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# The Insufficiency of the Causal Mechanisms of Scientific Naturalism

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# CHAPTER 1

# INTRODUCTION

## Statement of Problem

Intellectual giant Stephen Hawking proclaimed, "If the rate of expansion one second after the big bang had been smaller by even one part in a hundred thousand million million, the universe would have recollapsed before it ever reached its present size."[1] With this comment, Hawking pointed out what was already well known within the scientific community—that life as it exists today is entirely dependent upon a series of parameters that had to be in place with mind-boggling precision at the moment of the Big Bang. Yet explaining the existence of these parameters is challenging under the causal agents and methodology of scientific naturalism.

The prevailing approach to science today is built upon a philosophy put forth by Hume in the 18th century and supported by Darwin's work from the 19th century that depend on naturalistic causal agents that drive an evolutionary process. For the last two centuries of scientific study and exploration, scientific naturalism has increasingly been the worldview of science, looking solely to those causal agents to explain the material world. However, the causal agents of scientific naturalism seem to work best when given millions or billions of years to work, as opposed to the fractions of a second that may not have even been available at the Big Bang.

Writing in "Engineering and Science" in 1985, pioneering scientist Sir Fred Hoyle declared: "A common sense interpretation of the facts suggests that a superintellect has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature. The numbers one calculates from the facts seem to me so

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[1] Stephen Hawking, *A Brief History of Time* (New York: Bantam, 1998), ch. 8.

overwhelming as to put this conclusion almost beyond question."[2] To remain credible as the guiding paradigm for origins science, the causal agents and methodology of scientific naturalism need to be able explain the presence of these finely-tuned parameters, as the theory about the origin of life must also encompass the origin of the universe that allowed for the development of a life-bearing planet. If scientific naturalism is unable to do this, then the scientific community should recognize the weakness of the paradigm and explore other paradigms and theories that better fit the data, perhaps even allowing for the workings of Hoyle's super-intellect.

## Statement of Purpose

The purpose of this thesis will be to explore elements of cosmology, known as the fine-tuning parameters, using the causal agents[3] and methodology of scientific naturalism which were developed during a time when our universe was thought to be eternal, to determine if scientific naturalism still provides a valid paradigm for guiding origins science. The speed and precision with which the constants and laws of physics developed provides a unique challenge to the explanatory mechanism of scientific naturalism, and if scientific naturalism cannot explain how our universe began, then it provides an insufficient theory for explaining the origin of life. This paper presents the conclusion that the causal agents of physical necessity and chance that drive scientific naturalism are incapable of explaining the appearance and precision of gravity and the gravitational constant.

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[2] Sir Fred Hoyle, "The universe: Past and present reflections," *Engineering and Science* 45, no. 2 (1981): 12.

[3] Within scientific naturalism, causal agents fall into one of two categories: chance, or physical necessity. Theists acknowledge design as a third category. However, since the notion of design implies a designer acting outside of the natural laws governing the material world, scientific naturalism rejects the causal agency of design.

## Statement of Importance of the Problem

Scientific naturalism is the approach to science taught almost exclusively in our public schools and universities. It guides research, which impacts the allocation of funding into important fields of study. Therefore, scientific naturalism shapes not only what we know, but how we learn and grow as a society. However, leading proponents of scientific naturalism such as Darwin assumed that this paradigm of scientific study that seemed to work so well with operations science and efforts to explain how the universe functions through observable and repeatable experimentation should have the same effectiveness when exploring origins science and the quest to explain the genesis of natural phenomena that are, by their nature, incapable of being repeated or observed.[4] If scientific naturalism is unable to explain the origins of the universe, then our understanding of who we are is being stunted by a faulty model. Acknowledging deficiencies will help to revise and adjust our approach to science, encouraging alternative theories on the origins of the universe, perhaps allowing us to identify the correct paradigm for understanding life. Additionally, for Christians who find their belief in the creative power of God to be dismissed by the prevailing scientific attitudes, a demonstration of the inadequacies of scientific naturalism could equip or embolden the Christian to better fulfill the command from Peter to be prepared to give a reason for the hope that they have in Christ (1 Peter 3:15).

