COSMOPOLITAN TERTIARY BATHYAL BENTHIC FORAMINIFERA[1]

F. P. C. M. van Morkhoven[2]

ABSTRACT

A three-year study of Tertiary bathyal benthic foraminiferal assemblages revealed that many species have extensive, often near-global geographical distributions combined with restricted vertical stratigraphic ranges. The study was based on an examination of closely sampled surface profiles and cored subsurface sections from widely separated areas throughout the world, including an almost completely cored composite section of Tertiary strata from the DeSoto Canyon in the northern Gulf of Mexico.

The preliminary range chart of Tertiary bathyal benthic Foraminifera, *issued with this volume,* gives the total stratigraphic ranges of 120 selected species, as they are known to us at present. Ranges are shown against the standard pelagic foram zones of Blow (1979) and the calcareous nannoplankton zonation of Martini (1971). Also shown for each species are the areas in which they have so far been observed to occur, and the extinction tops of some of the more conspicuous ones are indicated.

The correct nomenclature of such cosmopolitan species poses serious problems. Undoubtedly, many geographical variants were described and named differently by authors from widely scattered regions. Some species names used on our chart will need to be revised and the correct identifications of those shown in open nomenclature are yet to be determined. This task, together with additional checking of their vertical ranges, etc., is being carried out at present at the Woods Hole Oceanographic Institute.

In our opinion, bathyal benthic Foraminifera show great promise of becoming a potentially important global stratigraphic tool. They can be used for isochronous correlations and age dating in areas where planktic organisms are mostly absent (such as parts of the California Tertiary) or between areas with very different planktic faunas (i. e. high vs. low latitude, or tethys vs. boreal areas). Many species exhibit gradual morphological changes through geologic time. The detailed study of such 'chronoclines' will add significantly to the resolution of an envisaged global zonal scheme based on this group of fossils.

Another important attribute of bathyal benthic Foraminifera lies in their usefulness as indicators of paleo-depth of deposition. Many species were observed to show clear ecophenotypic variations with depth, while others were found to be restricted to certain depth limits within the bathyal realm. This seems to make them particularly useful for detecting major sea-level changes which often are best reflected in slope deposits.

Lastly, the usefulness of these deep water benthic organisms for paleo-oceanographic studies should be emphasized. The apparent sudden extinction of a good number of species around N.9-N.11 time, as apparent on our range chart, would seem to reflect the Mid-Miocene oxygen-isotopic event (Woodruff, 1979) when colder antarctic bottom water started invading the oceans.

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[2]Stratigraphic Services, Shell Oil Company, Houston, Texas

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Martini, E., 1971, Standard Tertiary and Quaternary calcareous nannoplankton zonation: Proc. 2nd Planktonic Conference, Roma, 1970.

