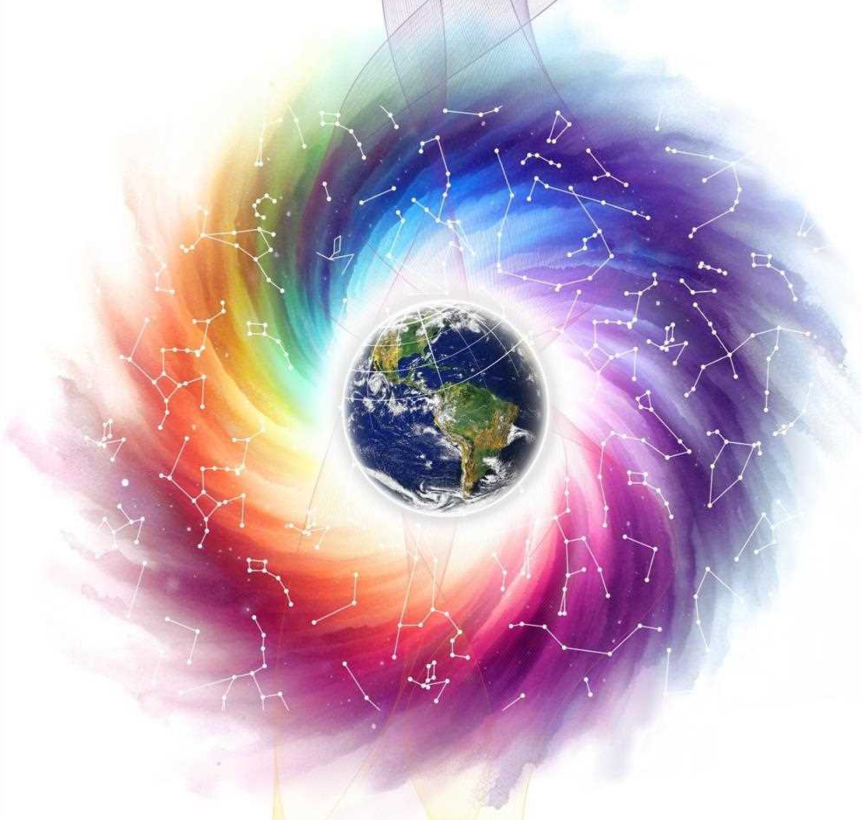
Woo Way



Forest Neff

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Introduction

Our words are whispers in the wind, waves wandering adrift in the space and time between us, each afloat upon the vast, unfathomable seas of consciousness we share. They are spectral wisps of thought and breath, like ghosts in a void. They roll across the sands of time and ripple through our minds like wrinkles in the fabric of our imaginations. The symbols that you see, the characters that cross these pages, are footsteps on the paths that connect us. The concepts and ideas outlined herein are portals between our worlds—reflections on the shared experiences and narratives that drive and shape our lives.

The soul and spirit of a thing is set in its intention and manifest within the content and context that combine to bring it forth from reality and give it form and function. The purpose of this book is to serve as a guide to developing a deeper understanding of ourselves, our fellow humans, and our place in the grand order of things at both the individual and collective levels. Each of us is only a tiny, transient piece of reality, but we are all connected by the wealth we inherit from the natural world and the common threads that interlace within and amongst us, tying us to one another like nodes in a network and weaving our lives and communities together. Some have said that by nature of our smallness and impermanence, we are insignificant. From each of our unique, internal, subjective perspectives and in the view of those who love us, we are anything but that.

I have always had a special love for books and other media that work from the bottom up or the outside in by walking through the sequence of events that brought us to the present moment. I have therefore chosen to open with a brief overview of the history of the universe from the beginning of space and time as we know them to the present moment. I hope this serves to emphasize the broader context of our lives, to bring the modern world into perspective through an appreciation of the myriad causes and conditions that created it, and to set the stage for our exploration into the human condition and our astounding potential by providing a roadmap of the immense cosmic timeline that forms and frames our existence.

Following this synopsis on the evolution of reality, we will hone in on humanity as a whole, including a brief look at the systems and structures we have developed since antiquity. I present my own observations and analysis of modern life, attempting to find a balance between discussing the unique trials and tribulations of our times and the many extraordinary blessings that fill us all with wonder. We then turn to an investigation of the complex lives we live as individuals and the relationships and communities that make them worth living, looking deeply at our own nature and some of the many ways in which we can get to know and live in harmony with ourselves and each other. I hope to provide insights and information that can help us learn to better our own lives, the lives of those around us, and the world we live in.

In addition to an overview of some of the empirical bodies of knowledge and relevant scientific observations that can inform and elucidate the human experience, I have worked to draw attention to bits and pieces of the sustaining wisdom of our predecessors. The myths, stories, and philosophies passed down by our ancestors carry many common themes related to our quests for love, knowledge, meaning, and peaceful, efficacious lives guided by gratitude and grace. I hope that the reader comes away with a broadened perspective and deepened curiosity regarding the nature of our environments and cosmos; systems and institutions; lives and communities; thoughts, beliefs, and behaviors; and other potent and profound aspects of our shared and individual experiences.