[4] Michael N. Keas, "Christianity Cultivated Science with and without Methodological Naturalism," *Religions* 14, no. 7 (2023): 927.

## Statement of Position on the Problem

The causal agents of scientific naturalism are incapable of explaining the precision with which the constants of physics[5], particularly the fundamental forces, were fine-tuned to permit the development of our universe to a point where it could sustain sentient life on Earth. Theoretically, gravity would still permit the development of a universe with either a slightly higher or lower strength even though those universes would not have allowed for the development of sentient life, conferring no recognizable benefit to a particular gravitational strength over another potential setting.[6] Further, the fundamental forces had to be at their precise strengths at the moment of the Big Bang, allowing for neither the passage of time or some intervening mutational event to refine those constants to the necessary strengths.[7] Theorizing that fine tuning is the result of a supernatural cause is readily rejected because it is untestable by modern science as an hypothesis. However, theories put forth by the scientific community that attempt to explain fine tuning are equally untestable or depend on sheer luck, neither of which conform with credible scientific study.[8] Recognizing the inadequacy of scientific naturalism, the scientific community should be receptive to theories that can better explain the observable data.

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[5] The constants of physics include fundamental values such as the speed of light in a vacuum, gravitational constant, Planck constant, electron mass, proton mass, neutron mass, elementary charge, electric constant, magnetic constant that are considered to be universal in value.

[6] Fred C. Adams, "The Degree of Fine-Tuning in our Universe — and Others," *Physics Reports* 807 (2019): 78.

[7] This is the conclusion of Dawkins, Hawking, Hoyle, Meyer, and other scientists, which has led to the formulation of the Multiverse Theory.

[8] George Ellis and Joe Silk, "Scientific Method: Defend the Integrity of Physics," *Nature* 516 (2014): 321–23.

## Limitations/Delimitations

Although the author holds theistic beliefs about the creation of the universe and origins of life, this paper does not attempt to defend a causal agent beyond scientific naturalism, intending instead to highlight deficiencies in the current approach. Neither does this paper intend to delve deeply into the realm of theoretical physics including quantum and inflationary theories, opting to simply provide a basic overview of prevailing theories pertaining to the origin of the universe and establishment of fine-tuning parameters. The list of finely-tuned parameters is lengthy, and while passing reference will be made to many during an introductory discussion of fine tuning, the author has chosen to emphasize gravity and the gravitational constant to allow for a focused defense of his thesis. While certain scientific details are critical when establishing positions, and quantum and inflationary theories will be touched upon, this paper is meant to criticize the philosophical paradigm of scientific naturalism that directs the specific approach to scientific learning under pre-established parameters including causal agents of either physical necessity or chance, and methodologies that depend almost exclusively on *a posteriori* evidentiary support.

# CHAPTER 2

# SCIENTIFIC NATURALISM

## Introduction

Assumptions provide the framework within which we consider a problem and seek solutions.[9] Fancier words, such as "paradigms" and "worldviews", may be used instead of something so commonplace as an assumption, but it truly is as simple as that. The finitude of human reason requires that we set parameters, because we are incapable of considering everything. As Kant stated about true reason, "its limitation, which consists in a general recognition of our never entirely removable ignorance, may be realized *a posteriori* also, by seeing how much remains to be known in spite of all that can be known."[10] Therefore, whether established before addressing an issue or imposed automatically by ignorance, the human mind will utilize a set of assumptions to guide our quest for knowledge and understanding. The framework that shapes the accepted approach to scientific inquiry is known as *scientific naturalism*.

## Origins of Scientific Naturalism

The term *scientific naturalism*, as understood by most scientists and academics today, is linked to Thomas Huxley, the nineteenth century British biologist and advocate of Charles Darwin's theory of evolution.[11] While the term itself had been in use for several decades prior to

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[9] Cornelius Hunter, *Science's Blind Spot: The Unseen Religion of Scientific Naturalism* (New York: Brazos Press, 2007), 33.

[10] Immanuel Kant, *Critique of Pure Reason*, trans. F. Max Muller (London: Macmillan and Co., 1881), 609.

