

Who Am I? From Birth to Earth

An edited transcript of an interview with Dr. Brian Swimme

To understand *who* we are, we need to know where we came from. We need to know something about our birth, which took place 13.7 billion years ago.

Everything has its origin in this moment. We all began in an amazing eruption of light. The Universe began in light. There were also bits of matter around. But they were so miniscule. We were predominately light. Then, as the Universe expanded, it cooled.

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One of the great moments in our birth is the stabilization of matter. The first forms of elementary particles - protons, electrons - began to stabilize. In the middle of this sea of light, the actual components of our bodies emerged. So, to be human is to be an extension of that original energy that emerged mysteriously at the beginning of time.

Since this is the most amazing discovery, in all of modern science, it took awhile for humans to grasp it. A number of physicists were involved, but two of them, Penzias and Wilson, are the ones that actually identified the light from the beginning of time. This was in the 1960s, in New Jersey. Penzias and Wilson were the first ones to actually hear the light from the beginning of time with their radio telescope.

People working in mathematical physics had theorized about the origin of the Universe. But when we had the observational data, it came together with our theories of the Universe and we realized that there was actually a beginning of the Universe. We now had a theory that was empirically grounded. Now it is the common understanding among all scientists that the Universe had its beginning in light 13.7 billion years ago.

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After the elementary particles stabilized, the great moment in the Universe was the formation of the atoms. This took place all at the same time. Not in an instant. But the Universe set about changing itself from one form of matter to another. And so all of the light atoms, of hydrogen and helium, came into existence. Then these atoms began to gather together and form the first stars.

Two hundred million years after the birth of the Universe, the stars come forth. The stars are an amazing event because a star brings together the atoms, and it actually changes them. It changes helium into carbon. It changes hydrogen into helium. And in that change, it transforms the mass of the atoms into light.

So the Universe begins in light. And then it forms these structures - stars - where mass is also transformed into light. This is part of the ongoing evolution of the Universe.

Now, throughout most of history, we had different theories about stars. Sometimes we thought they were gods. Isaac Newton actually thought that each star was a giant campfire. He thought it was wood burning. But it was only in the middle of the twentieth century that we learned of the fusion process that takes place within stars.

One of the things we realized is that stars actually don't live forever. They are not eternal. They have a birth. They have a middle age. And they have a death. The death of a star is an amazing event. Because the star, if it's large enough, will go through a process, in its core, of developing all of the elements in the Universe.

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A star starts off as hydrogen and helium. Then it creates carbon, in its core. And then it creates oxygen. And it creates phosphorus. All of these are being built up over billions of years. Finally the star gets to iron. And iron itself cannot burn. So the star is no longer able to hold back its gravitational collapse. In an amazing moment, an entire star collapses down to a point in just over a second.

This collapse, and explosive rebound, is called a supernova. What happens in the rebound is what is so amazing. All of the elements that had been created in the star are now dispersed out into the galaxy where they can gather together again into new stars.

So we, all of us, come out of the explosion of a star. Because the carbon of our bodies, for instance, could not be created in the Universe except through this process of a star fusing its elements. So we are composed, then, of the sacrifice of the star.

To make a single atom of carbon, an entire star had to be destroyed. It is one of the deepest mysteries in the Universe itself.

So what does it mean to be human? Who are we? In terms of the Universe, we are a later phase of a transformational process that requires enormous sacrifice, and yet gives birth to the possibilities for new complexity to emerge. We are the human phase of that. Just as we see what the star has given birth to, we participate in that process with a sense of mystery concerning what we can give birth to.