Much of this book is about learning to become a better human being. I must confess that to that effect, I have written it mostly for myself. The artist's eye is tuned to the characteristics of his craft and medium, and so I think and write about these ideas to deepen my own experience and understanding of them. Further, I enjoy collecting and reflecting on other people’s observations as I work to make sense of my own life and align my worldview with reality. The writing of this book has been a deeply reflective, often challenging, and regularly rewarding process. In life, growth and change are fundamental and inevitable, and I try to embrace these concepts throughout. I hope that you will find interesting connections between your own life and the information contained herein that cause you to pause and reflect. True insight must come from within, and so it is in how we engage and interact with life, experiences, and information that we grow as individuals.

It should be noted that the Big Bang theory, the standard model of particle physics, evolutionary and molecular biology, the psychoanalytic, behavioral, and cognitive schools of psychology, and other scientific observations and interpretations of reality that we will encounter herein are working based on models that were largely developed in the 20th century. Advancements in all of these fields continue to occur. Part of the beauty of the meticulous, rational, and objective investigation into the nature of reality that is enabled by the scientific method is that we try to limit and test the assumptions we bring to the table and remain prepared to adjust our understanding when presented with new evidence. In a world where our ideas, understandings, tools, and technologies are constantly evolving, we cannot cling too tightly to the treasures in our thinking, as often they are incomplete, and, like ourselves, imperfect and impermanent reflections of deeper underlying phenomena.

I have no PhDs in physics, biology, neuroscience, psychology, sociology, anthropology, philosophy, or religious history. Nor am I a priest, monk, acolyte, advocate, or practitioner of any particular religion or ideology. I hold only a humble associate's degree in the science of psychology. I am, however, a student of these subjects and devoted to a lifelong path of learning, contemplation, and meditation. I have a deep love of knowledge and how it empowers us to make our own lives better, and a will to offer what I can in service to the world. The book that you have in your hands is not meant to be an expert treatise on any of the topics, thoughts, or theories contained herein, but rather a modern mystic's musings on the interconnected nature of reality. While I have worked hard to present information that is factually verifiable and coherent to the most current and complete resources available, some errors and potentially inaccurate representations may remain, the fault for which is my own.

The timelessness and redundancy of some of what we will look at throughout is kind of the point. These are ideas and ideologies that have been extrapolated and re-interpreted in literature and other written works almost ad nauseam. Some of these points are pithy, some profound, but many share a certain universality that has somewhat obviously, if a bit esoterically, borne repeating since times immemorial. To get to know these ideas through the works of others has brought me great joy that I wish to share with you herein. I cannot attempt to approach the breadth and depth of many of the topics we will uncover and investigate in the coming pages within the confines of this volume, but I hope to express some reverence for the interconnectivity of it all. These words are meant as a compendium as much as an analysis.

The many years of research and contemplation that have culminated in the writing of this book were largely an attempt for me to come to terms with myself and the world we live in. I embarked on this quest in an effort to reconcile my relationship with reality after a series of LSD trips in my late adolescence rendered my tether with it somewhat frayed. I have always had an inquisitive mind, and what is laid out before you is the manifestation of that curiosity—a synopsis of my own interpretation of reality. It is a composite of the information I have gleaned from literature, other media, experience, and meditation relating to both specific and holistic interpretations of various phenomena, the human condition, and existence as a whole. Because this book is meant to be a broadscale reflection of my own worldview, it contains a cornucopia of information, and I encourage the reader to consider the many connections and relationships that exist between the various concepts, ideas, and ideologies presented herein.

Question everything. Few things are as simple as they seem. Most are either much simpler or much more complex, often both, in different ways and to varying degrees. This is a book about interconnectivity, relationships, and causality. It is about growth, change, and evolution. It is about the absolute and the abstract. It is about the past, the present and the future. It is about self-reflection and improving ourselves and our relationships. It is about acceptance, gratitude, grace, and love. As you read, I hope that you will ask yourself what this information means to you, how it might affect your life, and what you want to do with it. Our capacity and potential as human beings is built upon our agency and our role as actors on the grand stage of reality; we must actively engage and interact with ideas and phenomena in order to integrate them into our own little worlds. I thoroughly believe that you will get far more out of this book, and any other, if you adorn its pages with marginalia and contemplate the concepts and ideas from your own perspective along the way. There are answers to the questions we ask ourselves that no author or teacher can provide, answers we discover through our own curiosity, introspection, and experience.

Throughout, I have taken the liberty of using metaphors, similes, imagery, and other poetic language, especially to describe certain concepts that some readers may find unfamiliar. This is done in an effort to make this book accessible to the broadest possible demographic. Some of the language contained in this volume is somewhat ornate and erudite, with the intention of offering the reader moment-to-moment opportunities to pause and contemplate the particular and potential meanings, nuances, and implications of specific words and ideas. Still, where applicable, I have also worked to include relatively simple conceptual definitions, examples, and explanations that contribute substantially to informing the context of the subject matter and anywhere they may be useful and interesting. Entire books have been written on many of the minutia found herein, and, in addition to a bibliography pertaining to anything I have quoted, paraphrased, and/or referenced directly, I have provided at the end a list of some of my favorites. What you are reading is intended to be a somewhat concise, deeply contemplative, and functionally cumulative summary of where we come from, who we are, and what we can become.

