.L.L., Cat. No. 59892. Ramdat marl, type locality, near San Fernando, south Trinidad.

16-18. **Globigerina gravelli** Bronnimann, n. sp. 12

Rz. 287; T.L.L., Cat. No. 50506. Lower zone of Lizard Springs formation, south Trinidad. Holotype.

All appr. ×144



EXPLANATION OF PLATE 2 (12)

Figures — Page

1-3. **Globigerina** sp. aff. G. triloculinoides Plummer 14

Rz. 287; T.L.L., Cat. No. 50506. Lower zone of Lizard Springs formation, south Trinidad.

4-6. **Globigerina hornibrooki** Bronnimann, n. sp. 15

Rz. 287; T.L.L., Cat. No. 50506. Lower zone of Lizard Springs formation, south Trinidad. Holotype.

7-9. **Globigerina linaperta** Finlay 16

Rz. 287; T.L.L., Cat. No. 50506. Lower zone of Lizard Springs formation, south Trinidad.

10-12. **Globigerina finlayi** Bronnimann, n. sp. 18

Rz. 287; T.L.L., Cat. No. 50506. Lower zone of Lizard Springs formation, south Trinidad. Holotype.

13-15. **Globigerina** sp. aff. G. **hornibrooki** Bronnimann, n. sp. 15

Rz. 286; T.L.L., Cat. No. 50505. Lower zone of Lizard Springs formation, south Trinidad.

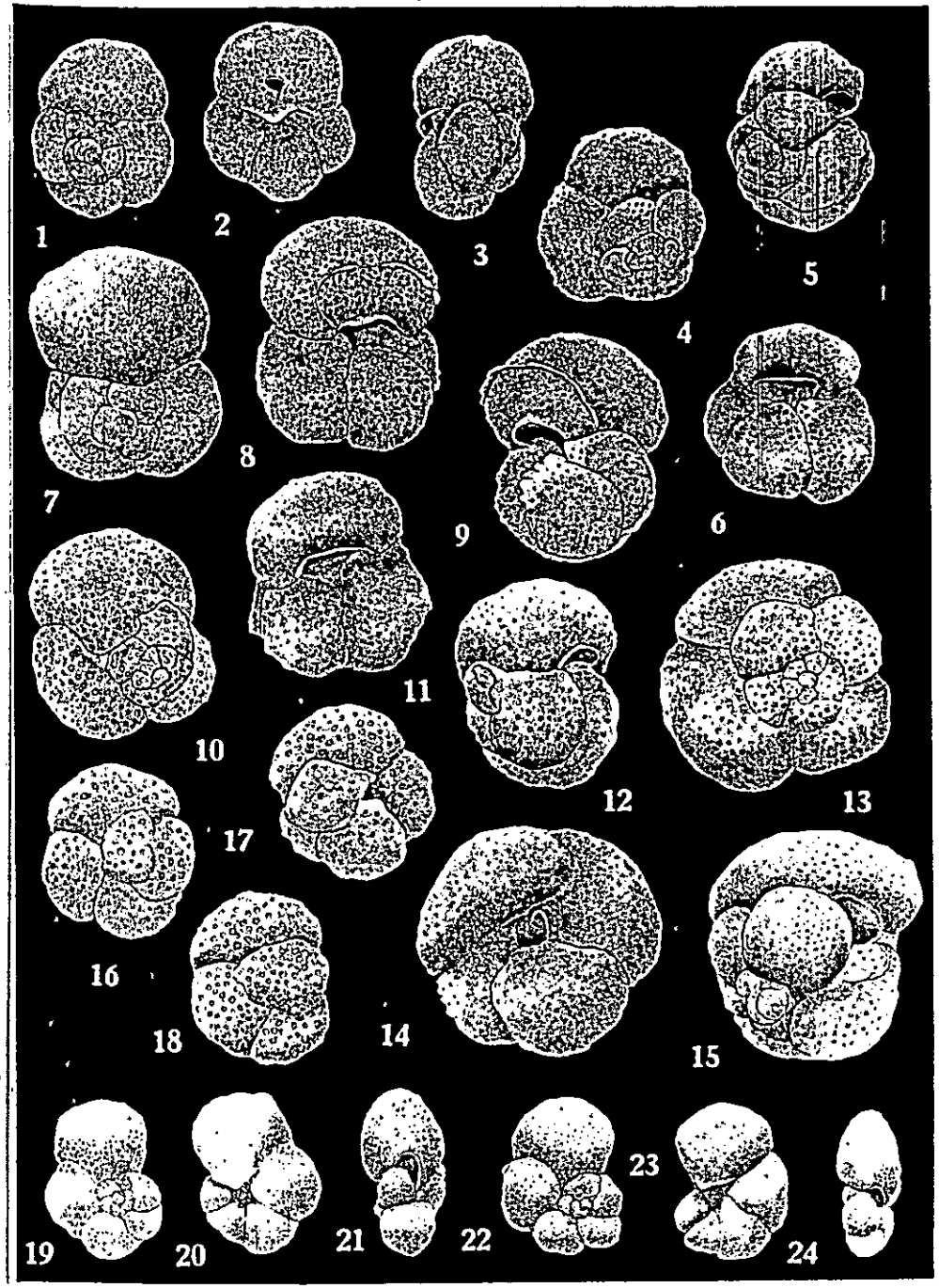
16-18. **Globigerina taroubaensis** Bronnimann, n. sp. 18

Rz. 413; T.L.L., Cat. No. 59892. Ramdat marl, type locality; near San Fernando, south Trinidad. Holotype.

19-24. **Globorotalia compressa** Plummer 25

Sh. 100, 30 feet augerhole; T.L.L., Cat. No. 143838. Kapur Stone area, south Trinidad.

All appr. ×144



EXPLANATION OF PLATE 3 (13)

ures Page

-3. **Globigerina turgida** Finlay 19

Rz. 413; T.L.L., Cat. No. 59892. Ramdat marl, type locality, near San Fernando, south Trinidad.

-6. **Globigerina**, n. sp. 21

Rz. 413; T.L.L., Cat. No. 59892. Ramdat marl, type locality; near San Fernando, south Trinidad.

-9. **Globigerina pseudo-bulloides** Plummer 21

Rz. 281; T.L.L., Cat. No. 50314. Upper zone of Lizard Springs formation, south Trinidad.

12. **Globigerina stainforthi** Bronnimann, n. sp. 23

Sh. 100, 30 feet augerhole; T.L.L., Cat. No. 143838. Kapur Stone area, south Trinidad. Holotype.

.8. **Globigerina triloculinoides** Plummer 24

Sh. 100, 30 feet augerhole; T.L.L., Cat. No. 143838. Kapur Stone area, south Trinidad.