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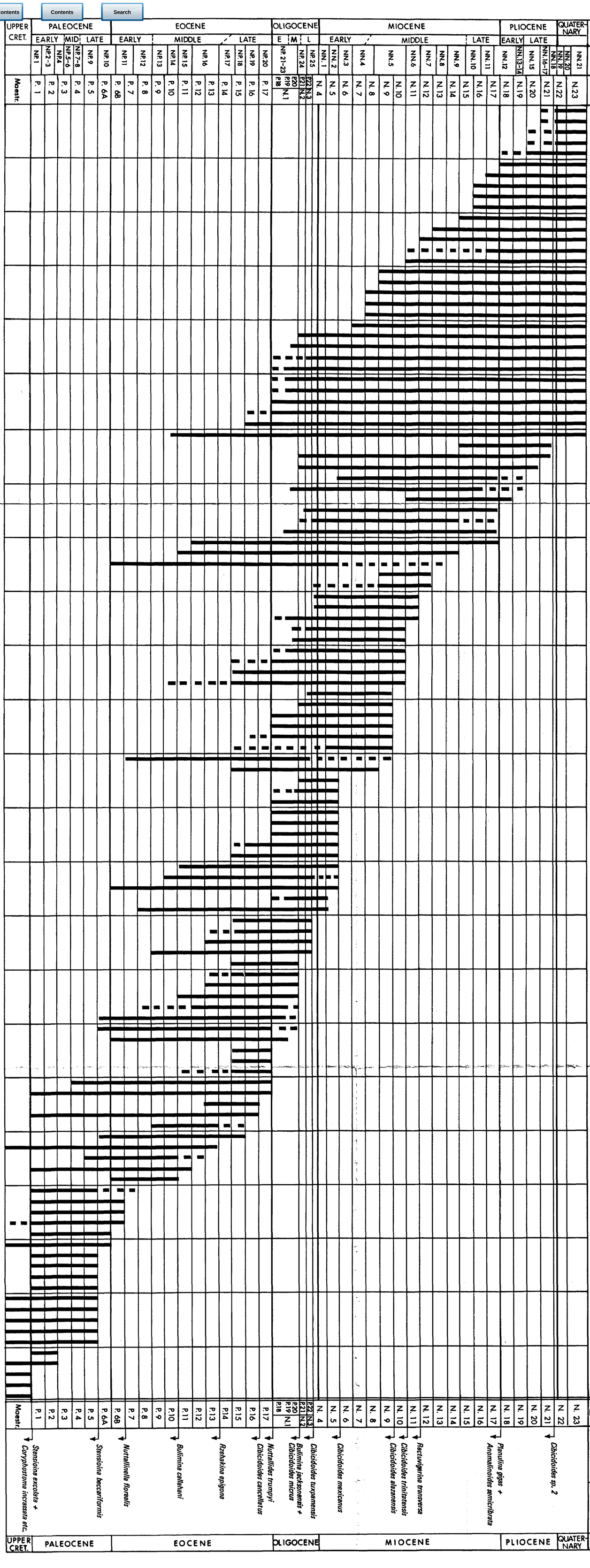

