

The first billion years of life on Earth

Malcolm Walter

There is only one known example of life in the Universe: life on Earth. Everything we know about life is based on a sample of one. Just imagine what we might learn if we found even one other example. That search is the stuff of astrobiology. The search is based on predictions we can make based on our sample of one.

How and when did life start here? The answers lie in the fossil record and also in what we can deduce from the genetics and chemistry of current life. I'm going to concentrate on the fossils. Immediately we have two major problems. The further we go back in time the fewer rocks we have to preserve fossils, because over time rocks get recycled by plate tectonics (continental drift). Secondly, we are dealing with microbes, not creatures with shells or bones that are readily preserved.

It just happens by an accident of geological history that the best record of early life is found in the Pilbara region of Western Australia, in rocks 3.5 to 2.7 billion years old. But the Earth is 4.56 billion years old. So what happened in the first billion years? That first billion, and the next, determined all subsequent evolution. Our ancestors were microbes, and most of the cells in our bodies still are. That is our model for life in the Universe.

Malcolm Walter is Professor of Astrobiology at the University of New South Wales, Australia. He is the Founding Director of the Australian Centre for Astrobiology. He has worked for 50 years on the geological evidence of early life on Earth, including the earliest convincing evidence of life. During 1999 his book "The Search for Life on Mars" was published by Allen & Unwin. He has published more than 130 articles and several other books. In 2004 he was elected a Fellow of the Australian Academy of Science, and in 2005 he was made a Fellow on the Geological Society of Australia.