[11] John F. Haught, *Is Nature Enough? Meaning and Truth in the Age of Science* (Cambridge: Cambridge University Press, 2006), 5.

Huxley's 1892 work *Essays Upon Some Controverted Questions*, the term had previously been used by religious writers seeking to portray this certain scientific approach in a negative manner.[12] The Enlightenment had been an era of significant advancement in understanding, whether that be philosophical or scientific, and Huxley was aware that the significant point of distinction and controversy was the emphasis on natural versus supernatural causes,[13] as it appeared that the supernatural must decrease as the natural increases. As Huxley declared, "I have hitherto dwelt upon scientific Naturalism chiefly in its critical and destructive aspect. But the present incarnation of the spirit of the Renascence [sic] differs from its predecessor in the eighteenth century, in that it builds up, as well as pulls down."[14] With this statement, Huxley pointed out that the philosophical foundation for scientific naturalism had now been paired with a scientific theory that he believed would allow for advancement of humanity.

## Hume's Original Thesis

The philosophical basis for scientific naturalism referenced by Huxley that flowed out of the 18th century was largely the work of the Scottish philosopher David Hume. Writing about Hume, Benedict declares that his collective body of work "is regarded as one of the most influential articulations of a naturalistic approach in philosophy, interpreted by many as a key inspiration for naturalistic projects in a range of areas."[15] Whereas Ray's work, *Wisdom of God Manifested in the Works of Creation*, provided the closing decade of the 17th century with "the

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[12] Gowan Dawson and Bernard Lightman, eds., "Introduction," in *Victorian Scientific Naturalism: Community, Identity, Continuity* (Chicago: University of Chicago Press, 2014), 5.

[13] Thomas Huxley, *Essays Upon Some Controverted Questions* (n.p., 2009), 6–7.

[14] Huxley, *Essays*, 37.

[15] Benedict Smith, "Hume and Liberal Naturalism," in *The Routledge Handbook of Liberal Naturalism,* eds. Mario De Caro and David Macarthur (Abingdon: Routledge, 2022), 26.

definitive statement of the argument from design,"[16] Hume's work would provide a robust challenge to the teleological argument.[17]

Hume's capstone work on his philosophy of naturalism is presented in his work *Dialogues Concerning Natural Religion*, which was published following his death in 1772. Two key subjects examined are how people learn and Hume's thoughts on miracles. Regarding the former, Hume held that our causal reasoning was *a posteriori*, declaring that "Our knowledge of events unseen is based on experience rather than deduction."[18] Building upon this, Hume established his general maxim of regarding experience, which states that "events are logically discrete, that no objects have any discoverable connexion [sic] together from which we could deduce the occurrence of one thing from the occurrence of another, and that all the inferences, which we can draw from one thing to another, are therefore founded merely on our experience of their constant and regular conjunction."[19] From the perspective of operations science, Hume was affirming the importance of basing scientific inquiry on the notion of efforts that are testable, observable and repeatable. However, this emphasis on observability and repeatability placed unnecessary restrictions on the ability to study and understand events that are singular in occurrence, as if Hume was disregarding the importance of origins science.[20] Hume was, in

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[16] Niall O'Flaherty, "The rhetorical strategy of William Paley's *Natural theology* (1802): Part 1, William Paley's Natural theology in context," *Studies in History and Philosophy of Science Part A* 41, no. 1 (March 2010): 25.

[17] Charles Taliaferro, William Paley: Apologetics of Design and for Culture," in *The History of Apologetics: A Biographical and Methodological Introduction*, eds. Benjamin K. Forrest, Joshua D. Chatraw, and Alister E. McGrath (Grand Rapids: Zondervan Academic, 2020), 349.

[18] David Hume, Scott Stapleford, and Tryon Goldschmidt, *Hume's Enquiry: Expanded and Explained* (New York: Routledge, 2018), 217.

[19] Hume, Stapleford, and Goldschmidt, *Hume's Enquiry*, 217.

