

INTRODUCTION

*Time present and time past
Are both perhaps present in time future,
And time future contained in time past*

THOMAS STEARNS ELIOT (1888–1965)

Time is one of the greatest of all our obsessions. Why? In many ways, it's a complete paradox. After all, time has no physical basis. We can't feel or touch it. Yet there's almost a sense that we can see it. From as soon as we can remember, we become aware that 'time flies' and 'time is money'. We religiously follow the movement of the hands on a clock; we allow time to dictate our lives. And no matter how hard we try, most of us just don't have enough of it.

Unfortunately, we really can't ignore the unrelenting tick of the clock. Even a hermit living in the back of beyond isn't immune to its effects. Surviving the different seasons would force even the most zealous recluse to follow the demands of the clock. Regardless of whether it's a business meeting or the migration of a school of whales, our world runs on time. We simply can't avoid it.

How time is used has always been pretty controversial. The control of something we both love and hate has often been seen as a way of wielding power. When the world's clocks were set relative to Greenwich Mean Time in 1884, competing empires offered alternatives. When the modern Gregorian calendar was developed by the Roman Catholic Church in 1582, it was ignored by Protestant and other religious nations and resulted in organized chaos for several centuries.

Even what might seem to be a safe discussion on the age of our universe has got people into trouble. As recently as 2005, the singer Katie Melua had a top-5 hit single in the UK called

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'Nine Million Bicycles'. One of the verses contained the rather innocent-sounding 'We are 12 billion light years from the edge. That's a guess. No one can ever say it's true'. We shall come back to the age of the universe later but for now let's just say the scientific community was incensed; this age was way off the mark. Interviews were had; a flurry of articles written. An alternative version was created, with the offending lyrics replaced by the less harmonious-sounding 'We are 13.7 billion light years from the edge of the observable universe. That's a good estimate with well-defined error bars. Scientists say it's true, but acknowledge that it may be refined'. Sometimes science and the arts just don't mix.

Fundamentally, we love to know how old things are. Every other day an article appears in a newspaper, on the web or on television, telling us that an archaeological or geological find has been discovered and it's 'x years old'. Big numbers are impressive, so ages regularly get top billing in the press. They grab the imagination. It almost seems that the further back in the past the better. But with this comes quite a bit of confusion. Although the example of Katie Melua and the age of the universe is a pretty small spat in the grand scheme of things, there is a difference of 1.7 billion years between the ages according to the lyrics and science. That's a heck of a long time.

During my scientific career, I've been fascinated by the past and communicating its importance but it does seem that there is an ever-widening gulf between enjoying the benefits of science and understanding it. Numbers are thrown about but it's not often clear how they were calculated. In many ways, this is true of countless branches of science. There's a danger that science is seen as too difficult, too boring. And it's not just the perception of time that's becoming an issue.

Perhaps the single greatest threat to twenty-first-century timekeeping is the pressure to teach 'creation science' in the school science classroom. This is the claim that the first book of the Bible, Genesis, is held to be the literal truth; with the

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most extreme form believing that God created the Earth in six days, just 6000 years ago. Fantastically, it just won't go away, despite all the evidence to the contrary. A recent NBC News poll in the US showed that 44% of adults believed in a literal biblical interpretation for the creation of the world. Clearly it's an idea that strikes a chord. That's fair enough. After all, it is a question of personal choice. Unfortunately, it's not often left to the individual; every now and again, some of its better funded believers gather their support and worryingly try to force their beliefs into school science classes. No one should claim that science has the answer to life, the universe and everything. But because of the way theories are constructed, tested and validated, the whole system is self-correcting.

The key word we hear with creationism is 'belief'. No matter how much science proves otherwise, some creationists still choose to *believe* the world is only 6000 years old. I might *believe* that the world is flat or that little green men live on Mars; should I get a teaching slot alongside electrostatics and gravity? I hope not.

We could argue: why does it matter? After all, the Western world has a good quality of life. Perhaps, but this is dangerously short-sighted. There are many challenges facing our world that urgently need to be sorted out. Massive extinction of the world's fauna and flora and extreme climatic change are just two examples where drastic action is needed by us all. If the Earth is only 6000 years old, many of the past catastrophes, which we will discuss later in the book, could not have happened. Our society is built on democracy but there are politics with time. If government, including educational policy, is hijacked by religious teaching, we're not giving ourselves a chance to learn from past calamities and face future challenges with any sort of confidence. Time gives us the framework to meet these challenges face to face, to manage them, to mollify and perhaps even prevent them happening.

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These are exciting times in archaeology and geology. New techniques open ever-more windows into the past. Over the next 11 chapters, we'll take a look at how dating techniques have helped solve some of the most exciting mysteries of what has gone before: for us, our species and our planet.