Much of what you will find within the thoughts, words, and ideas that unfold in the coming pages may well be quite familiar.

Some of it can be called common knowledge and is included primarily to provide context for ideas that may be more abstract or esoteric, or to remind myself and the reader that simple truths often have profound consequences. At many stages throughout the writing of this book, I have attempted to actively apply any practical advice I offer in my own life, mind, and relationships, and to deeply consider the implications of the various concepts and information I present. That process has refined my thinking, and what remains in the book that you are reading was kept and developed because it proved useful, fruitful, engaging, and elucidating. If even one amongst my readers finds herein a reflection of themselves that brings them closer to clarity, compassion, and understanding within the woos, woes, and wonders of their life, I will have done my job.

I bid you safe travels through the wide, wild, world of nature, life, and mind. May love guide you along the way. Woo, thank you.

1: The Story So Far

“Remember:
Matter. How tiny your share of it.
Time. How brief and fleeting your allotment of it.
Fate. How small a role you play in it.”

— *Marcus Aurelius*

Inhale… Exhale… Breathe… In and out. Let your body relax and feel each breath, noticing the pause at either end. Breath is the thread that connects each of us to the tapestry of the infinite, the abstract, the subconscious, and the unknown—into the expansion and contraction of emptiness and totality. It nourishes our bodies like water and food, keeping us alive. With our attention on breathing, our mind's eye can catch a conscious glimpse of an unconscious impulse, to see into our body's core functionality, and into the depths of our minds. Feeling the breath rising and falling tunes us into other latent sensations, tensions, and pleasures. We become aware of the rhythmic pulsing of life, breath, and blood within our skin, veins, muscles, nerves, organs, and bones, existing in harmony with the world around us. Relax your mind and feel into these sensations with each and every breath.

Enlightened as we are by the observations of modern science, we do not yet know how our universe began, or whether or not existence existed prior to it. The first moments of creation are still the subject of much speculation and debate. In the beginning, some have said there was emptiness, a nothingness that was everything and nowhere, timeless and infinitesimally small. Perhaps this prehistory was much like the final contraction of an empty breath, a vacuum pulling inwardly upon itself. Some say that an omnipotent and eternal creator set everything in motion. The question of the composition and content of reality before our universe may be paradoxical in itself, since time, like space, is a measurement of the separation between events in the sequential causality of reality. Stephen Hawking points out in *A Brief History of Time* (1988) that "one may say that time had a beginning at the

Big Bang, in the sense that earlier times simply would not be defined." Others have suggested that perhaps our universe was born out of the collapse of a previous one, or that it is nested within an infinite set of universes, a multiversal collection of cosmic Matryoshka dolls. Still others posit that it could be oscillating back and forth from one end of time to the other like a pendulum or spring. As it stands, the leading theory is that it all started from a singularity, a minuscule composite of immense energy that was both infinitely small and infinitely dense.

Our myriad models of math and physics suggest that what happened next was a moment of becoming, when smallness became bigness, all of a sudden and over a very long time. The almost instantaneous part seems to have consisted of unfolding arrays of energy expanding into and becoming time and space at speeds and in ways that appear both amazing and absurd from our perspective, roughly 14 billion years since the event we now call the Big Bang. In a trillionth of a second, the singularity we envision as the source of reality proceeded to fracture into a multiplicity of growing fields of energy that dispersed themselves into the surrounding nothingness, creating both space and time as they went.

Much of our understanding of the very early universe is based on mathematical extrapolations of the laws that govern the distribution of energy at extremely high temperatures and pressures. Working backward from what we can observe of events that unfolded later in the history of reality, we find evidence that suggests that the unfathomable amount of energy that was released and destined to transform into the material cosmos we know today was once condensed and confined by the limits of spacetime such that it was unimaginably hot and dense. Under such conditions, the very laws we use to investigate, describe, and define interactions of matter and energy begin to break down, and may not be applicable as we understand them. Scientists hold out hope that a Unified Field Theory, a comprehensive model of the relationship between the four fundamental forces, gravity, electromagnetism, and the strong and weak nuclear forces, will eventually allow us to fully comprehend the conception and creation of the universe. In the past few decades, significant progress has been made in this effort. Physicists have been able to establish the functional connections between three of the four fundamental forces—at the time of this writing, only gravity eludes our quest for unification.

Everything is energy, and energy cannot be created or destroyed, it can only transition from one form to another. It is the nature of reality to tend towards balance, and as a result, when energy is concentrated, it either spreads itself out (homogenizes) or collapses inwardly into a new harmonically stable state of equilibrium (aggregates). Within minuscule fractions of a second, energy was everywhere across the early cosmos, turning itself inside out like a fractal maelstrom made up of uncountably many miniature whirlpools, as waves dispersed in an extremely hot, dense, soupy fog. As space and time stretched, spreading out the raw energy of everything, the fundamental forces acting within it evolved, or rather divided and diverged, phasing from unity into discrete diversity. Different types of energy fractured from within a once unified field and separated themselves into distinct layers.