All appr. ×144

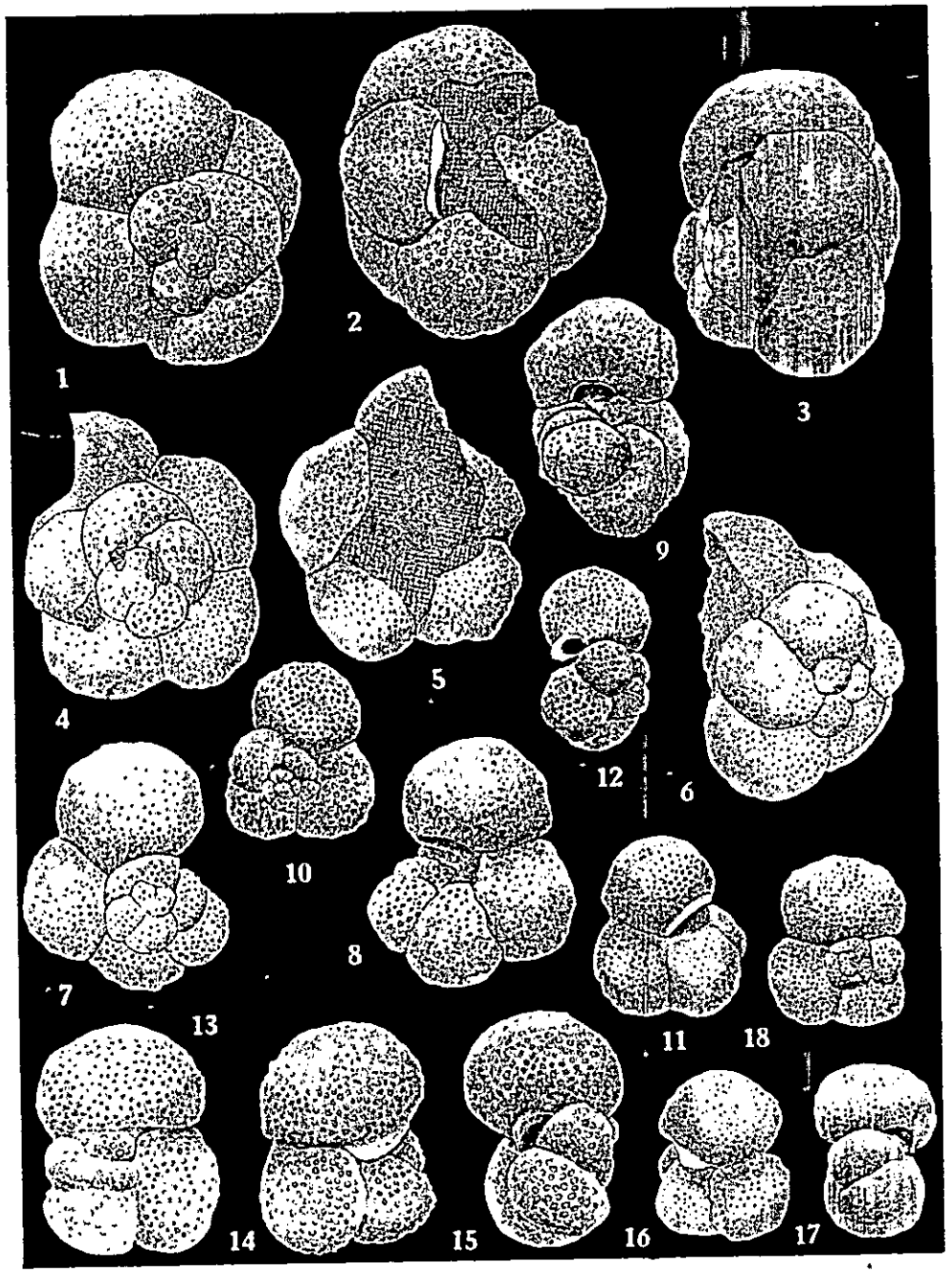


Plate 15. Globigerina

FIGURES 1, 2. *Globigerina taronbaensis* Bronnimann — Page 72
1, Spiral view of topotype (USNM P5041). 2, Umbilical view. From the *Globoratalia aragonensis* zone, upper Lizard Springs formation, Trinidad, B.W.I. × 100.

FIGURES 3–5. *Globigerina turgida* Finlay — 73
3, Spiral view of hypotype (USNM P5042). 4, Side view. 5, Umbilical view. From the *Globoratalia aragonensis* zone, upper Lizard Spriags formation, Trinidad, B.W.I. × 100.

FIGURES 6–8. *Globigerina primitiva* Finlay — 71
6, Spiral view of hypotype (USNM P5035). 7, Side view. 8, Umbilical view. From the *Globoratalia rex* zone, upper Lizard Springs formation, Trinidad, B.W.I. × 100.

FIGURES 9–11. *Globigerina velascoensis* Cushman — 71
9, Spiral view of hypotype (USNM P5034). 10, Side view. 11, Umbilical view. From the *Globoratalia pseudomenardii* zone, lower Lizard Springs formation, Trinidad, B.W.I. × 100.

FIGURES 12–14. *Globigerina triangularis* White — 71
12, Spiral view of hypotype (USNM P5033). 13, Side view. 14, Umbilical view. From the *Globoratalia pseudomenardii* zone, lower Lizard Springs formation, Trinidad, B.W.I. × 100.

FIGURES 15–17. *Globigerina linaperta* Finlay — 70
15, Spiral view of hypotype (USNM P5032). 16, Side view. 17, Umbilical view. From the *Globoratalia pseudomenardii* zone, lower Lizard Springs formation, Trinidad, B.W.I. × 100.

FIGURES 18–20. *Globigerina triloculinoides* Plummer — 70
18, Spiral view of hypotype (USNM P5031). 19, Side view. 20, Umbilical view. From the *Globoratalia pusilla pusilla* zone, lower Lizard Springs formation, Trinidad, B.W.I. × 100.

FIGURES 21–23. *Globigerina collactea* (Finlay) — 72
21, Spiral view of hypotype (USNM P5039). 22, Side view. 23, Umbilical view. From the *Globoratalia rex* zone, upper Lizard Springs formation, Trinidad, B.W.I. × 100.

FIGURES 24–26. *Globigerina prolata* Bolli, new species — 72
24, Spiral view of holotype (USNM P5040). 25, Side view. 26, Umbilical view. From the *Globoratalia formosa formosa* zone, upper Lizard Springs formation, Trinidad, B.W.I. × 100.

Plate 16. Globigerina, Globorotalia

(All figures × 100)

FIGURES 1–3. *Globigerina gravelli* Bronnimann — Page 72
1, Spiral view of topotype (USNM P5038). 2, Side view. 3, Umbilical view. From the *Globoratalia formosa formosa* zone, upper Lizard Springs formation, Trinidad, B.W.I.

FIGURES 4–6. *Globigerina soldadoensis angulosa* Bolli, new subspecies — 71
4, Spiral view of holotype (USNM P5037). 5, Side view. 6, Umbilical view. From the *Globoratalia formosa formosa* zone, upper Lizard Springs formation, Trinidad, B.W.I.

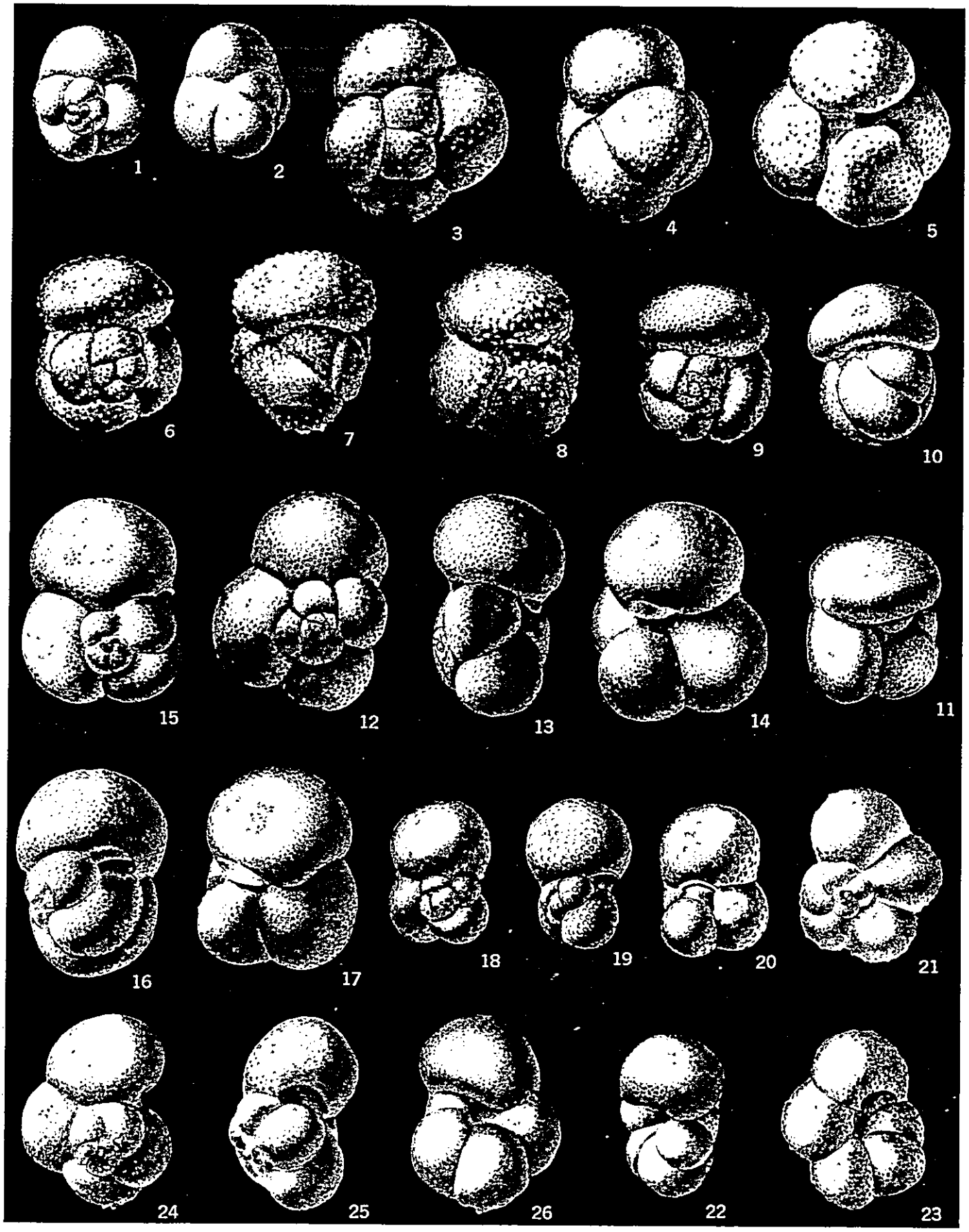
FIGURES 7–9. *Globigerina soldadoensis* Bronnimann — 71
7, Spiral view of hypotype (USNM P5036). 8, Side view. 9, Umbilical view. From the *Globoratalia formosa formosa* zone, upper Lizard Springs formation, Trinidad, B.W.I.

FIGURES 10–12. Transitional form between *Globigerina soldadoensis* Bronnimann and *Globigerina gravelli* Bronnimann — 71
10, Spiral view of specimen (USNM P5073). 11, Side view. 12, Umbilical view. From the *Globoratalia formosa formosa* zone, upper Lizard Springs formation, Trinidad, B.W.I.