Species	Index #	North Atlantic	South Atlantic	Europe	Indian Ocean	West Pacific	East Pacific
Bulimina aculeata	1	•	•	•	•	•	•
Uvigerina sp. 2	2	•	•			•	•
Bulimina marginata	3	•	•	•	•	•	
Hyalinea baltica	4	•	•	•		•	
Buliminella sp. 1	5	•	•				•
Planulina foveolata	6	•	•				
Uvigerina senticosa	7	•		•		•	
Cibicidoides sp. 6	8	•	•				
Planulina sp. 1	9	•	•				
Planulina sp. 2	10	•	•				
Anomalinoides globulosus	11	•	•		•	•	
Cibicidoides sp. 15	12	•				•	•
Cibicidoides robertsonianus	13	•	•	•		•	•
Pyrgo sp. 1	14	•		•		•	•
Cibicidoides rugosus	15	•					•
Planulina wuellerstorfi	16	•	•	•	•	•	•
Pyrgo murrhina	17	•	•	•		•	•
Cibicidoides cicatricosus	18	•	•	•	•	•	•
Planulina sp. 3	19	•	•				•
Sigmoilopsis schlumbergeri	20	•	•	•	•	•	•
Bulimina striata mexicana	21	•	•	•	•	•	•
Uvigerina aculeata	22	•	•	•	•		•
Cibicidoides floridanus	23	•	•				•
Melonis pompilioides	24	•	•	•	•	•	•
Cibicidoides corpulentus	25	•	•				•
Laticarinina pauperata	26	•	•	•	•	•	•
Sphaeroidina bulloides	27	•	•	•	•	•	•
Lenticulina sp. 1	28	•	•				•
Cibicidoides subhaidingeri	29	•	•			•	•
Hoeglundina elegans	30	•	•	•	•	•	•
Cibicidoides bradyi	31	•	•	•	•	•	•
Cibicidoides sp. 2	32	•	•				
Hanzawaia sp. 1	33	•	•				•
Rectuvigerina sp. 1	34	•			•		
Cassidulina sp. 1	35	•	•				
Cancris sp. 1	36	•	•	•			•
Planulina sp. 4	37	•					•
Planulina gigas	38	•	•	•	•	•	•
Plectofrondicularia sp. 3	39	•	•	•		•	•
Plectofrondicularia vaughani	40	•	•	•			
Anomalinoides semicribrata	41	•	•	•		•	•
Rectuvigerina sp. 2	42	•		•			
Bulimina tuxpamensis	43	•		•	•	•	•
Rectuvigerina sp. 3	44	•					•
Cibicidoides sp. 3	45	•	•				
Matanzia bermudezi	46	•	•				•
Rectuvigerina transversa	47	•	•	•			•
Cibicidoides sp. 12	48	•		•			
Rectuvigerina senni	49	•		•			•
Cibicidoides sp. 11	50	•		•			
Cibicidina sp. 2	51	•	•				•
Uvigerina gallowayi	52	•				•	•
Bulimina jarvisi	53	•	•		•	•	•
Cibicidoides trinitatensis	54	•	•	•		•	
Cibicidoides dohmi	55	•	•			•	•
Anomalinoides sp. 2	56	•				•	•
Eponides sp. 1	57	•	•	•			•
Planulina sp. 5	58	•	•				•
Cibicidoides alazanensis	59	•	•	•		•	•
Uvigerina sp. 5	60	•					•
Buliminella grata	61	•	•	•	•	•	•
Aragonia sp. 3	62	•	•	•			•
Rectuvigerina sp. 4	63	•	•				•
Bolivina sp. 1	64	•	•	•		•	•
Cibicidoides mexicanus	65	•	•	•			•
Planulina sp. 6	66	•	•				
Planulina renzi	67	•	•	•	•	•	•
Uvigerina sp. 7	68	•	•				•
Uvigerina basicordata	69	•	•				•
Discorbis sp. 1	70	•	•	•	•	•	•
Bulimina impendens	71	•	•	•		•	•
Rectuvigerina sp. 4A	72	•	•				•
Hanzawaia cushmani	73	•	•			•	•
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Anomalinoides aragonensis	85	•	•	•			•
Alabamina dissonata	86	•	•	•		•	•
Bulimina semicostata	87	•	•	•		•	•
Marginulina sp. 2	88	•				•	
Planulina sp. 7	89	•					•
Cibicidoides sp. 7A	90	•		•			•
Abyssamina poagi	91	•	•				
Nuttallides trumpyi	92	•	•	•	•	•	•
Cibicidoides cancellatus	93	•	•	•			•
Bulimina trinitatensis	94	•	•	•		•	•
Hanzawaia caribaea	95	•	•				•
Turrilina brevispira	96	•	•				•
Rzehakina epigona	97	•	•	•			•
Aragonia semireticulata	98	•	•	•			•
Quadratobuliminella pyramidalis	99	•	•	•		•	•
Bulimina callahani	100	•	•	•			•
Nuttallinella florealis	101	•	•	•			•
Loxostomoides applinae	102	•	•	•	•	•	•
Tappannina excavata	103	•	•	•			•
Gyroidinoides globosus	104	•	•	•			•
Bulimina velascoensis	105	•	•			•	•
Bolivinoides delicatulus	106	•	•	•	•	•	•
Aragonia sp. 1	107	•	•	•		•	•
Gavelinella hyphalus	108	•	•	•			•
Gavelinella velascoensis	109	•	•	•			•
Stensioina beccariformis	110	•	•	•	•	•	•
Aragonia velascoensis	111	•	•	•		•	•
Cibicidoides dayi	112	•	•	•			•
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Neoflabellina jarvisi	114	•		•		•	•
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1) After MARTINI, 1971

2) After BLOW, 1979

PRELIMINARY RANGECHART OF SELECTED TERTIARY COSMOPOLITAN BATHYAL BENTHIC FORAMINIFERA

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