

Cambridge University Press

0521022533 - Benthic Foraminiferal Biostratigraphy of the South Caribbean Region

Hans M. Bolli, Jean-Pierre Beckmann and John B. Saunders

Frontmatter

[More information](#)

Benthic foraminifera from the classic southern Caribbean region are presented in this book, to provide useful information on ranges for biostratigraphers working in the region and beyond. Around 1000 of the more important species are assembled, from the Barremian (Early Cretaceous) to the Middle Miocene, approximately 120 to 10 million years before present. The deeper-water benthic species are tied in to the zonal scheme used in the earlier book, *Plankton Stratigraphy*, published by Cambridge University Press in 1985.

The taxa have been brought up to date generically, and in many cases new comparisons between species have been made; the Late Cretaceous and Early Paleogene are particularly detailed. This information, together with illustrations, will enable the taxa to be used stratigraphically.

Cambridge University Press

0521022533 - Benthic Foraminiferal Biostratigraphy of the South Caribbean Region

Hans M. Bolli, Jean-Pierre Beckmann and John B. Saunders

Frontmatter

[More information](#)

**Benthic foraminiferal biostratigraphy
of the south Caribbean region**

Cambridge University Press

0521022533 - Benthic Foraminiferal Biostratigraphy of the South Caribbean Region

Hans M. Bolli, Jean-Pierre Beckmann and John B. Saunders

Frontmatter

[More information](#)

Benthic foraminiferal biostratigraphy of the south Caribbean region

HANS M. BOLLI

Paleontological Institute

University of Zurich, Zurich, Switzerland

JEAN-PIERRE BECKMANN

Geological Institute

Federal School of Technology, Zurich, Switzerland

JOHN B. SAUNDERS

Natural History Museum

Basel, Switzerland



CAMBRIDGE
UNIVERSITY PRESS

Cambridge University Press
0521022533 - Benthic Foraminiferal Biostratigraphy of the South Caribbean Region
Hans M. Bolli, Jean-Pierre Beckmann and John B. Saunders
Frontmatter
[More information](#)

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

Cambridge University Press
The Edinburgh Building, Cambridge CB2 2RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9780521415217

© Cambridge University Press 1994

This publication is in copyright. Subject to statutory exception
and to the provisions of relevant collective licensing agreements,
no reproduction of any part may take place without
the written permission of Cambridge University Press.

First published 1994
This digitally printed first paperback version 2005

A catalogue record for this publication is available from the British Library

Library of Congress Cataloguing in Publication data

Bolli, Hans M.
Benthic foraminiferal biostratigraphy of the South Caribbean
Region / Hans M. Bolli, Jean-Pierre Beckmann, John B.
Saunders.
p. cm.
Includes bibliographical references (p.) and index.
ISBN 0 521 41521 7 (hc)
1. Foraminifera, Fossil – Caribbean Area. 2. Paleontology,
Stratigraphic. 3. Paleontology – Caribbean Area. I. Beckmann,
Jean-Pierre. II. Saunders, John B. III. Title.
QE772.B577 1994
563'.12'09729 – dc 20 93-29909 CIP

ISBN-13 978-0-521-41521-7 hardback
ISBN-10 0-521-41521-7 hardback

ISBN-13 978-0-521-02253-8 paperback
ISBN-10 0-521-02253-3 paperback

Contents

List of illustrations	ix
Introduction	1
Acknowledgments, authorship, depository	3
Publications in which the distribution of Cenozoic benthic foraminifera is correlated with planktic foraminiferal zonal schemes	4
Correlation of zones and formations in the areas under discussion	7
Trinidad	
Introduction	9
Barremian to Early Albian	11
Introduction	11
The Early Cretaceous formations	13
Remarks	15
Annotated taxonomic list	16
Late Albian to Early Eocene	47
Geologic-stratigraphic background	47
Previous studies in Trinidad	49
Source of the Trinidad material	50
Composition of the fauna	52
Comparisons with other areas	55
Biostratigraphy	56
Paleoecology	58
Sample list	63
Annotated taxonomic list	65
Late Early Eocene to Middle Miocene	229
Introduction	229
The annotated taxonomic list for Trinidad is combined with those from Venezuela (Falcon) and Barbados beginning on page 323	
Venezuela	
Introduction	261
Early Cretaceous of eastern Venezuela	265
Introduction	265

The Early Cretaceous formations	266	Barbados	
Remarks on the occurrence and distribution of benthic and planktic foraminifera in the Early Cretaceous of eastern Venezuela and Trinidad, and the zones based on them	267	Introduction	311
Oligocene and Miocene of eastern Venezuela	273	Middle Eocene to base Miocene	313
Review of foraminiferal investigations	273	The annotated taxonomic lists for Barbados are combined with those from Trinidad and Venezuela (Falcon) beginning on p. 323	
The Falcon Basin	277	Annotated taxonomic list of late Early Eocene to Middle Miocene benthic foraminifera of Trinidad, Venezuela (Falcon), and Barbados	
Introduction	277	Introductory remarks	323
Eastern Falcon	278	Agglutinated taxa	324
Central Falcon	283	Calcareous non-trochospiral taxa	330
The annotated taxonomic list for eastern and central Falcon is combined with those from Trinidad and Barbados beginning on p. 323		Calcareous trochospiral taxa	360
The Maracaibo Basin	305	References	381
Introduction	305	Index	393
The Late Cretaceous to Miocene formations	307		

