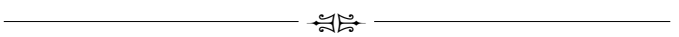
The Dating Game

One Man's Search for the Age of the Earth

CHERRY LEWIS



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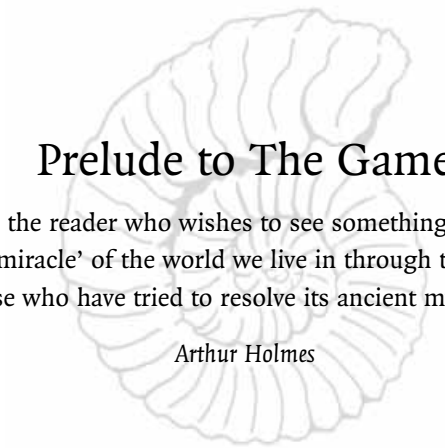

Prelude to The Game

To the reader who wishes to see something of the
'wild miracle' of the world we live in through the eyes of
those who have tried to resolve its ancient mysteries.

Arthur Holmes

I have always been a collector. I blame my parents. As very small children my sisters and I would be taken on warm sunny afternoons to the beach we overlooked from our house in Devon. Hours would be spent sifting through the sand and debris hunting for shells, the prize of which was the cowry. Rare and elusive, not much bigger than my thumb nail, the exotic, white-lipped and pink-backed shell, sometimes dotted with brown spots and sometimes not, was the greatest treasure on the beach. Somewhere in the attic a boxful of cowries awaits my retirement when I shall use them to make shell pictures and decorate little wooden boxes. These I shall give to my grandchildren for Christmas who will give me a kiss then hide them in a cupboard with embarrassment: 'Oh, it was just something Granny made.'

From then on I was addicted. I walked around with my eyes on the ground just in case I missed some treasure – an unusual stone, a rare wild flower, a pretty feather, a sixpenny bit; nothing was overlooked and I collected it all. Aged eight and we were living in Iraq. We went for walks on the edge of the desert and one day I picked up a crimson stone. On the polished face a 'C'

was clearly etched in orange. C for Cherry – my stone. 'God must have put it there for you to find,' my mother said. But I wasn't sure about God, so I held the stone in one hand and stretched out both arms before me. 'If there is a God', I told him telepathically, 'knock the hand holding the stone'. I waited and waited but nothing happened, he didn't knock my hand or smite me down for my blasphemy, but when I got home I couldn't find the stone. I had held it in my hand all the way back, and now suddenly it wasn't there anymore. I can feel the bitter disappointment even now. Where had it gone? Had God spirited it away to teach me a lesson? It seemed likely, it would be just like him. But that stone remained in my heart.

With my nose to the ground it didn't take long before I discovered fossils. My favourites were ammonites, the ribbed, tight, spiral whirls that came in such incredible shapes and sizes. Some would be coated in glistening cubes of fool's gold; some cracked open to reveal secret chambers filled with shimmering crystals; others as solid as stone had beautiful, fern-like patterns etched all over them. A few were enormous – three feet across. Occasionally a complete one just lay there waiting to be picked up, but usually I spent hours chipping and scratching away at the mud in the hope of revealing a jewel.

My geography teacher liked fossils too. He would take us out on field trips and explain that ammonites were the remains of squid-like creatures that had floated about in the warm shallow sea that covered southern England in Jurassic times, about 180 million years ago. Dinosaurs had roamed there too, but somehow they didn't interest me much, those huge lumbering giants that have excited so many. Much more enticing were discoveries at low tide of flattened, almost paper-thin ammonites, wet and iridescent, all colours of the rainbow. The mud they were buried in was so fine that it had preserved the original mother-of-pearl-like material their shells were made of, instead of turning it to stone. So those warm tropical seas had been full of colour even then, just like they are today. I put an ammonite

on a chain and wore it around my neck, impressing my friends with its '180 million years'. But how did I know how old it was? Well my teacher told me of course, and so it just was.

Years later I became a geologist. Standing in a white, sterile laboratory I held in my hands cold, hard rocks that would reveal to me the secrets of the Himalayas – how long had they been there, why were they so high, how fast were they growing? Locked up within the tiny crystals that made up the rock were the answers I sought, I only had to reach in and prize them free. Measuring time in millions and even billions of years became routine, much like a banker gets used to dealing in millions of pounds, and an astronomer in millions of light years. By then I understood how to date a rock and why it is important to know, but not once had I ever thought to ask 'who?'. Who had shown the way? Who had dated the very first rock, and how had they done it?