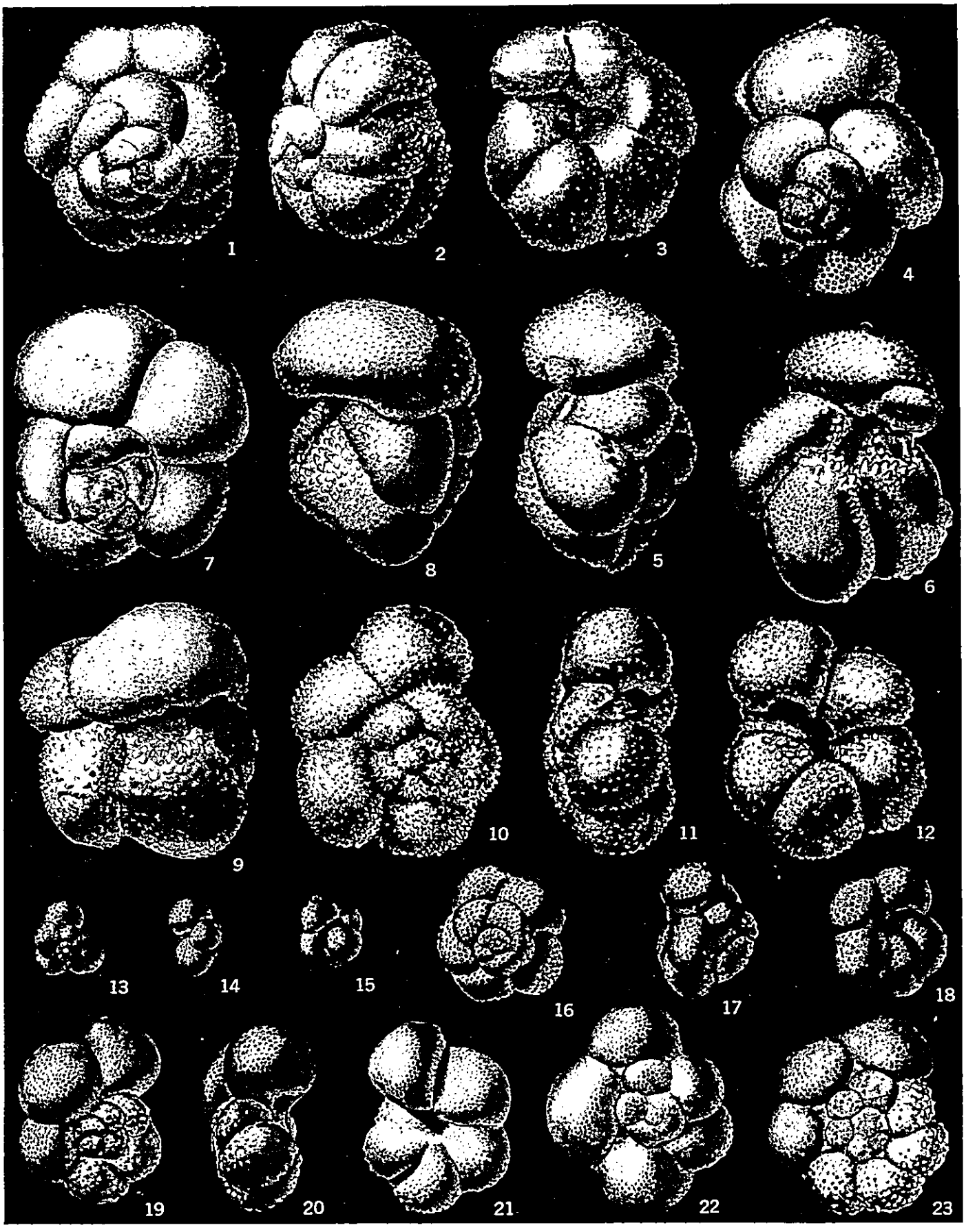
FIGURES 13–15. *Globigerina daubjergensis* Bronnimann — 70
13, Spiral view of hypotype (USNM P5029). 14, Side view. 15, Umbilical view. From the *Globoratalia trinidadensis* zone, lower Lizard Springs formation, Trinidad, B. W. I.

FIGURES 16–18. *Globigerina spiralis* Bolli, new species — 70
16, Spiral view of holotype (USNM P5030). 17, Side view. 18, Umbilical view. From the *Globoratalia uncinata* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 19–23. *Globoratalia trinidadensis* Bolli, new species — 73
19, Spiral view of holotype (USNM P5044). 20, Side view. 21, Umbilical view. 22, Spiral view of paratype (USNM P5045). 23, Spiral view of another paratype (USNM P5046). From the *Globoratalia trinidadensis* zone, lower Lizard Springs formation, Trinidad, B. W. I.



GLOBIGERINA



GLOBIGERINA, GLOBOROTALIA

PLATE 17. GLOBOROTALIA, GLOBIGERINA

(All figures × 100)

FIGURES 1–3. *Globorotalia acqua* Cushman and Renz — Page 74
1, Spiral view of hypotype (USNM P5051). 2, Side view. 3, Umbilical view. From the *Globorotalia velascoensis* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 4–6. *Globorotalia angulata abundocamerata* Bolli, new subspecies — Page 74
4, Spiral view of holotype (USNM P5050). 5, Side view. 6, Umbilical view. From the *Globorotalia pusilla pusilla* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 7–9. *Globorotalia angulata* (White) — Page 74
7, Spiral view of hypotype (USNM P5049). 8, Side view. 9, Umbilical view. From the *Globorotalia pusilla pusilla* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 10–12. Transitional form between *Globorotalia uncinata* Bolli, new species and *Globorotalia angulata* (White) — Page 74
10, Spiral view of specimen (USNM P5074). 11, Side view. 12, Umbilical view. From the *Globorotalia pusilla pusilla* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 13–15. *Globorotalia uncinata* Bolli, new species — Page 74
13, Spiral view of holotype (USNM P5048). 14, Side view. 15, Umbilical view. From the *Globorotalia uncinata* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 16–18. Transitional form between *Globorotalia pseudobulloides* (Plummer) and *Globorotalia uncinata* Bolli, new species — Page 74
16, Spiral view of specimen (USNM P5075). 17, Side view. 18, Umbilical view. From the *Globorotalia uncinata* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 19–21. *Globorotalia pseudobulloides* (Plummer) — Page 73
19, Spiral view of hypotype (USNM P5043). 20, Side view. 21, Umbilical view. From the *Globorotalia pusilla pusilla* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 22–24. *Globorotalia quadrata* (White) — Page 73
22, Spiral view of hypotype (USNM P5047). 23, Side view. 24, Umbilical view. From the *Globorotalia pusilla pusilla* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 25–26. *Globigerina triloculinoides* Plummer — Page 70
25, Spiral view of hypotype (USNM P5076) showing *Globorotalia*-like apertural character. 26, Umbilical view. From the *Globorotalia pusilla pusilla* zone, lower Lizard Springs formation, Trinidad, B.W.I.

PLATE 18. GLOBOROTALIA

(All figures × 100)

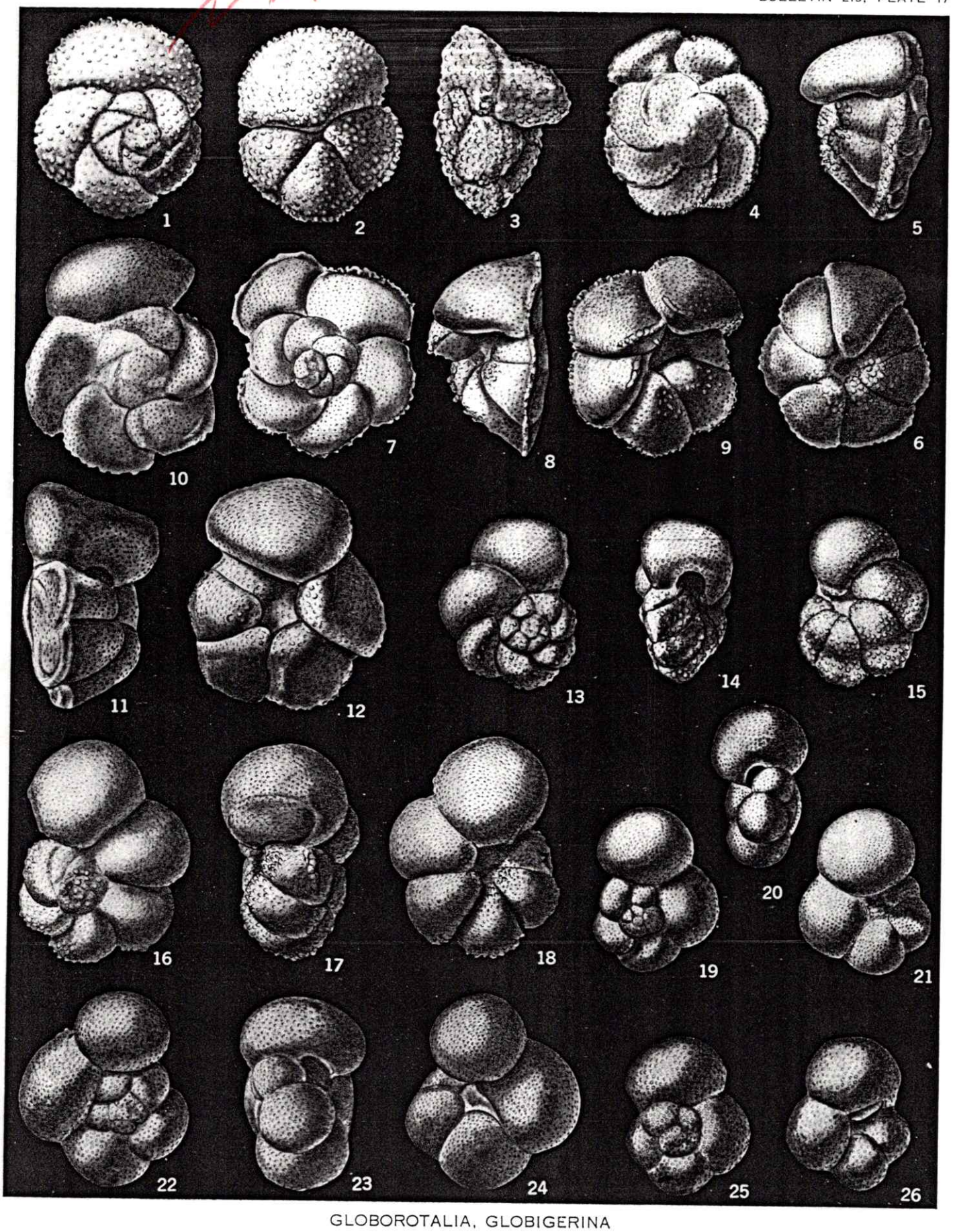
FIGURES 1–3. *Globorotalia formosa formosa* Bolli, new species, new subspecies — Page 76
1, Spiral view of holotype (USNM P5056). 2, Side view. 3, Umbilical view. From the *Globorotalia formosa formosa* zone, upper Lizard Springs formation, Trinidad, B.W.I.