This period of cosmic inflation is fascinating because it appears that, for a brief moment, the universe was expanding faster than the speed of light, the cosmic speed limit that restricts all other known phenomena. This could be an indication of significant gaps in our understanding of this phase of the creation of our universe. It could be that such limits were created by this process itself, or perhaps the energy density at the time simply overpowered the restrictions we observe in reality today. It is also interesting that, according to our models of the inflationary period, the distribution of energy must have been ever so slightly rippled, which we attribute to the probabilistic fluctuations of the energy waves that composed reality at the time. Had it been entirely homogeneous, the relatively denser pockets that later developed into larger structures might not have formed, leaving the universe a perfectly uniform but entirely barren cloud of dispersed energy.

Up until quite recently, the only observations we have been able to make of reality in its infancy and any of the components that likely constituted it have been of light emitted by glowing bodies in the cosmos billions of years ago or reflected off of the objects we observe in laboratories. In fact, light has been the primary medium of most of our investigations into the natural world. Accordingly, physics has taken a special interest in developing a robust and comprehensive understanding of the nature of light itself. We now have devices that can detect other types of waves and particles like electrons, neutrinos, and gravitational waves, but still, our interpretations of the data we collect from such instruments, and the functionality of the instruments themselves, are generally restricted by electromagnetism as we understand it, by the behavior of light.

For centuries, from the time of Isaac Newton up into the early 1900s, physicists debated whether light is a particle or a wave, culminating in what we now call wave-particle duality, the idea that particles are bundles or packets of the waves themselves. As Stephen Hawking puts it, “for some purposes it is helpful to think of particles as waves and for other purposes it is better to think of waves as particles.” This line of thinking, coupled with increasingly detailed observations and models of the behavior of atoms and electrons, set the stage for the field of inquiry that developed into quantum mechanics, which in turn provided us with the Standard Model of particle physics we use to describe the form, function, and behavior of the various fundamental particles that make up the matter and energy we observe in the universe. Quantum physics is so called because it is founded on the observation that, at the atomic scale and below, mass and energy tend to settle themselves into stable configurations in very specific quantities.

Much of the experimental evidence that we use to test our theoretical models of particle physics comes from our observations of high-energy collisions between small bits of matter in particle accelerators like the Large Hadron Collider (LHC) built by CERN, the European Organization for Nuclear Research. Particle accelerators work by speeding up charged particles in a ring of electromagnets to velocities approaching the speed of light and then causing them to collide. These collisions cause the particles to disintegrate into their constituents, which can be observed briefly before they decay into the energy fields in the surrounding space. This is much like smashing two clocks together at very high speeds in order to study the gears that create their functionality, and it is necessary because we have no other reliable way of deconstructing the particles in a stable environment. In 2012, the LHC was able to detect the Higgs boson, a particle thought to elicit mass in other particles, which experience drag as they move through the Higgs field, much as a boat is slowed down by the surface of the water across which it moves. The Higgs boson had been the last of the particles predicted by the Standard Model to elude our attempts at experimental verification.

We use the information we glean from observations of these high-energy collisions and other experiments in quantum mechanics to formulate our understanding of the very early universe. According to our models, the conditions at the time were much more akin in terms of energy density to what we emulate in such experiments than they are to the spaciousness of reality today. Still, these investigations can only provide us with pieces of the puzzle because the very early universe was so energetic that such collisions would have occurred ubiquitously, rather than in isolation. Theoretical physicists are able to develop complex models of what might have occurred during the earliest moments of creation only by applying the mathematics we use to describe such interactions according to our predictions of the immense heat and density of the cosmos immediately following the Big Bang.

Time and space allow for repetition and replication, and reality selects for functionality, primarily the functionality of energetic equilibrium. Repetition leads to the development of patterns, and as these patterns become increasingly prolific, adherence to them becomes a form of functionality. It is possible that the universe evolved as it did because energetically stable configurations established themselves and were selectively replicated, effectively outcompeting less stable arrangements and defining the harmonic conditions that any and all phenomena would need to adhere to. This broad theoretical framework was formally presented in 2023 when a team of philosophers and scientists from the University of Colorado, the Carnegie Institution for Science, the California

Institute of Technology (Caltech), and Cornell University proposed a new physical law describing the behavior of evolving systems which they call "the law of increasing functional information." Basically, it states that systems of all complexities will select for certain, core functionalities like stability, replication, and adaptability.

As spacetime expanded, the temperature cooled enough for vibrating energy to collect itself into particles—tiny, individual, distinct bits, like nodes on the waves that carried them—and to do so en masse, uncountably many times. According to quantum physics and the Standard Model, each of these particles, or quanta, serves as a container for a specific quantity and quality of energy. We categorize these fundamental particles into two distinct categories, bosons, or force-carrying particles, such as photons, and fermions, which make up ordinary matter. Some of the fermions, a subcategory known as quarks, found complementary companions and joined into groups, forming larger particles we call hadrons, which include the protons and neutrons that make up atomic nuclei. Another class of fermions called leptons, the most famous of which is the electron, are less inclined to combine with each other. Each new stable structure interacted with its neighbors, absorbing, exchanging, and dispersing energy in a branching array of possible outcomes.

