

Am I significant in the universe, or just an accident?

Are we alone in the universe? Two metres tall and only lasting about 70 years, can we matter in a universe that is so big and so old, so dark and so cold? Christians, and others, have argued both for and against our uniqueness in space. Surely, say some, God would not have put all his animals and plants on one planet, leaving all others empty. Other people have regarded life-as-we-know-it as unique. Some who are unsympathetic to Christianity claim that if Earth is the only planet of its kind, life must have been an unlikely cosmic accident and cannot have been divinely planned. Others, equally unsympathetic, have maintained that if there *are* other inhabited planets, Earth cannot be special or have been visited by God in the Incarnation (heads I win; tails you lose!).

Whether or not there is a plurality of inhabited worlds, many people feel insignificant when looking up on a clear night. The psalmist, awed by what he saw, said ‘When I consider your heavens, the work of your fingers, the moon and the stars... what is man ...?’. He could have counted about 1,500 stars with the naked eye, if he had bothered. We now know that our home galaxy, the Milky Way, contains about 100,000,000,000 stars. And there are another 100,000,000,000 galaxies each of 100,000,000,000 stars! The numbers are impossible to imagine. The old Wembley Stadium could hold 100,000 people, but it is difficult to picture a million Wembley Stadiums — and that is only the number of stars in one galaxy. What about the other 99,999,999,999 galaxies?

But some 30 years ago it was realised that if the constants of nature, like the gravitational constant, were minutely different, life as we know it could not have arisen. Like the story of Goldilocks in which Baby Bear’s porridge, chair and bed, were ‘just right’, so with these constants. The existence of these ‘cosmic coincidences’ has been dubbed the ‘Goldilocks Effect’, although its more formal name is the Anthropic Cosmological Principle. To estimate just how small the differences in the constants would have to be for life not to have arisen requires a look at how, according to current thinking, we were created:

In 1965, two scientists, Penzias and Wilson were investigating radio signals from space when their experiments were frustrated by persistent radio background interference. It turned out to be a hugely important discovery. It was as if some warm ashes had been found which showed there had been a fire earlier. The ‘fire’ was the Big Bang itself and the ‘warmth’ was actually only 2.7^0 above the lowest possible temperature of -273^0C . This discovery gave strong support for the ‘Big Bang’, which is currently thought to have signalled the beginning of space and time, something which is almost impossible to imagine.

In the Big Bang there is a tug-of-war between the outward explosion and the force of gravity trying to stop it. According to Professor Stephen Hawking

‘If the density of the universe one second after the big bang had been greater by one part in a thousand billion the universe would have recollapsed after ten years. On the other hand, if the density of the universe at that time had been less by the same amount, the universe would have been essentially empty since it was about ten years old.’

Professor Paul Davies theorised that

‘... had the explosion differed in strength at the outset by only one part in 10^{60} [1 followed by 60 noughts!], the universe we now perceive would not exist. To give some meaning to these numbers, suppose you wanted to fire a bullet at a one-inch target on the other side of the observable universe, twenty billion light years away. Your aim would have to be accurate to that same part in 10^{60} .’

The early universe was dominated by energy. From this, within about three minutes, the lightest elements, hydrogen and helium were formed. From these elements, stars developed as gravity brought the unevenly distributed matter together into clumps until there was enough for a star to ‘ignite’. Stars are like controlled hydrogen bombs, gigantic nuclear furnaces in which the collisions of the lighter particles under huge pressures and temperatures fuse them into heavier elements like carbon, nitrogen and oxygen — the elements necessary for life. This process requires a long time — about 15 thousand million years — after which, if the star is big enough, it ends its life in a gigantic explosion which scatters the new elements for life into space — the beginning of us.

If you are romantic you can think of your body as made of ‘star dust’; if you are more prosaic you could consider it as composed of ‘reprocessed nuclear waste’!

All sorts of explanations have been advanced for the Goldilocks Effect. One suggested explanation is the existence of ‘*multiverses*’, among which the constants of our *universe* just happen to be right for life. Another is as a consequence of an earlier inflationary phase in our universe in which the universe rapidly expanded to the size of a grapefruit. The first is at present, to use the jargon, a piece of ‘speculative metaphysics’; while the second simply pushes the question ‘why the Goldilocks Effect’ one stage further back to ‘why were the properties of the early universe such that an early inflationary phase occurred which resulted in the Goldilocks Effect which gave rise to us?’

What does emerge from what has been said is that the claim that we must be insignificant *because* the universe is so huge and ancient, can be stood on its head. Since it takes a long time to make the elements for life, and space is expanding at nearly the speed of light the universe is enormous. Because it expands so rapidly, it is very cold and very dark. If this were not so we could not be here. Christians (and others) can see this as pointing to God taking a lot of time and care in making us and of having a purpose for each of our lives.

A member of *Christians in Science*, Mike Poole is currently Visiting Research Fellow in Science & Religion at King’s College London and is the author of several books and some seventy articles on the topic. A more detailed treatment of the subject of this article appears in Ch. 5 of his (1995) *Beliefs and Values in Science Education*, Buckingham: Open University Press.

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