
PREFACE

Some 150 years ago, in 1859, Charles Darwin was greatly puzzled by a seeming absence of animal fossils in rocks older than the Cambrian period. He drew attention to a veritable Lost World that was later found to have spanned more than eighty per cent of Earth history. This book tells the story of his lost world, and of the quest to rescue its hidden history from the fossil record.

Intriguingly, such a quest did not really begin until 1958, some hundred years after Darwin. Why did an understanding take so long? Arguably it was because it was, and still remains, a very big and very difficult problem. Its study now involves the whole of the natural sciences. Progress has been a matter of slow attrition. For most of this time, for example, there has been no concept of the vast duration of Precambrian time, nor any evidence for a distinct biota.

This book follows the story of my own research history, beginning with a cruise as Ship's Naturalist on *HMS Fawn* studying Caribbean marine ecosystems. Like my own researches, it then pushes ever further backwards through time, from an inquisition into the nature of the Cambrian explosion and the enigmatic Ediacara biota some 600 to 500 million years ago, towards the

emergence of the earliest complex cells some 1000 million years back. Each step backwards in time has drawn me towards ever more remote and little known parts of the planetary landscape, and towards equally puzzling parts of the human mental landscape. I have therefore sought, in each chapter, to put some of the major questions into context by descriptions of premier field locations from around the world, enlivened by descriptions of their fossils, their fossil hunters, and their puzzles.

My hope is that the book will show just how rich and diverse have been our ways of thinking about the earliest life forms, written in words that can hopefully be read with ease and enjoyment. Good science is, after all, not just about facts. It should be a form of play. If a thing is not playful, it is probably not good science. Each generation has therefore come up with its own favourite solution to the question—*whence cometh life?*—only to watch it fall as the next generation of science and scientists has arrived on the scene and found even better solutions. Deep down, my hope is that the book will show how my subject works as a science, how the questions are being shaped, and how the early fossil record of animal life may yet be decoded, bringing the world of ancient and modern life right to the doorstep of all those who are curious and wish to learn about the rich history of life beneath their feet.

Here, then, is your passport to becoming a Time Traveller, and to making your own exciting discoveries about the world in which we really live. The fossil record is your best guide for decoding pattern and process and the meaning of life. And the starting point for the reading of patterns is your own natural curiosity spiced with a modicum of *doubt*. Happily, science is a uniquely valuable system for the measurement of doubt.

As my colleague Andy Knoll at Harvard has so rightly put it: 'science is a richly social endeavour.' Nothing in science would be possible without the support of a network of friends and colleagues. I here express my deep gratitude to the following fine teachers and mentors for encouraging my involvement in a lifetime's research into early life, roughly from the 1960s onward: John Dewey, Tony Barber, Bill Smith, Martin Glaessner, Perce Allen, Roland Goldring, Stewart McKerrow, Françoise and Max Debrenne, Michael House, John Cowie, Peter Cook, John Shergold, and Stephen Moorbath. I thank my colleagues Jonathan Antcliffe and Latha Menon for acting as major catalysts for this popular (or possibly unpopular) account and for giving me greatly appreciated advice upon the written word. The following geologists from around the world are here lauded for their invaluable assistance during field work, often in remote and hostile places, followed up by laboratory work, over four decades: Owen Green for his kind support in field and lab, and for running the Palaeobiology Labs at Oxford; my extended family of students and protégés including Duncan McIlroy, Graham Shields, Louise Purton, Gretta McCarron, David Wacey, Jonathan Leather, Zhou Chuanming, Nicola McLoughlin, Jon Antcliffe, Maia Schweizer, Richard Callow, Alexander Liu, Leila Battison, and Latha Menon for so many years of lively and fruitful discussion in field, lab and pub; and the following for their much valued support and friendship in the field: Alexei Rozanov, Andrei Zhuravlev, and Vsevelod Khomentovsky in Siberia and Mongolia from 1990 to 1993; Xiang Liwen, Xing Yusheng, Yue Zhao, Jiang Zhiwen, Luo Huilin, He Tinggui, and Sun Weiguo in China from 1986 to 2007; Lena Zhegallo, D. Dorjnamjaa, Bat-Ireedui, Rachael Wood, Simon Conway Morris, and Stefan Bengtson in Mongolia from 1991 to 1993; Dhiraj Banerjee in India in 1990 and Pratap Singh for the

donation of key Tal material; Joachim Amthor, Salim El Maskery, Philip Allen, and John Grotzinger in Oman; Petroleum Development Oman and the staff of Shell International for their generous support of Oman field work from 1994 to 2000; Philip Allen and John Grotzinger for showing me how to be a Precambrian sedimentologist; Bahaeddin Hamdi for generous provision of Iran samples and field notes; Eladio Liñan, Antonio Perejon, and Miguel-Angel de San José in Spain from 1978; Trevor Ford, Helen Boynton, Mike Harrison, Lady Martin, Mike Howe, John Carney, and numerous other kind people for their support of fieldwork in England and Wales at various times since 1965; Michael and Alison Lewis for making their Welsh farmhouse a home to Cambrian fieldwork over many decades; Mike Anderson, Ed Landing, Guy Narbonne, Caas van Staal, Bob Dalrymple, and Duncan McIlroy for major help with fieldwork in Newfoundland and Nova Scotia since 1987; John Hanchar and his team at Memorial University in Newfoundland for their encouragement and support; John Lindsay of NASA and Cris Stoakes in Perth for their enormous enthusiasm and encouragement and greatly valued companionship and hospitality during fieldwork across Australia from 1998 to 2006; Jim Gehling, Dave McKirdy, Richard Jenkins, and Pierre Kruse for their guidance and hospitality in the Adelaide and Darwin regions of Australia in 1998. There are, alas, very many other friends, colleagues and early teachers not mentioned by name in this list, and I sincerely hope they will accept my thanks for their undoubted contributions here.

Last of all, I wish to thank my dear, and now departed, Mum and Dad for helping to imbue in me a great love for nature, the planet and the past beneath my feet; my wife and dear companion Cecilia for her unstinting help with fieldwork in Sweden, Norway, Spain, England, Wales, and Scotland over three decades, and for being a

perfect 'geology widow' for several months of each year; and our children Matthew, Alex, and Zoe for their lively wit and enthusiasm during those many holidays spent on the rocks in Islay, Jura, Assynt, and the Dordogne. This book would not have been possible without their constant support and encouragement.

Oxford
July 2008
 M.D.B.