It seems that one of the fundamental qualities of reality, part of its core functionality, is that energy tends towards dispersal, which physicists refer to as the property of entropy. If the law of increasing functional information is correct, we would expect that any form or structure that allows energy to distribute itself efficiently, in other words, any system that embraces entropy, will become more common over time. The proliferation of particles throughout our young cosmos may well be an early example of this. Jeremy England, a contemporary professor and researcher at the Massachusetts Institute of Technology (MIT), has suggested that we can use entropy to explain the formation of various physical aspects of the universe, from fundamental waves and particles to life itself, by looking at how certain structures optimize a system's ability to disperse energy efficiently across time and space.

We theorize that over a very short amount of time, the energetic soup rapidly evolved into a particulate one, a dense, vigorously vibrational combination of countless bits and pieces. In the early universe, these particles would have been crushed together by the confines of the ever-expanding spacetime that contained them while the inability of two distinct fermions to occupy identical vector states (position, and velocity) created a repulsion between them, what physicists call the Pauli exclusion principle. They would have likely experienced collisions similar to the ones we emulate with particle accelerators, dispersing their constituents and reforming over and over again. As far as we can tell, all of this happened in a matter of seconds.

Once spacetime and the matter and energy it contained had spread itself out enough, it appears that the attractive force of gravity, the weakest but furthest acting of the fundamental forces, began to overpower the repulsion between individual particles. The leading theories suggest that the first large-scale structures formed in regions of space where tiny ripples in the energetic fields had overlapped and created slight variations in the distribution of matter and energy as the cosmos inflated. We have not been able to locate enough ordinary matter to account for the gravitational effects that would be required in the formation of the resulting structures, and so scientists have introduced the concept of dark matter, which is invisible to our instruments because it does not emit or reflect light and can only be detected by its effects on surrounding observable objects. It is theorized that dark matter accreted and collapsed upon itself, compacting into relatively denser regions interspersed across the early cosmos, and that, in time, ordinary matter was drawn into these regions as well. For the first 380 thousand years, light and matter would have been coupled in an internal dance falling into the gravity wells created by primordial dark matter clusters.

Eventually, the expanding fog cooled and dispersed enough for complementary pairs of hadrons and leptons to form the first atoms—primarily hydrogen, composed of a single proton and an accompanying electron, and a relatively smaller amount of helium, which has two protons and electrons. These harmonically stable mass-energy distributions consist mostly of space and repel each other at their surfaces, creating even more space between themselves. The resulting separation between atoms allowed photons and their corresponding light waves to escape into the emptiness of space. We call this flash of light the Cosmic Microwave

Background (CMB). The CMB is a fundamental limit to our ability to observe the history of our universe directly because, prior to this expansion of electromagnetic radiation through the cosmos, any light that was released would have been absorbed by the surrounding soup of particles. It is the first event that our instruments can actually “see.”

An Earth-based radio antenna was able to detect the CMB in 1965, quite by accident, when Arno Penzias and Robert Wilson stumbled across it while working for Bell Laboratories and trying to identify the source of an interference signal their instrument was receiving, which provided some of the first physical evidence for the Big Bang theory. The Big Bang theory itself had gained significant traction since the 1929 discovery by Edwin Hubble, the first scientist to prove the existence of other galaxies outside the Milky Way, that those galaxies appeared to be moving away from us in any direction that we looked, implying that space was expanding and that at some point in the past, it had been much more condensed. Later mapping of the CMB using more sophisticated and specialized devices revealed that it is not entirely uniform, as the original measurements had suggested. It is from these fluctuations that we have extrapolated much of what we suspect about the formation of large structures in the universe resulting from accretion within denser regions of the primordial cosmic soup, regions which themselves could have developed from the harmonic overlapping of quantum phenomena as described above.

Often, our broadening understanding of the cosmos occurs at the conjunction of novel observations and the implications of other processes we are familiar with. This is a testament to a multi-disciplined approach to research in general, and also to the role that advancing technologies play in elucidating phenomena. In *Starry Messenger* (2022), while exploring the way in which scientific instruments enhance and far surpass the reach of our senses in detecting external stimuli, Neil deGrasse Tyson notes that "the farthest thing visible to the human eye is a twin of our own Milky Way, the Andromeda Galaxy, which sits two million light-years away, far beyond the stars of the night sky.” Optical tools allow us to peer much farther and much deeper. From microscopes and telescopes to MRI and X-ray machines, we have developed a variety of extraordinary means to extend the depth to which we can investigate and observe the many wonders of nature. In 2021, NASA successfully launched the James Webb Space Telescope (JWST), the largest of its kind to date, with which we can see nearly 13.5 billion light-years across space, and thereby the same number of years into the past. The JWST allows us to gaze upon light emitted by some of the earliest structures in the universe, furthering our understanding of our infant cosmos. Its findings may well provide answers to some of the enduring questions about the formation of the universe.