Illustrations

1	Map of the southern Caribbean region	2
2	Correlation of Cretaceous formations of Trinidad and Venezuela with planktic foraminiferal and calcareous nannofossil zones	6
3	Correlation of Tertiary formations of Trinidad, Venezuela and Barbados with planktic foraminiferal and calcareous nannofossil zones	8
4	Map of Trinidad showing type localities of Early Cretaceous foraminiferal zones	14
5	Distribution of selected benthic foraminifera in the Early Cretaceous of Trinidad (illustrated on Figs. 6–11)	34
6–11	Illustrations of selected benthic foraminifera from the Early Cretaceous of Trinidad	36–46
12	Late Albian to Early Eocene biostratigraphy: ages, planktic foraminiferal zones and formations	48
13	Map of Trinidad showing the Late Albian to Early Eocene sample localities	51
14	Frequency distribution of benthic foraminiferal taxa in the Late Albian to Early Eocene of Trinidad	57
15	Stratigraphic distribution of selected taxa (part 1): species and subspecies from Trinidad that are restricted to the Cretaceous	59
16	Stratigraphic distribution of selected taxa (part 2): species and subspecies from Trinidad that	60

	occur mostly in the latest Cretaceous and the Paleocene		the Serrania del Interior, eastern Venezuela	
17	Stratigraphic distribution of selected taxa (part 3): species and subspecies from Trinidad that are found mainly in the latest Cretaceous and the Early Tertiary	61	70	Map of Falcon showing basin boundaries and study areas 278
18–47	Illustrations of Trinidad Albian to Early Eocene benthic foraminifera	168–227	71	Agua Salada Group, southeastern Falcon: proposed ages, stratigraphic units, zonal schemes based on benthic and planktic foraminifera and calcareous nannofossils 280
48	Map of Trinidad showing late Early Eocene to Middle Miocene type localities	231	72	Correlations of formations in southeastern, northeastern, central and northcentral Falcon with the planktic foraminiferal zonal scheme 284
49	Correlation of late Early Eocene to Middle Miocene formations of Trinidad with planktic foraminiferal zonal schemes	232	73	Distribution in southeastern Falcon of Miocene species of the genera <i>Bolivina</i> , <i>Bulimina</i> , <i>Uvigerina</i> , <i>Rectuvigerina</i> , <i>Siphogenerina</i> and calcareous trochospiral species (illustrated on Figs. 78–80) 286–7
50	Distribution in Trinidad of late Early Eocene to Middle Miocene species of the genera <i>Bolivina</i> , <i>Bulimina</i> , <i>Uvigerina</i> , <i>Rectuvigerina</i> , <i>Siphogenerina</i> (illustrated on Figs. 53 and 54)	233	74	Distribution in southeastern Falcon of Miocene species of the genera <i>Textularia</i> , <i>Lenticulina</i> , <i>Nodosaria</i> and selected agglutinated and calcareous species (illustrated on Figs. 76, 77, 80) 288–9
51	Distribution in Trinidad of late Early Eocene to Middle Miocene calcareous trochospiral species (illustrated on Figs. 55–61)	234	75	Distribution in central Falcon of Middle Oligocene to Early Miocene species of the genera <i>Bolivina</i> , <i>Buliminia</i> , <i>Uvigerina</i> , <i>Siphogenerina</i> and selected other benthic species (illustrated on Fig. 81) 290
52	Distribution in Trinidad of additional late Early Eocene to Middle Miocene species (illustrated on Figs. 62 and 63)	235	76–80	Illustrations of benthic species from the Miocene Agua Salada Formation, southeastern Falcon 292–301
53–64	Illustrations of selected Trinidad late Early Eocene to Middle Miocene benthic foraminifera	236–59	81	Illustrations of Middle Oligocene to Early Miocene benthic foraminifera from central Falcon 302–3
65	Map showing areas discussed in eastern and western Venezuela	262	82	Locality map of the Maracaibo Basin 306
66	Transects 3–6 through the Early Cretaceous of the Serrania del Interior, eastern Venezuela	266	83	Correlation of age, stages and formations/members of benthic and planktic foraminiferal zones in the Lake Maracaibo area 308
67	Correlation of Barremian to Cenomanian zonal schemes based on planktic and benthic foraminifera and ammonites with formations in the Serrania del Interior, eastern Venezuela	267	84	Correlation of age, stages, formations/members of Late Cretaceous benthic and planktic foraminiferal zones in the Colon
68	Distribution in eastern Venezuela of Early Cretaceous Barremian to Albian benthic foraminifera	268–9		
69	Map showing type localities of Tertiary formations and areas studied in the southern foothills of	274		

Cambridge University Press

0521022533 - Benthic Foraminiferal Biostratigraphy of the South Caribbean Region

Hans M. Bolli, Jean-Pierre Beckmann and John B. Saunders

Frontmatter

[More information](#)*List of Illustrations*

xi

	district, southwest of Lake Maracaibo (Rosario, Los Manueles, Campo Tarra)		87	Illustrations of selected benthic foraminifera from the Oceanic Formation of Barbados	316–17
85	Map of Barbados showing location of stratigraphic sections	312	88–89	Illustrations of Eocene–Oligocene calcareous benthic trochospiral foraminifera from the Oceanic Formation of Barbados	318–21
86	Distribution of selected Eocene to Oligocene benthic foraminifera from the Oceanic Formation of Barbados	314			