[20] In fairness to Hume, the scientific world at that time put little thought into what we call origins science today and, given the limits on the technology and knowledge of the time, likely had no ability to conceive of the need to approach origins from a different paradigm than operations.

effect, limiting the ability to apply concepts that had been learned through experimentation to those phenomena that were difficult or impossible to replicate.

Kant saw the limitation of this approach, as Hume would have considered *a priori* knowledge to be "imaginary."[21] To Kant, there were critical principles that frame our ability to gain knowledge that precede experience. Among modern theologians, Sproul would affirm the importance of the law of non-contradiction as one of Kant's a priori principles when critiquing scientific naturalism.[22] Yet despite these critiques and apparent flaws, Hume's focus on evidence and experience resonated with the academic world that was driven by scientific observation.[23]

As it pertains to naturalism, or perhaps more to the defeat of supernaturalism, it was Hume's *a posteriori* approach to causal reasoning—when applied to miracles—that solidified his stance on any sort of external creator. Building his argument, Hume declared that we have knowledge of the laws of nature because we have observed them as being rigid, regular, and universal and therefore worthy of designation as a law.[24] Defining a miracle "as a violation of the laws of nature by the intervention of the Deity," Hume then frames the argument as one between miracles and experience as the root of the law.[25] Hume's argument concludes by pointing towards the evidence, suggesting that since the laws of nature are based on a breadth of

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[21] Kant, *Critique of Pure Reason,* 613–14.

[22] R. C. Sproul and Keith Mathison, *Not a Chance: God, Science and the Revolt against Reaso*n, exp. ed. (Grand Rapids: Baker Books, 2014), 26.

[23] Hunter, *Science's Blind Spot*, 23.

[24] Hume, Stapleford, and Goldschmidt, *Hume's Enquiry*, 225.

[25] Ibid.

observation and experience, then there will always be a superior proof supporting the laws of nature over some claim to the contrary.[26]

The net effect of Hume's work—particularly his argument against miracles—was to establish an acceptable scientific paradigm whereby the practitioners of natural sciences could assume that evidence and observations consistent with the laws of nature would prevail. Huxley would weigh in, declaring "Hume's arguments have a very different value, for they resolve themselves into a simple statement of the dictates of common sense—which may be expressed in this canon: the more a statement of fact conflicts with previous experience, the more complete must be the evidence which is to justify us in believing it."[27] Allowing Hume to have the final words on miracles, Hume's maxim on miracles and evidence proclaims: "That no testimony is sufficient to establish a miracle, unless it would be a greater miracle for the testimony to be false than for the thing reported to be true."[28]

Through his assault on miracles and his approach to causal reasoning, Hume was attempting to put to rest the teleological argument that had been promoted by Ray and theologians such as Aquinas.[29] As Hume pointed out, instead of relying on actual evidence that could be observed or measured, the argument for design represents an argument from analogy.[30] However, in the decades following Hume's death, William Paley would respond to Hume's assault on the argument from design, presenting his own analogy of a man walking through a

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[26] Ibid., 226.

[27] Huxley, *Essays,* 134.

[28] Hume, Stapleford, and Goldschmidt, *Hume's Enquiry*, 228.

[29] William Edgar and K. Scott Oliphint, eds., *Christian Apologetics Past and Present: A Primary Source Reader, to 1500*, vol. 1 (Wheaton, IL: Crossway, 2009), 407.

[30] David Hume, *Dialogues Concerning Natural Religion* (1779, repr., Luton: Andrews UK Ltd., 2012) 25.

heath who accidentally kicks a watch that had been laying on the ground. Per Paley's rebuttal, the beauty of the watch's design, the functionality of the watch, and the intricacy of the parts within the watch would all suggest that the watch was the result of the careful work of a watchmaker.[31] Paley's logic resonated with some of the great minds of the time, including a young student at Cambridge University by the name of Charles Darwin, who delighted in the clarity of Paley's work.[32] To determine the victor of this argument-from-design debate, the academic world needed the observable, measurable evidence that Hume championed.

