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OPINION

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So what came before time?



The sun and its planets condensed 4.55 billion years ago from interstellar gas.

by [Martin Rees](#)

This is the time of year we resolve to use our time better in the time to come. Time is a precious commodity. We can gain or lose it. We can save, spend or waste it. If our crimes are revealed, we risk having to do time.

But to scientists, time is something we can measure. Indeed, astronomy was driven by the need to measure and keep track of time – for the calendar, and for navigation. Clocks have, over the centuries, been the high-tech artefacts of their era. Before there was a reliable calendar – or records or artefacts that could be reliably dated – the past was a fog. But this didn't stop efforts to impose precise chronologies, such as that worked out by James Ussher, Archbishop of Armagh, according to which the world began at 6pm on Saturday October 22, 4004 BC. Right up until 1910, Bibles published by Oxford University Press displayed Ussher's chronology alongside the text.



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In the 19th century, Charles Darwin's genius was to recognise how "natural selection of favoured variations" could have transformed primordial life into the amazing varieties of creatures, now mainly extinct, that have crawled, swum or flown on Earth. In defiance of Ussher (and mindful of supporting evidence from geology), Darwin guessed that evolution was a slow process, requiring not just millions but hundreds of millions of years.

Radioactive dating

Precise radioactive dating now tells us that the sun and its planets condensed 4.55 billion years ago from interstellar gas in a galaxy that is part of a still vaster cosmos, which emerged from a fiery "beginning" that happened 13.8 billion years ago.

What happened before the beginning? On this fundamental question, we cannot do much better than St Augustine in the 5th century. He sidestepped the issue by arguing that time itself was created with the universe. The "genesis event" is in some ways as mysterious to us as it was to St Augustine.

So cosmic history, we now believe, extends not just over Ussher's few thousand years but over billions. Our time-horizons have hugely extended back into the past. But there has been an even greater enlargement in our concept of the future. To our 17th-century forebears, history was nearing its close. Sir Thomas Browne wrote: "The World itself seems in the wane. A greater part of Time is spun than is to come."

Even today, most people think we humans are necessarily the culmination of the evolutionary tree. That hardly seems credible to an astronomer – indeed, we are probably still nearer the beginning than the end. Our sun has got about 6 billion more years before its fuel runs out. It then flares up, engulfing the inner planets. And the expanding universe will continue – perhaps forever – destined to become ever colder, ever emptier. To quote Woody Allen, eternity is very long, especially towards the end.

Anthropocene era

Our cosmic horizons are far more extensive than those of our forebears. We have entered the anthropocene era when one species, ours, can determine the planet's fate. The collective "footprint" of humans on the Earth is heavier than ever; today's decisions on environment and energy resonate centuries ahead. They will determine the fate of the entire biosphere and how future generations live.

In contrast, our planning horizons have shrunk because our lives are changing so fast. The political focus is on the urgent and immediate, and the next election. Medieval cathedrals took a century or more to complete. Now, there are few efforts to plan more than two or three decades ahead – or to build structures that will, as the cathedrals have done, offer inspiration for a millennium.

As an antidote to short-termism, we should welcome the initiative of the California-based Long Now Foundation. In a cavern deep underground in west Texas, it is building a massive clock designed to tick (very slowly) for 10,000 years, programmed to resound with a different chime every hour over that expanse of time. Those who visit it this century will contemplate an artefact built to outlast the cathedrals – and will hope that it will still be ticking a hundred centuries from now, and that this century's legacy is a world that is sustainable rather than devastated.

Lord Rees is the Astronomer Royal

The Telegraph, London

The Telegraph, London

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