

Cosmic Karma

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Introduction

We live, we die, and in between we wonder: what does it all mean? This paper is a reflection on the circle of life from both a scientific and spiritual lens. Rather than invoking blind faith, we explore connections between physics, ecology, and the human experience. We'll examine how life likely began, what's left over when it ends, and how our actions ripple through space and time - a grounded take on karma. Ultimately, we'll consider the fate of our great civilization and why we may be alone in the cosmos. The goal isn't to answer everything, but to offer an eternal meaning to our lives that doesn't need heaven to be holy.

The Origins of Life

"The universe is not fine-tuned for life; life is fine-tuned to the universe." - Sean Carroll

In the beginning, or at least as far back as we can observe, a singularity gave way to the Big Bang, expanding space, time, and matter into existence. Roughly ten billion years later, our planet formed and took orbit in the goldilocks zone of our Sun (one of approximately 50 billion similar stars in the Milky Way Galaxy alone). Over time, an (apparently) unique chain of events took place on Earth. Volcanic activity gave rise to hydrothermal vents on the ocean floor brewing the primordial soup of reactive chemicals to create the first RNA, and eventually give rise to nucleotides. From chemistry rose biology and emerged a self-correcting algorithm, evolution - optimizing for survivability through mutation and selection, sculpting ever more resilient forms of life. Unicellular organisms grew multicellular, evolving into vertebrates, to land based mammals, and bipedal primates (walking upright), to homo habilis (using tools), homo erectus (mastering fire), and finally you and I, the distinct apex species of all known life forms in the universe: Homo Sapiens.

While the actual dance of chance and chemistry remains unfathomably complex, surely leaving room for a divine chemist to carefully assemble the building blocks, I have always prioritized an understanding of the nature I can see over belief in the miracles I cannot.

Chirality and the Shape of Life

"Life is left-handed." – Graham Cairns-Smith

Life is not only built from atoms, but from molecules whose shapes matter. Many biological molecules, like amino acids and sugars, are **chiral** - meaning they can exist in two mirror-image forms, like left and right hands. In principle, chemistry shouldn't mind which of these equal but opposite versions is available. Yet in all known life, amino acids are exclusively left-handed, and sugars are right-handed. If this symmetry were different, proteins might not fold correctly, DNA might not coil stably, and the delicate machinery of biology could collapse. The mystery is why one "hand" was chosen in the first place. Perhaps chance crystallized life's handedness billions of years ago. Or perhaps universal asymmetries, like the tiny imbalance in the weak nuclear force, which itself violates mirror symmetry, nudged chemistry in a particular direction. In either

case, chirality shows how life is tuned not only to the broad constants of physics, but to the subtle quirks in the universe's design. What looks like a mere molecular preference becomes the very foundation of complexity, a reminder that our very existence depends on details as small as the twist of a single molecule. As small as we may be relative to the vastness of our universe, our lives and the influence they carry matter deeply.

The Energy Chain: Death as the Fuel of Life

"The atoms that make up your body were once part of ancient stars. In that sense, you are eternal." – Lawrence Krauss

The Amazon exhales moisture that rains down in Africa, a lifeline for animals waiting in the dry expanse of the Sahara. Dust from that same desert fertilizes the Atlantic, feeding blooms of microscopic life in the sea. Those tiny organisms, invisible to the eye, become food for the largest animal on Earth: the blue whale. Life doesn't respect borders - it drifts, flows, and cycles across the planet. And before any of it began, comets traveled from the outer reaches of the solar system or beyond, to seed Earth with water and carbon, delivering the raw ingredients that make every ocean and forest possible. We're part of a system that's always been global, and before that, galactic - stitched together by currents, collisions, and cosmic handoffs.

What happens when we die? Religions offer answers involving souls and afterlives, but science gives us a simple empirically eternal truth. When a body decomposes, its atoms re-enter the ecosystem. Your carbon becomes soil. Your phosphorus feeds the roots. Your nitrogen nourishes a tree. Your last breath could be a leafling's first.

The First Law of Thermodynamics tells us energy cannot be created or destroyed. The energy that powered your cells now powers something else. In this way, nothing ever truly dies - it transforms. This is not resurrection or reincarnation in the religious sense, but in a physical, observable one.

