FORAMINIFERA AND THEIR APPLICATIONS

The abundance and diversity of Foraminifera ('forams') make them uniquely useful in studies of modern marine environments and the ancient rock record, and for key applications in palaeoecology and biostratigraphy for the oil industry. In a one-stop resource, this book provides a state-of-the-art overview of all aspects of pure and applied foram studies.

Building from introductory chapters on the history of foraminiferal research, and research methods, the book then takes the reader through biology, ecology, palaeoecology, biostratigraphy and sequence stratigraphy. This is followed by key chapters detailing practical applications of forams in petroleum geology, mineral geology, engineering geology, environmental science and archaeology. All applications are fully supported by numerous case studies selected from around the world, providing a wealth of real-world data. The book also combines lavish illustrations, including over 70 stunning original picture-diagrams of Foraminifera, with comprehensive references for further reading, and online data tables providing additional information on hundreds of foram families and species.

Accessible and practical, this is a vital resource for graduate students, academic micropalaeontologists, and professionals across all disciplines and industry settings that make use of foram studies.

ROBERT WYNN JONES has 30 years' experience working as a foraminiferal micropalaeontologist and biostratigrapher in the oil industry, from gaining his Ph.D. in 1982, until his recent retirement from BG Group PLC. Throughout his career, he also maintained an active interest in academic research, producing over one hundred publications, which include seven books, among them *Applied Palaeontology* (Cambridge, 2006) and *Applications in Palaeontology: Techniques and Case Studies* (Cambridge, 2011). Dr Jones is also the author of a book on the history of London, and is an Honorary Scientific Associate of the Natural History Museum in London.

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CAMBRIDGE
UNIVERSITY PRESS

Shaftesbury Road, Cambridge CB2 8EA, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India

103 Penang Road, #05–06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

We share the University's mission to contribute to society through the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org
Information on this title: www.cambridge.org/9781107036406

First published 2014

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

ISBN 978-1-107-03640-6 Hardback

Additional resources for this publication at www.cambridge.org/foraminifera

Dedicated to John Haynes and John Whittaker,
and to the memory of Fred Banner

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Preface

What, if anything, are Foraminifera?

This is a question that I am often asked. I tend to try to keep my answer simple, so as to be as comprehensible as possible to the layman. I say that they are single-celled organisms similar to *Amoebae*, but differing in possessing shells.

Why should I care?

This is another question that I am often asked in one form or another (such as 'So what?'), usually immediately after I have given my answer to the previous one. I say: on account of their numerical importance in modern environments and in the ancient rock record; and of their practical importance to Science and to Humankind, in developing an understanding of modern environments and of the ancient rock record.

Importance of Foraminifera

The number of nominal living species of Foraminifera, including synonyms, has been estimated to be at least 6000 (Jones, 1994, based on a count of those in the Ellis & Messina Catalogue), and could be considerably more (Pawlowski *et al*., 2003a; Murray, 2007; Lipps & Finger, 2010; Pawlowski *et al*., 2010; Pignatti *et al.*, 2010). The total number of fossil and living species, again including synonyms, has been estimated to be at least 38 000. Foraminifera have been estimated to constitute approximately 2% of all the animals, or animal-like organisms, known from the Cambrian–Recent, and 38% of the animal-like protists or 'protozoans' (Boltovskoy & Wright, 1976).

As individuals as opposed to species, Foraminifera are common in all modern and ancient marine environments, such that their study has been, and continues to

be, central to a number of branches of natural science, including biology, ecology, oceanography, geology and palaeontology. It is perhaps as fossils that they are best known, and that they have been, and continue to be, most useful to Science and to Humankind. Fossil Foraminifera are sufficiently common throughout the rock record as to have proved particularly invaluable in the science of stratigraphic palaeontology, or biostratigraphy, and in palaeoenvironmental interpretation, both in academia and in industry, for example in petroleum, mineral and engineering geology. Some, so-called larger benthic Foraminifera or LBFs, are sufficiently large as well as common in parts of the rock record as to be rock-forming, and even, locally, reservoir-forming!

Books on Foraminifera

There have been a large number of previous books on Foraminifera, including, for example, those of Loeblich & Tappan (1964), Murray (1973), Boltovskoy & Wright (1976), Haynes (1981), Bolli *et al*. (1985), van Morkhoven *et al*. (1986), Loeblich & Tappan (1987), Murray (1991), Sen Gupta (1999) and Murray (2006). These books each cover one or two of the key aspects of biology, morphology and classification; ecology; palaeobiology or palaeoecology; biostratigraphy; sequence stratigraphy; and applications. This book covers all aspects, although it focuses on applications, and contains numerous case studies of applications, in petroleum geology, mineral geology, engineering geology, environmental science and archaeology.

Acknowledgements

My sincere thanks are due to Cambridge University Press, the Geological Society, and the Grzybowski Foundation, for providing permission to reproduce copyrighted figures.

To Laura Clark, Abigail Jones, and their colleagues at CUP, and the copy-editor, Zoë Lewin, for seeing the project through to publication.

To Hildegard von Bingen, Antonella de Caserta, Pablo Bruna, Pietro Nardini, Yevstigney Fomin, Benjamin Carr, Ion Ivanovici, Ricardo Castro, Ture Rangstrom, Harry Partch, Daniel Jones, Avner Dorman and Yanni, for their musical inspiration – and to my prospective daughter-in-law Jess for putting me on to them!

And last, but not least, to my wife Heather and sons Wynn and Gethin, for putting up with me for so long!