The JWST is already sending waves through the scientific community. Data continues to pile up that may not be in alignment with our current theories and models. For example, some of the observations of early galaxies by the JWST are beginning to indicate that dark matter might not just be invisible, it may not exist at all. A recent paper found evidence when analyzing images taken by the JWST that aligns better with another major theory of galaxy formation, the Modified Newtonian Dynamics (MOND) hypothesis which seeks to reconcile the observations that led to the postulation of dark matter in the first place by making a slight adjustment to Newton's second law, the framework we use to describe motion and the interaction of forces and objects. Another study using JWST data on early galaxies challenged the age of the universe by nearly a factor of two, suggesting that our universe may in fact be closer to twenty-seven billion years old rather than the widely accepted figure of fourteen.

New theories and findings like these highlight the interdependency of our theoretical models. They remind us that science, like reality, is dynamic and evolving. It is working ever closer to a comprehensive and cohesive model of reality. A small change here and there can have massive implications in the complicated systems of logical dependencies that give modern science its robust functionality and descriptivity. Sometimes, as may well prove to be the case with the MOND hypothesis, first presented in the 1980s, an old theory that was overlooked or set aside in favor of a different model is later found to be more congruent with our increasingly detailed observations. Still, our existing models are indeed robust and well-tested, we need not worry that we will always need to rewrite them entirely with the advent of new data, simply that we may need to adjust them accordingly.

For a few hundred million years after the initial release of radiation into the vastness of it all, it appears that the hydrogen and helium atoms that had formed during the expansion of space were mostly dispersed, far enough apart from one another that they each existed in a sort of isolation. Over time, they were pulled by the gravity of denser areas and the earliest large-scale structures, causing them to fall inwardly upon themselves like clouds precipitating into raindrops. Dense regions in the gas clouds condensed upon themselves, accreting into denser clumps, eventually crushing the particles under their own weight in a process we call a gravitational collapse. The compressive forces of such collapses heat up the particles involved, creating the energetic dynamics necessary for the formation of stars, which fuse the nuclei of the early, lighter elements into their heavier descendants.

Sometimes the density of the matter inside the growing structure of a star can cross a threshold where the space between things no longer allows them to stick together in their particulate form and the radiating energy rips the star apart, rapidly dispersing what is left of the elements it had contained into the surrounding space. From the remnants of these novas and supernovas, matter accretes and collapses upon itself again, becoming the molecular and crystalline clusters that form asteroids, gaseous and rocky planets, and new stars. Over time and across the cosmos, stars, and the planets and asteroids they held in tow, wove themselves together into galaxies around the densest regions, sometimes collapsing further and condensing into black holes where even light falls into the pull of the accumulated matter and energy at their cores.

The more immense these structures become, the more they pull upon their neighbors, even while the space between them continues to expand. Stars and galaxies fall toward each other, warping the web-like foam of spacetime with wells that collect matter like flowing rivers into the interlaced threads of a woven network across the cosmos. It is on one of these threads, in a wing of a galactic spiral that is no more than a droplet in that cosmic sea, whirling around a star that showers us in light, on the wispy, wet, rocky remains of a rough, crumpling, melting ball of fused stardust, that life, as we know it, came to be.

Our home star, Sol, must be at least a third-generation star, meaning that a minimum of two stellar cycles, from star birth to dispersal in a nova, must have occurred in this general region of space for our sun to be created. We can infer this because we are able to measure its rough composition from the light that it emits using a process called mass spectrometry, which is one of the most reliable methods we have for testing the chemical makeup of things. From those measurements, we can tell that it contains a significantly higher percentage of elements heavier than helium, what astronomers call its metallicity, than would be expected for a star of its type, age, and size had it been constructing those elements itself through nuclear fusion. This means that those ingredients must have been provided by its predecessors, and the degree to which we find them in the sun itself and in the planets and asteroids of the surrounding solar system indicates that a similar line of logic could be applied to its most recent ancestor, thereby requiring at least three generations.

Earth formed from the accretion of heavy minerals in the solar nebula that was left over by a nova that provided the materials for all of the planets in the solar system and our sun. In a process that was relatively similar to the formation of a star, matter accumulated upon itself as gravity pulled more and more of it together. It is likely that our planet was more or less a ball of lava at the time and was constantly pummeled by asteroids. The heat generated by these impacts and the radioactive decay of heavier elements, coupled with greenhouse effects of the early atmosphere kept temperatures high enough to melt metals and other minerals. It is theorized that at some point during this time our planet collided with another one, flinging loose enough material to create the Moon we see in the night sky. As the Earth slowly cooled, liquid water collected on its surface during millions of years of relatively consistent rain to form oceans that likely covered most of the planet.

Deep within Earth's oceans, another soup was forming. Warm water bubbled with chemical-rich gas from geothermal vents on the seafloor. The leading theories about how life came to exist on our planet posit that molecules drifting around and dissolved in the water began to form into structures that could harness the energy inherent to the chemical and temperature gradients around them to create copies of themselves. We have not been able to recreate this process in laboratories, and accordingly, we still do not know exactly how non-living molecular structures eventually became the single-celled organisms we find evidenced in the earliest layers of the geologic record.