Even when the electrochemical sparks of consciousness fire for the last time, the brain's light goes out, and our bodies lay beneath the ground, we become fuel for the mycelial webs beneath the soil. In a final act of connectivity, we pass our matter and energy into a larger, more ancient intelligence - one that spans trees, plants, and entire ecosystems. It's a kind of afterlife, not of spirit, but of structure. A return from a single conscience to the Earth's collective neural network..

Karma as Cause and Effect

"We do not inherit the Earth from our ancestors, we borrow it from our children." – Native American proverb

Karma is often understood as a metaphysical force for justice: do good, receive good. But strip away the mysticism, and karma can be boiled down to cause and effect extended over time and space.

Overfish a species to extinction and entire ecosystems can collapse leaving generations to come with fewer sources of food and stability. Continue burning fossil fuels and runaway reactions could shift global climates, melting ice, raising sea levels, and slowly shrinking the very land masses we call home.

This scientific karma doesn't punish or reward. It simply responds. Our actions echo, sometimes subtly, sometimes catastrophically. Whether we're dealing with an ecosystem, a city, or a civilization, short-sightedness tends to collapse the system. In that sense, being "good", conserving, cooperating, caring, isn't just moral. It's a pragmatic and effective technique to improve the longevity of the human race.

The Great Filter: Self-Destruction

"The fact that humans have come to dominate the Earth... is not necessarily a triumph. It may be a disaster." – David Attenborough

If life is so tenacious, and the universe so vast, then where is everybody? This is the Fermi Paradox, the troubling apparent silence in a universe where intelligent life should be common. One possible answer is the Great Filter: a stage in the evolution of intelligent life that most civilizations fail to pass.

Maybe it's the leap from single-celled life to complex organisms. Maybe it's inventing nuclear weapons. Maybe it's ecological collapse. But the pattern is familiar: when a species gains enough power to alter its world, it comes with a tendency toward destruction.

What if the key to surviving the Great Filter isn't intelligence, but wisdom? A civilization that doesn't first learn to live within its planetary limits may never reach the stars. If karma operates on cosmic timescales, then perhaps civilizations die not by divine punishment, but by their own unchecked greed and excess.

Eternal Meaning in a Temporary Life

"We are finite beings in a universe without end. Our brief flicker of awareness is part of something vast and enduring." – Alan Lightman

Everything is impermanent. Stars burn out. Mountains erode. Species go extinct. But impermanence doesn't cheapen life, it appreciates it. Like a song that ends, or a sunset that fades, life is precious precisely because it is scarce and temporary.

Just as we once believed the Earth was the center of the universe, today we treat life as a straight line: birth, life, death. But the more we learn, the more we see a circle, repeating with revolutions as familiar as our orbit around the sun.

We may not live forever, but the atoms in our bodies have. They've been stars, seas, soil, air, and fire. And they will be again. In that sense, we are eternal - not as individuals, but as participants in a vast, ongoing orbital transformation.

The legacy of a good life might not be written in a holy book or rewarded in an afterlife. It might be in the way your choices echo in the soil you left clean, the forest you didn't burn, and the children you raised well. That is a kind of eternity, rooted not in faith, but in observable truth.

The Beauty of Life

While many constants of physics appear uncannily precise, balanced on knife-edges that allow stars, chemistry, and consciousness to exist, we might consider whether it is life that is fine-tuned to them instead. The gravitational constant, the ratio of proton to electron mass, the speed of light - shift them slightly and the universe as we know it would dissolve. But perhaps this doesn't point to a universe designed for us so much as to our emergence within the narrow crevice of possibility it allowed. Just as water fills the shape of its container, life has adapted itself to the contours of reality, evolving into whatever forms these cosmic equations permitted. What seems like improbable coincidence may simply be inevitability: given these laws, some form of complexity would arise, and eventually, that complexity would look back and marvel at its own improbable existence. By extension, Heaven may not be the place from which you look down upon your grandchildren, but the peace of mind inherited from the continuity of life, connected across time and space by matter, energy, and good will.

After all, we are stardust, arranged briefly into individual consciousness, then scattered into particles again for the next revolution in the circle of life. We need not fear death or worship gods to find meaning. We just need to sew benevolence in the pattern with the conscious impact of our actions. While we may feel small and immaterial in the face of a never-ending universe, mathematically speaking, everything is small relative to infinity, and as the poetic reality of life would have it, the judgement of beauty ever belongs to the beholder.

The End, for now.