FIGURES 4–6. *Globorotalia formosa gracilis* Bolli, new species, new subspecies — Page 75
4, Spiral view of holotype (USNM P5055). 5, Side view. 6, Umbilical view. From the *Globorotalia rex* zone, upper Lizard Springs formation, Trinidad, B.W.I.

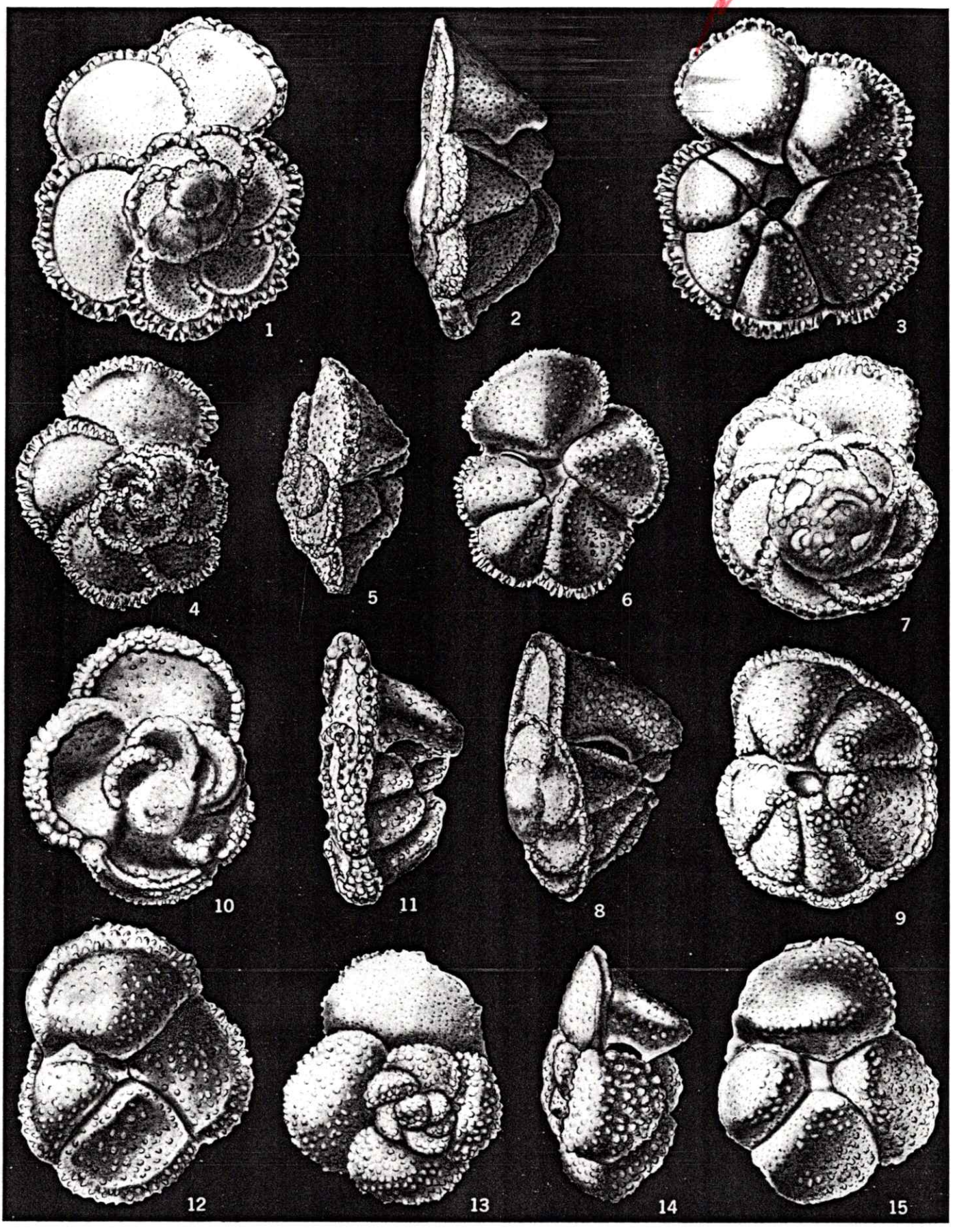
FIGURES 7–9. *Globorotalia aragonensis* Nuttall — Page 75
7, Spiral view of hypotype (USNM P5054). 8, Side view. 9, Umbilical view. From the *Globorotalia aragonensis* zone, upper Lizard Springs formation, Trinidad, B.W.I.

FIGURES 10–12. *Globorotalia rex* Martin — Page 75
10, Spiral view of hypotype (USNM P5053). 11, Side view. 12, Umbilical view. From the *Globorotalia rex* zone, upper Lizard Springs formation, Trinidad, B.W.I.

FIGURES 13–15. *Globorotalia acqua* Cushman and Renz — Page 74
13, Spiral view of hypotype (USNM P5052). 14, Side view. 15, Umbilical view. From the *Globorotalia velascoensis* zone, lower Lizard Springs formation, Trinidad, B.W.I.



GLOBOROTALIA, GLOBIGERINA



GLOBOROTALIA

PLATE 19. GLOBOROTALIA

(All figures × 100)

FIGURES 1–6. *Globorotalia quatra* Bolli, new species — Page 79
1, Spiral view of holotype (USNM P5070). 2, Side view. 3, Umbilical view. 4, Spiral view of paratype (USNM P5071). 5, Side view. 6, Umbilical view. Both from the *Globorotalia formosa formosa* zone, upper Lizard Springs formation, Trinidad, B.W.I.

FIGURES 7–9. *Globorotalia wilcoxensis* Cushman and Ponton — Page 79
7, Spiral view of hypotype (USNM P5069). 8, Side view. 9, Umbilical view. From the *Globorotalia rex* zone, upper Lizard Springs formation, Trinidad, B.W.I.

FIGURES 10–12. *Globorotalia whitei* Weiss — Page 79
10, Spiral view of hypotype (USNM P5068). 11, Side view. 12, Umbilical view. From the *Globorotalia pseudomenardii* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 13–15. *Globorotalia broedermanni* Cushman and Bermudez — Page 80
13, Spiral view of hypotype (USNM P5072). 14, Side view. 15, Umbilical view. From the *Globorotalia formosa formosa* zone, upper Lizard Springs formation, Trinidad, B.W.I.

FIGURES 16–18. *Globorotalia mckannai* (White) — Page 79
16, Spiral view of hypotype (USNM P5067). 17, Side view. 18, Umbilical view. From the *Globorotalia pseudomenardii* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 19–21. *Globorotalia tortiva* Bolli, new name — Page 78
19, Spiral view of hypotype (USNM P5066). 20, Side view. 21, Umbilical view. From the *Globorotalia pseudomenardii* zone, lower Lizard Springs formation, Trinidad, B.W.I.

PLATE 20. GLOBOROTALIA

(All figures × 100)

FIGURES 1–4. *Globorotalia velascoensis* (Cushman) — Page 76
1, Spiral view. 2, Side view. 3, Umbilical view. 4, Umbilical view of small specimen. Hypotypes (USNM P5057 and P5058). From the *Globorotalia pseudomenardii* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 5–7. *Globorotalia pusilla laevigata* Bolli, new species, new subspecies — Page 78
5, Spiral view of holotype (USNM P5065). 6, Side view. 7, Umbilical view. From the *Globorotalia pseudomenardii* zone, lower Lizard Springs formation, Trinidad, B.W.I.