However living cells came to be, it is obvious that once they became able to multiply through division, replication, and reproduction they proliferated in doing so for roughly the next four and a half billion years, branching, combining, cooperating, and competing within different niches of their complex and dynamic environments. As the genomes of these early beings expanded, they altered, traded, and recombined particular gene sequences within and between individuals and communities, resulting in distinctions that set one species apart from another, each finding a way to process, exploit, conserve, and disperse the energy inherent around them. The tree of life continued to divide and spread its branches as groups split off and individuals developed adaptations that allowed them to survive and pass those traits along to their descendants.

It wasn't until about two billion years ago that enough light penetrated the stormy atmosphere of our planet for organisms to begin harvesting it for energy. When it did, photosynthesis soon rivaled chemosynthesis as the main energy source for living things. Cyanobacteria bloomed in shallow waters around the world producing oxygen and cooling the atmosphere further. One theory about the development of multicellular life is that cooperative collections of single-celled organisms came together where different species could provide for each other symbiotically, and eventually, the genetics of these organisms converged into a single set of instructions that could produce a variety of cells, ripe to be tested against the tides of time and evolution. These specialized groups of cells would have developed into the organs that various plants and animals use to digest and transmit nutrients, glean information about their surroundings, and process it in productive ways. All the while, slight variations in the genetic code that provided the instructions for the development of an organism could result in distinct physical mutations. The more beneficial the genetic adaptation, the more likely its bearer and their offspring were to survive.

In the Cambrian Explosion, about 540 million years ago, the geologic record indicates that the diversity of species of plants and animals skyrocketed, and a few algae began to adapt to survive on the land that protruded out of the sea. Vertebrates developed backbones and internal skeletons and eventually made their way onto the land to follow the plants that had also begun to make their home there. Corrals, mollusks, and fish flourished in the seas. Around 400 million years ago, four-limbed animals called tetrapods established a lineage that branched into amphibians, reptiles, dinosaurs, birds, and—some time later—the mammals to whom we owe our heritage. Several mass extinctions, culminating in one about 66 million years ago, culled the population of dinosaurs and large raptors, letting mammals take their place as the dominant animals of the land. Many species of very large mammals evolved and populated the landscape. In time, our ancestors, descendants of primates relatively similar to ourselves—social animals with large brains and opposable thumbs—developed the tools and skills we needed to hunt most of the Pleistocene megafauna (the aforementioned big mammals) into extinction.

Slowly but surely, our rather clever species learned by reflecting on our pasts to divine and orchestrate our paths and futures in order to protect ourselves from danger, discomfort, hunger, and helplessness. Tools were crafted from wood, bone, stone, and later metal, with the help of fire, to make the lives of their carriers a little easier, a little more fit for survival. Stone hearths began to pop up around the world in fertile valleys and along coastlines, built for cooking, crafting, and gathering our families and communities. Nomadic peoples began to settle more and more readily in fertile and abundant locations, primarily along waterways, for longer stretches of time. Settlements created new needs and new opportunities, and billowing populations of people worked together to farm, cook, create, and converse, distributing food, technology, shelter, and ideas amongst themselves.

Trade between individuals and communities created the need for complex systems of counting and record keeping, leading to ledgers made of clay and papyrus and other methods for preserving, analyzing, and communicating information. Such tools built upon pictographic symbolism and became the forefathers of the math and writing systems we use today. Stories were told, and later written, to carry the history, wisdom, and values of these communities into posterity, and these stories became myths, legends, histories, and religions—common narratives that connected individual lives to the cultures and communities that sustained them. We worshiped the earth and the mountains that made it up, the life that covered it, and the sun, sky, and stars. We gave gifts, prayers, and sacrifices to the spirits and deities we had woven into our tales and chronicles to explain the ways and woes of the natural world and our place within it.

As our cities got bigger, the world got smaller, and its people more connected. Governments, cultures, and religions clashed with each other, and powerful groups and people plotted to control the goods and services that humanity depended on: food, land, tools, labor, shelter, money, and water. Violence and economic coercion competed across clans, continents, and generations for the dishonor of deciding the allocation of resources and position of the borders between people—the walls, fences, landscape features, and arbitrary lines that kept our people separated and our wealth protected. All the while, technology, and the logical sciences that serve as its foundation, evolved to keep up with our changing needs, often with arms races and power struggles spearheading that development. Laws to create and maintain order in communities and societies—to protect us from ourselves and one another—were drafted from the writings of sacred texts and the literature of scientific and philosophic investigation.

For generations, cycles of scarcity and abundance, affluence and poverty have ebbed and flowed through our systems, institutions, and societies. During economically and politically stable times, the broadscale availability of food, wealth, and other resources often provided certain demographics with time to engage in creative and intellectual pursuits like art, mathematics, philosophy, and science, all of which played pivotal roles in the development of the modern world. For much of human history, these activities were largely luxuries for the elite, but that has begun to change as technology, infrastructure, medicine, and legal systems steadily work to improve the standard of living for more and more people. Education and literacy have brought the pursuit of knowledge and social and economic mobility within the grasp of the general populace.