Robert Shackleton, Professor of Geology and nephew of the great explorer Ernest Shackleton, was retiring. At 76 he had led our expedition to Tibet, striding up and down mountains at 15 000 feet when I could barely walk at that altitude, but now it was time he took things a bit easier. As he cleared his office he placed a large pile of unwanted papers on my desk. It was the last thing I needed, out-of-date papers, but I thanked him anyway. Distractedly I glanced through them and noted half a dozen signed by the author, a certain Arthur Holmes of whom, I admit, I had not heard. Perhaps it was the title that made me open up *The Age of the Earth*; perhaps it was the date '1913' that intrigued me. Whatever it was I started to read and was instantly captivated. It was then I found out 'who'.

Time is crucial to us all; in this frenetic world we live in we have a constant need to refer our lives to a time scale we understand, and for most of us today that scale is the twenty-four hour clock

we wear on our wrists. At the end of the nineteenth century, however, geologists, biologists, physicists and astronomers were looking for another clock that would provide an answer to one of the greatest Time problems of all: How old is the Earth? Ingenious methods for measuring it were proposed but few came close to the truth because no accurate scale had been developed to quantify geological time.

At that time, understanding geology was like understanding history, but without the dates. Imagine history without any dates: you know that the Romans invaded Britain prior to the First World War, but you have no idea when – was it two million, two thousand or only two years before? You know that Kennedy was shot after the Second World War, but again, you don't know how long after. And when were those wars anyway? Without a scale of time there would be no way of knowing. With no dates you can only understand the order in which historical events happened, but not *when* they happened. Such was geology at the beginning of the twentieth century: history without any dates. How old were the first fossils, the first birds, first trees, and all those enormous dinosaurs? No one had any idea. All they knew was that the ones at the top were younger than the ones at the bottom, because that was the order in which the rocks were laid down: slowly and gradually one of top of another, so the oldest had to be at the bottom. Other than that there was no scale with which to measure geological time.

So why is it important to know the age of the Earth? What difference does it make to our lives? Stephen Hawking explains it well:

ever since the dawn of civilisation, people have not been content to see events as unconnected and inexplicable. They have craved an understanding of the underlying order in the world . . . our goal is nothing less than a complete description of the universe we live in.

By knowing the age of Earth rocks, Moon rocks and rocks from other planets we contribute to that 'complete description' and are more able to understand our place in the order of things,

our relationship to other celestial bodies. It helps us to navigate our way around the Universe and to build up a picture of why we are here at all.

But it is not just finding our place in the heavens when dating rocks comes into its own. In the mid-1960s our ability to determine very precisely the age of certain rocks found on the ocean floor became a 'Eureka' moment in the history of science which, within a couple of years, led to the confirmation of the 'Theory of Plate Tectonics'. This theory now ranks as one of the great unifying theories of all time, alongside Darwin's theory on the Origin of Species and Einstein's General Theory of Relativity, explaining as it does just about every natural process that we ever observe on this Earth. But, as we shall see, without the ability to date rocks, we might still be in a position of speculation regarding this theory.

Today we state with authority that the Earth is four and a half billion years old, and some say with great confidence that '65 million years ago' an enormous meteorite collided with the Earth wiping out those dinosaurs and most of life. But how do we know those dates? How do we count all those years?

If you ask most people how geologists date the age of the Earth they will think for a bit, remember the Turin Shroud, and invariably answer 'carbon dating'. Not so. Carbon is the archaeologist's clock and can only be used to date things that are less than fifty thousand years old, which is of little use to the geologist. No, geologists have their own clock. It is made of uranium and lead, and has been ticking away ever since the Earth was formed in a nebulous cloud of dust. In order to find out how long ago that was, all we had to do was learn how to tell the time using this special clock. But first we had to find the clock.

For nearly 50 years the English scientist, Arthur Holmes (1890–1965) pursued these goals almost single-handedly. Indeed, so intertwined is the life of Arthur Holmes with his search for a geological clock and the age of the Earth that it is

impossible to separate the two, thus the story of one becomes a biography of the other.

So, now let me introduce you to the players in the Dating Game, but before I do I should perhaps warn you: wild miracles occur throughout this book. Some are easy, some are hard, but they all require a little thought. Be brave.