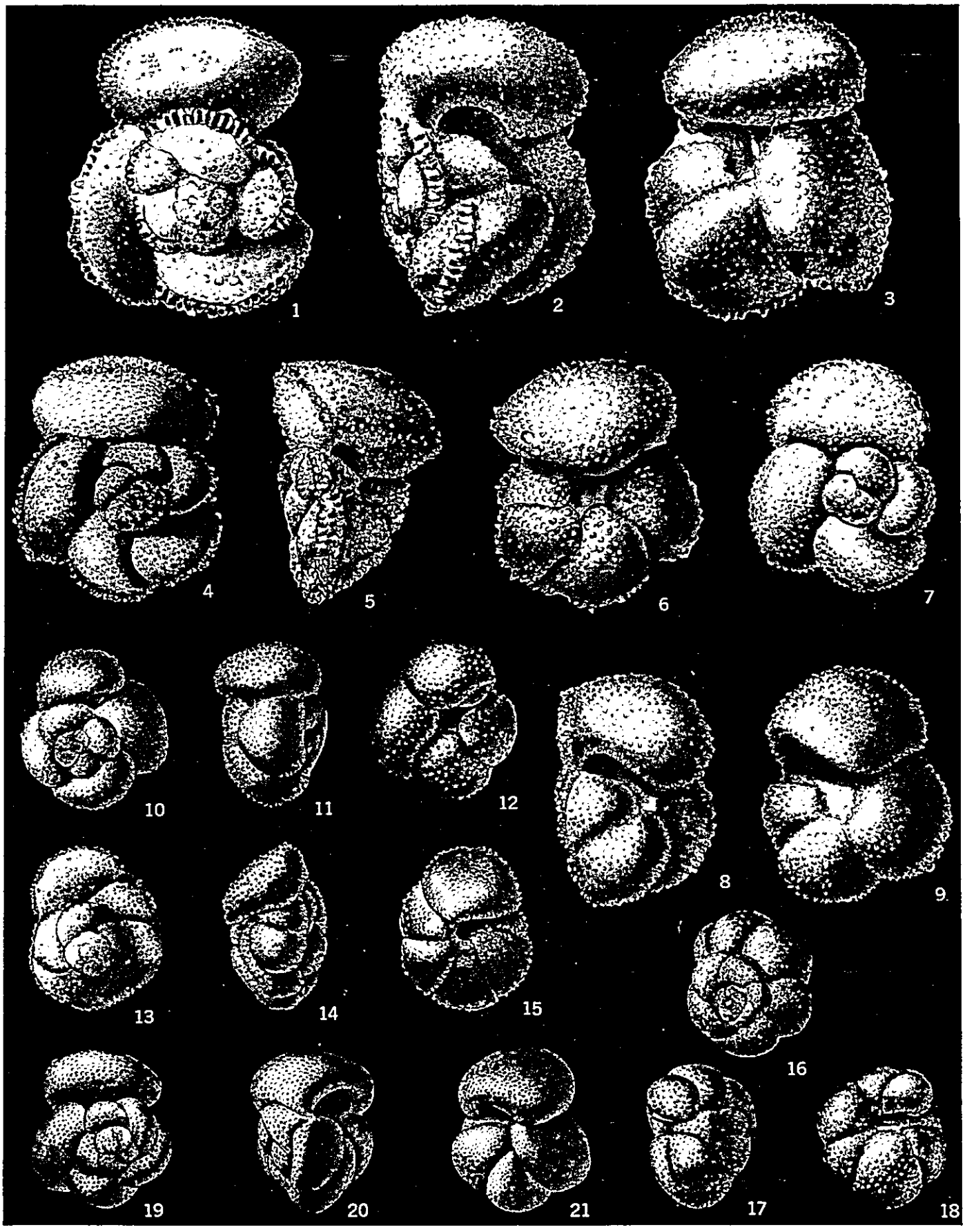
FIGURES 8–10. *Globorotalia pusilla pusilla* Bolli, new species, new subspecies — Page 78
8, Spiral view of holotype (USNM P5064). 9, Side view. 10, Umbilical view. From the *Globorotalia pusilla pusilla* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 11–13. *Globorotalia elongata* Glaessner — Page 77
11, Spiral view of hypotype (USNM P5063). 12, Side view. 13, Umbilical view. From the *Globorotalia pseudomenardii* zone, lower Lizard Springs formation, Trinidad, B.W.I.

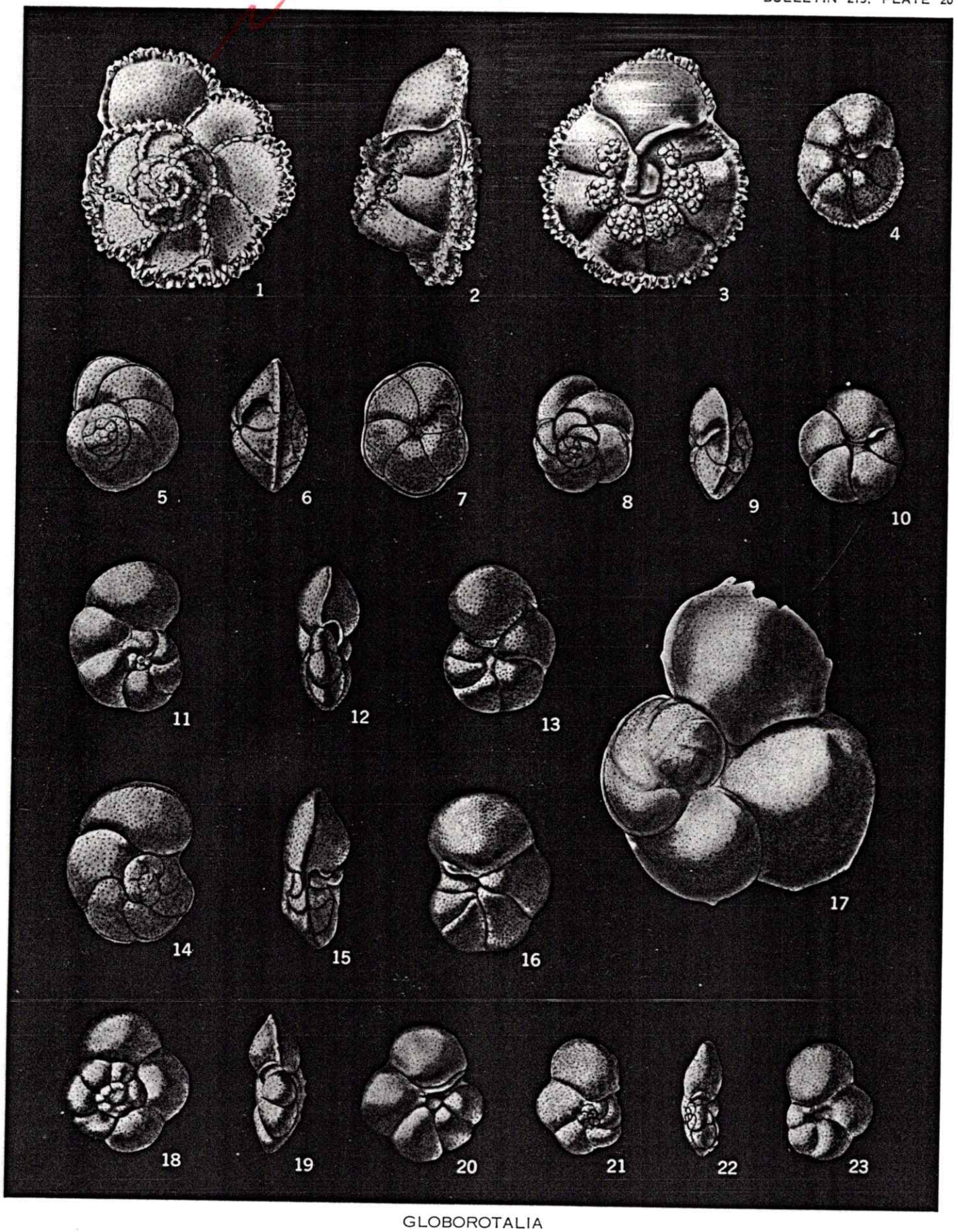
FIGURES 14–17. *Globorotalia pseudomenardii* Bolli, new species — Page 77
14, Spiral view of holotype (USNM P5061). 15, Side view. 16, Umbilical view. 17, Spiral view of a large paratype (USNM P5062). From the *Globorotalia pseudomenardii* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 18–20. *Globorotalia ehrenbergi* Bolli, new species — Page 77
18, Spiral view of holotype (USNM P5060). 19, Side view. 20, Umbilical view. From the *Globorotalia pusilla pusilla* zone, lower Lizard Springs formation, Trinidad, B.W.I.

FIGURES 21–23. *Globorotalia compressa* (Plummer) — Page 77
21, Spiral view of hypotype (USNM P5059). 22, Side view. 23, Umbilical view. From the *Globorotalia pusilla pusilla* zone, lower Lizard Springs formation, Trinidad, B.W.I.