We live in a world defined by technology and connectivity, by efficiency and industry, and by information and application. To achieve this, we have changed the courses of rivers and stripped mountains for their minerals. As human ingenuity has altered the landscape of our ecology, our role, rhythm, and tempo in the dance of nature have shifted. Electric lights disrupt our circadian rhythms and outglow the stars in the night sky. Noisy environments dull our sensitivity to the wealth of information contained in the sounds that surround us. Abstractly motivated, fast-paced, and stress-ridden economies detract from our sense of purpose and engage us primarily as consumers and statistics. The wheel of progress counts greater margins and better returns above health and human wellness, and productivity is paramount to survival. It has been this way for quite some time, as far as we can surmise.

Much of human history, which has been but a moment on this cosmic timeline, consists of class and resource struggles similar to those of today, often with a crescendo of hope as we break through into a revolutionary way of thinking and operating. There seems to be a sort of oscillation between relatively calm, prosperous times in our history and those that are plagued by social unrest, inequality, and oppression. Perhaps we may attribute this back and forth to the now famous observation of modern author and combat veteran G. Michael Hopf: "Hard times create strong men. Strong men create good times. Good times create weak men. And, weak men create hard times." We are, in many ways, products of our environments. A parallel factor is that, sadly, wealth generated by the conquest of nations and the military-industrial complex of the modern era plays a substantial role in this ebb and flow of ideologies, technologies, and resources.

In consideration of the rapid rate and extensive nature of development and progress in our societies across generations, it is interesting that we can find evidence of the same issues regarding greed, poverty, ethics, morality, power, and tolerance in the writings and stories passed down to us over thousands of years that we feel in our common experiences today. Like the cosmos we were born from, our social systems settle into patterns that follow from the forces acting upon us at a variety of levels. It is said that history repeats itself and only the actors change. Perhaps that is true, but we can only hope that our capacity to learn and grow outshines our proclivity to reenact past mistakes and misdeeds.

Whatever our fate, in these extraordinary times, we do face unique challenges due to the exponential growth of our population and the systems and tools that sustain us straining the limits of our planet’s natural resources and environment. These challenges, and the work we undertake to address them, are fundamentally different from the trials and tribulations of our ancestors, partly because of their scale and scope and partly because modern societies and the people that compose them are becoming less and less isolated from each other. Telecommunications networks, high-speed travel, global media distribution and broadcasting, and the internet facilitate an intricately and extensively interconnected world where all of humanity can share in the joy and suffering of individuals and communities throughout our human family.

In the last few decades, the connectivity of the world has ballooned into an almost cartoonish state. We send and receive constant updates and feedback on our lives and the lives of our fellow humans, near and far. We have developed an omnipresent availability of information and a regularly reinforced expectation of instant gratification. We are more connected to, influenced by, and aware of our broad collective of fellow humans than we may have ever been, all while becoming increasingly separated and distant in our personal and intimate relationships. The experiences of information and sensory overload and the irony of digital isolation that have come to be ubiquitous in modern life should cause us to pause and consider our place in the grand story of everything.

Here we are now, billions of years in, all too often overwhelmed by the complexity of it all as we contemplate the woes and wonders of reality and ask amongst ourselves: How did we get here? Why are we here? And what will become of us? As far as we can tell, in the beginning, everything was one, the source of all the energy that became reality, a singularity—all the mass-energy of everything contained within a single point. Then, a long, long time ago, energy, space, and time unfolded into our particulate and material reality in an expansive expression of unity, duality, division, replication, and conservation, becoming all that is—the Big Bang and the universe that followed. Stars have lived and died in the cosmic dance of compression and inflation to provide our planet with the energy, elements, chemicals, and minerals that enable life to thrive and evolve. Over time, that evolution led to us and our extraordinary capacities for creation, contemplation, and relation.

The great inhalations and exhalations of the energies that encircle our history and heritage, from the expansion of the cosmos to the depth and breadth of our relationships, have brought our lives into being as they are—infinitely related and each individually distinct. Millennia of meticulous observations, records, and applications have afforded humanity unparalleled and almost godlike control over our reality, imploring upon us the responsibility to act as adequate and conscientious stewards of the Earth. Our hubris, fear, and greed have built for us a world in which we cannot, and perhaps should not, sustain the status quo. In reconciliation, our creative power, fueled by our faculties of thought and reasoning and our rapidly developing technologies, must be focused and channeled into intentions, actions, and policies that aid in and aim toward the betterment of reality, or at the very least, fail to harm it. We can draw upon the wisdom, values, and virtue passed down through our cultural heritage and the insights of our sciences and objective observations to provide us with an ethical, effective, and practical framework to guide our actions and decisions.

Like the stars, planets, and many living beings that came before us, we are each an expression of the natural world—characters in a vast cosmic story. Our past, present, and future are intricately and inextricably woven into a universal narrative. We are bound to the rhythms, patterns, and cycles of our own nature, which is in itself a facet of the nature of reality. We were created, with all of our glorious and wonderful capacities and capabilities, by dynamic systems evolving through time into the causes and conditions of our existence—energy becoming matter, becoming Earth, us, and everything else.