GLOBOROTALIA



GLOBOROTALIA

PLATE 35. HASTIGERINA, CLAVIGERINELLA, GLOBIGERINA

(Figures 1–2 × 144, all others × 73)

FIGURES 1a–2b. *Hastigerina micra* (Cole) 161
1a, Equatorial view of small hypotype (USNM P5698a). 1b, Side view. 2a, Equatorial view of hypotype (USNM P5698b). 2b, Side view. Both from the *Porticulasphaera mexicana* zone, Navet formation, Trinidad.

FIGURES 3a, b. *Clavigerinella* aff. *akersi* Bolli, Loeblich, and Tappan 162
3a, Equatorial view of specimen (USNM P5700). 3b, Side view. From the *Hantkenina aragonensis* zone, Navet formation, Trinidad.

FIGURE 4. *Clavigerinella akersi* Bolli, Loeblich, and Tappan 161
4, Equatorial view of topotype (USNM P5699) from the *Hantkenina aragonensis* zone, Navet formation, Trinidad

FIGURES 5, 6. *Clavigerinella jarvisi* (Cushman) 162
5, Equatorial view of large hypotype (USNM P5701a). 6, Equatorial view of hypotype (USNM P5701b). Both from the *Globorotalia lehneri* zone, Navet formation, Trinidad.

FIGURES 7a, b. *Globigerina prolata* Bolli 162
7a, Spiral view of hypotype (USNM P5702). 7b, Umbilical view. From the *Globorotalia palmerae* zone, Navet formation, Trinidad.

FIGURES 8a–c. *Globigerina soldadoensis angulosa* Bolli 162
8a, Spiral view of hypotype (USNM P5703). 8b, Umbilical view. 8c, Side view. From the *Globorotalia palmerae* zone, Navet formation, Trinidad.

FIGURES 9a–c. *Globigerina soldadoensis* Bronnimann 162
9a, Spiral view of hypotype (USNM P5704) 9b, Umbilical view. 9c, Side view. From the *Globorotalia palmerae* zone, Navet formation, Trinidad.

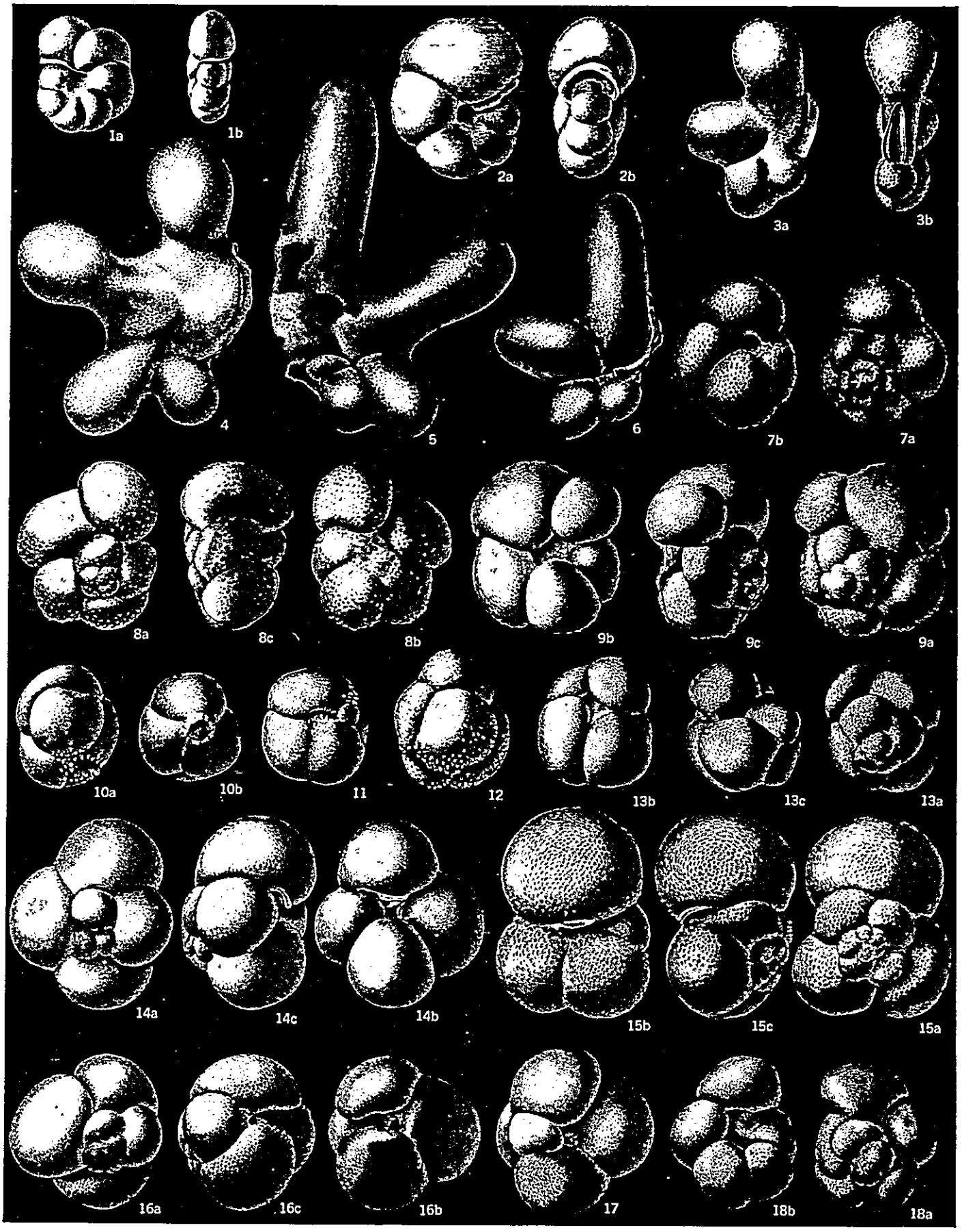
FIGURES 10a–12. *Globigerina senni* (Beckmann) 163
10a, Side view of hypotype (USNM P5705a). **10b,** Umbilical view. **11,** Umbilical view of hypotype (USNM P5705b). **12,** Side view of hypotype (USNM P5705c). All from the *Porticulasphaera mexicana* zone, Navet formation, Trinidad.

FIGURES 13a–c. *Globigerina turgida* Finlay 163
13a, Spiral view of hypotype (USNM P5706). **13b,** Umbilical view. **13c,** Side view. From the *Globorotalia palmerae* zone, Navet formation, Trinidad.

FIGURES 14a–15c. *Globigerina yeguaensis* Weinzierl and Applin 163
14a, Spiral view of hypotype (USNM P5707). **14b,** Umbilical view. **14c,** Side view. From the *Porticulasphaera mexicana* zone, Navet formation, Trinidad. **15a,** Spiral view of hypotype (USNM P5708). **15b,** Umbilical view. **15c,** Side view. From the *Globigerapsis semiinvoluta* zone, Navet formation, Trinidad.

FIGURES 16a–17. *Globigerina venezuelana* Hedberg 164
16a, Spiral view of hypotype (USNM P5709a). **16b,** Umbilical view. **16c,** Side view. **17,** Umbilical view of hypotype with rudimentary final chamber (USNM P5709b). Both from the *Porticulasphaera mexicana* zone, Navet formation, Trinidad.

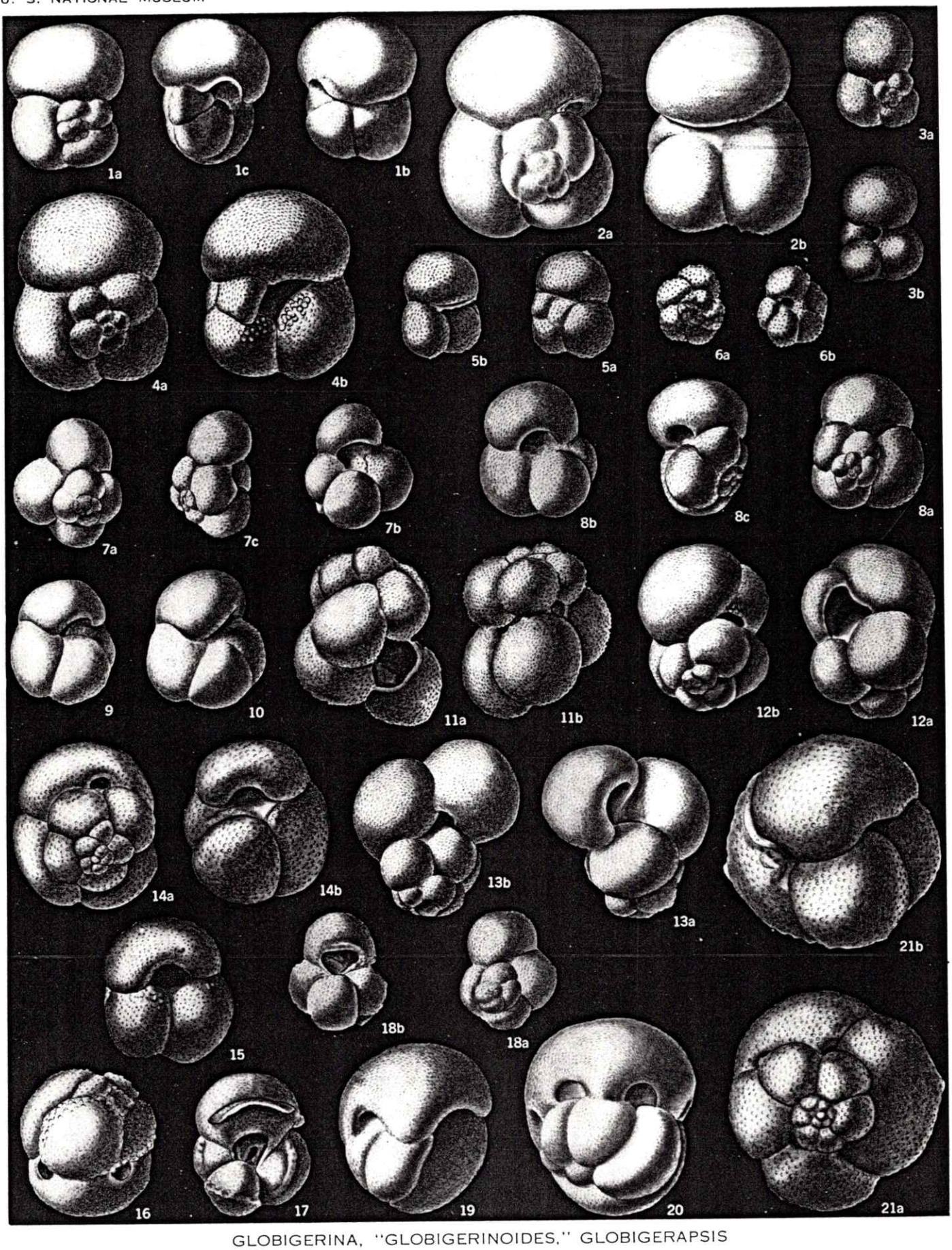
FIGURES 18a, b. *Globigerina collactea* (Finlay) 162
18a, Spiral view of hypotype (USNM P5710). **18b,** Umbilical view. From the *Globorotalia palmerae* zone, Navet formation, Trinidad.



HASTIGERINA, CLAVIGERINELLA, GLOBIGERINA

PLATE 36. GLOBIGERINA, "GLOBIGERINOIDES", GLOBIGERAPSIS

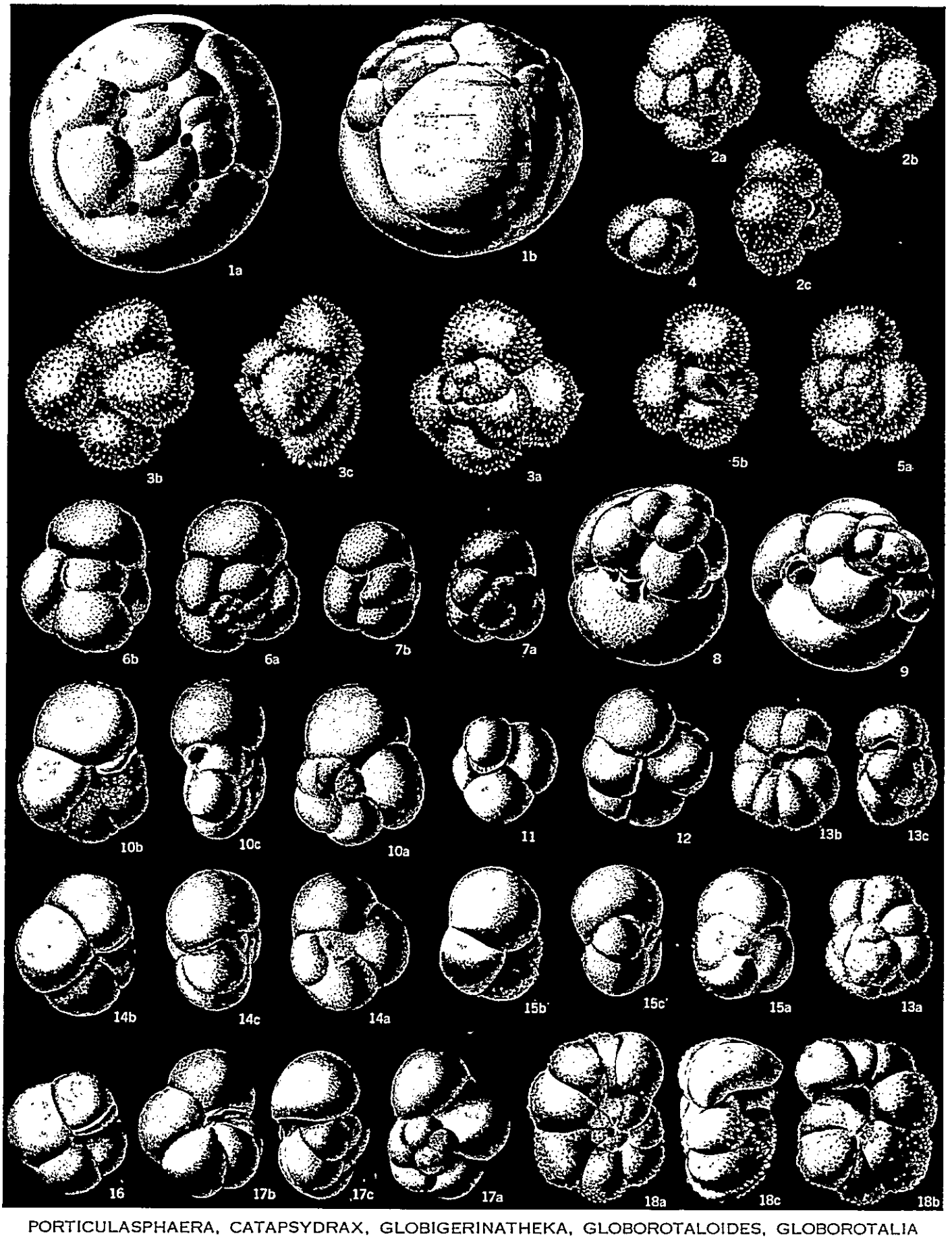
(All figures × 73)



GLOBIGERINA, "GLOBIGERINOIDES," GLOBIGERAPSIS

PLATE 37. PORTICULASPHAERA, CATAPSYDRAX, GLOBIGERINATHEKA, GLOBOROTALOIDES, GLOBOROTALIA

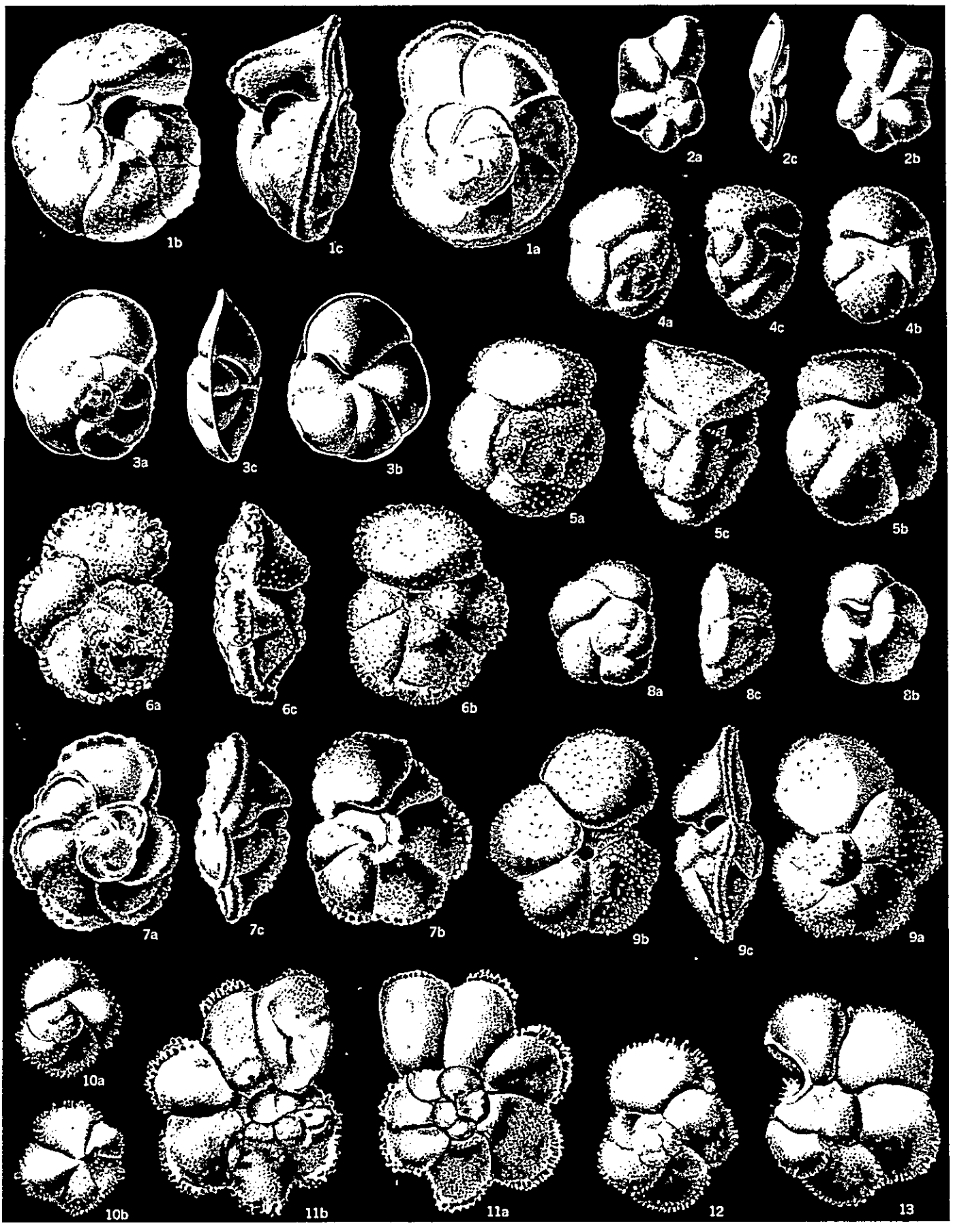
(All figures × 73)



PORTICULASPHAERA, CATAPSYDRAX, GLOBIGERINATHEKA, GLOBOROTALOIDES, GLOBOROTALIA

PLATE 38. GLOBOROTALIA

(Figures 3a–c, × 144; all others × 73)



GLOBOROTALIA

PLATE 39. GLOBOROTALIA, TRUNCOROTALOIDES

(Figures 3a-c, × 144; all others × 73)

FIGURES 1a-4. *Globorotalia centralis* Cushman and Bermudez — Page 169

1a, Spiral view of large hypotype (USNM P5748a). 1b, Umbilical view. 1c, Side view. 2a, Spiral view of high spired hypotype (USNM P5748b). 2b, Side view. 3a, Spiral view of small hypotype (USNM P5748c). 3b, Umbilical view. 3c, Side view. All from the *Porticulasphaera mexicana* zone, Navet formation, Trinidad. 4, Side view of typical hypotype (USNM P5749). From the *Globorotalia cocoaensis* zone, San Fernando formation, Trinidad.

FIGURES 5a–7b. *Globorotalia cocoaensis* Cushman — 169

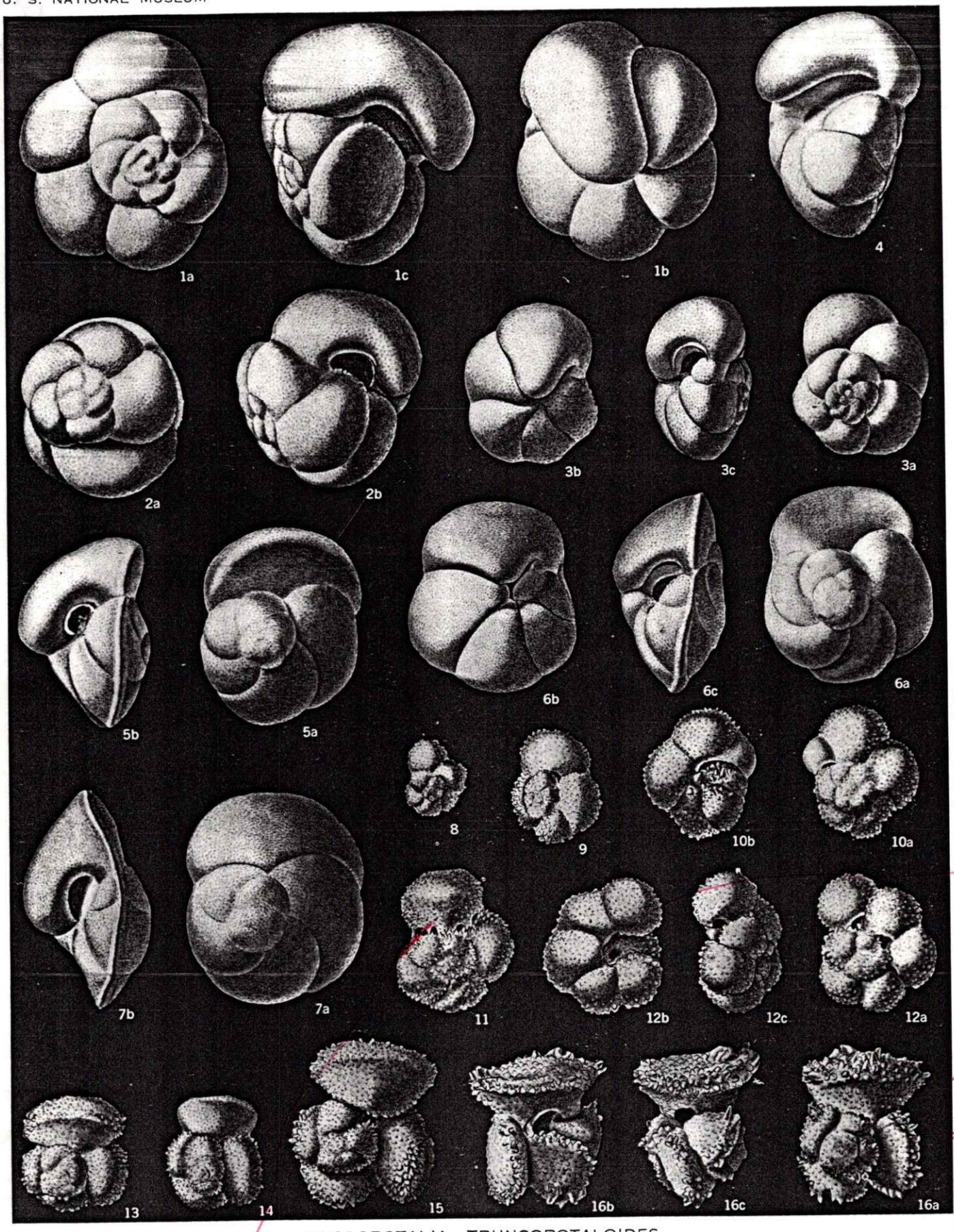
5a, Spiral view of the distinctly umbilico-convex hypotype (USNM P5750a). 5b, Side view. 6a, Spiral view of hypotype (USNM P5750b). 6b, Umbilical view. 6c, Side view. 7a, Spiral view of hypotype (USNM P5750c). 7b, Side view. All from the *Globorotalia cocoaensis* zone, San Fernando formation, Trinidad.

FIGURES 8–12c. *Truncorotaloides rohri* Bronnimann and Bermudez — 170

8, Spiral view of juvenile hypotype which has not yet developed sutural supplementary apertures (USNM P5751a). 9, Spiral view of slightly larger hypotype (USNM P5751b), showing sutural supplementary apertures. 10a, Spiral view of hypotype (USNM P5751c) with sutural supplementary aperture on rudimentary final chamber. 10b, Umbilical view. 11, Spiral view of hypotype (USNM P5751d) showing several sutural supplementary apertures in the last two chambers. 12a, Spiral view of characteristic hypotype (USNM P5751e). 12b, Umbilical view. 12c, Side view. All from the *Porticulasphaera mexicana* zone, Navet formation, Trinidad.

FIGURES 13–16b. *Truncorotaloides topilensis* (Cushman) — 170

13, Spiral view of small hypotype which has not developed sutural supplementary apertures (USNM P5752a). 14, Spiral view of small hypotype showing two small sutural supplementary apertures (USNM P5752b). 15, Spiral view of large hypotype (USNM P5752c). 16a, Spiral view of very angular, spinose hypotype (USNM P5752d). 16b, Umbilical view. 16c, Side view. All from the *Porticulasphaera mexicana* zone, Navet formation, Trinidad.



GLOBOROTALIA. TRUNCOROTALOIDES

Abertura en la parte umbilical

Aberturas secundarias en la parte espiral

PALEOCENE-EOCENE PLANKTIC FORAMINIFERA GENERA AND THEIR TYPE SPECIES

(as used in Toumarkine & Luterbacher 1985)

Acarinina	Acarinina acarinata Subbotina 1953
Clavigerinella	Clavigerinella akersi Bolli, Loeblich & Tappan 1957
Cribrohantkenina	Hantkenina brevispina Bermudez 1937
Globigerina	Globigerina bulloides d'Orbigny 1826
Globigerinatheka	Globigerinatheka barri 1952
"Globigerinoides"	"Globigerinoides" higginsi Bolli 1957
Globoconusa	Globoconusa conusa Khalilov 1956
Globorotaloides	Globorotaloides variabilis Bolli 1957
Hantkenina	Hantkenina alabamensis Cushman 1925
"Hastigerina"	Globigerina wilsoni bolivariana Petters 1954
Morozovella	Pulvulina velascoensis Cushman 1925
Orbulinoides	Porticulasphaera beckmanni Saito
Planorotalites	Globorotalia pseudoscitula Glaessner 1937
Pseudohastigerina	Nonion micrus Cole
Truncorotaloides	Truncorotaloides rohri Brönnimann & Bermudez 1953
Turborotalia	Globorotalia centralis Cushman & Bermudez 1937

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