## Darwinian Evolution

While defending the term *scientific naturalism*, Huxley pointed beyond the philosophical arguments put forth by Hume that tore at the idea of a supernatural creator. What made Huxley such a strong defender of this approach to knowledge were the advances being made in the realm of the physical sciences that presented the sort of observable, measurable evidence that appeared to give Hume the edge over Paley. Charles Lyell, a British geologist and professor at King's College in London, had proposed his theory that the Earth's geological formations were the result of prolonged, gradual changes that required far longer to form than a few thousand years.[33] Although his geological theories were at odds with young-earth creationist beliefs that were prevalent at King's College, resulting in Lyell's resignation,[34] the rational approach to geology

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[31] William Paley, *Natural Theology; Or Evidences of the Existence and Attributes of the Deity* (1802, repr., New York: Classic Works, 2013), 2–3.

[32] Charles Darwin, *The Autobiography of Charles Darwin* (1887, repr., New York: Open Road Integrated Media, Inc., 2003), 31.

[33] Charles Lyell, *Elements of Geology,* Cambridge Library Collection: Earth Science (1838, repr., Cambridge: Cambridge University Press, 2014), 10.

[34] C. P. Rajendran, "Charles Lyell: The Man Who Unlocked the Earth's Sprawling History," *Resonance: Journal of Science Education* 25, no. 7 (July 2020): 897.

resonated with other academics, bolstering support for natural causes as a fundamental order in science.[35] By demonstrating that God's creative power wasn't necessary to explain geological stratification if the perceived time limits of the Bible were set aside, Lyell opened the door to the notion that other observable phenomena could similarly be explained through the influence of chance or physical necessity on naturally-occurring processes.

A contemporary scientific thinker of Lyell's was the same Darwin who had been taken by Paley's work while a student at Cambridge but who then latched on to the idea that geological time scales may vastly exceed the creationists' dating and that significant change in the biological world could also be the result of incremental modifications.[36] Armed with a copy of Lyell's work, as well as a working knowledge of variation within species, Darwin would set sail upon the HMS Beagle—his floating laboratory that would allow him to investigate species variation in the field.[37][38] Following this time of research and subsequent writing, Darwin would publish his groundbreaking work, *On the Origin of Species*, in 1859, which meshed perfectly with the philosophy proposed by Hume and the counter-scriptural geological theory put forth by Lyell.

Darwin understood that variations occurred naturally, noting even that puppies from the same litter demonstrate differences that might encourage the continued breeding of one dog over the others in the litter.[39] Whereas domesticated animals and plants might be cultivated based

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[35] Hunter, *Science's Blind Spot,* 23.

[36] Rajendran, "Charles Lyell," 905.

[37] Ibid.

[38] Charles Darwin, *On the Origin of Species* (1859, repr., London: Alma Books, 2019), 5.

[39] Darwin, *On the Origin of the Species*, 18.

upon traits selected by the breeder, Darwin proposed that nature could provide a similar selective mechanism when certain variations conveyed an advantage to one member of the species over another.[40] Given the inherent competition for resources that takes place in nature, Darwin assumed that any slight advantage would promote an increased chance of survival over others, with the subsequent surviving organism naturally selected.[41] However, the key to success for Darwin's theory was time, as the natural selection process was incremental, incorporating very minor modifications in short, slow steps.[42]

Regarding the mechanism of natural selection, Darwin stated that it can "act only by the preservation and accumulation of infinitesimally small inherited modifications."[43] Given the scientific equipment available in the first half of the nineteenth century, Darwin had no idea how right he was, for he could not have understood the size of the genes that truly determined the variations within the species. Scientists in the second half of the nineteenth century such as Mendel studied more closely the biological mechanism that impacted the conveyance of features that appeared to Darwin as beneficial variations and found that it was indeed an infinitesimally small change that first occurred on the genetic level and would subsequently be manifested in some physical feature.[44] This deeper explanation, known as Modern Synthesis or neo-Darwinism, ensured that Darwin's work continued to be recognized as the valid general theory

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[40] Ibid.

[41] Ibid., 357.

[42] Ibid., 356.

[43] Ibid., 76.

[44] Z. B. Hancock, E. S. Lehmberg, and G. S. Bradburd, "Neo-darwinism still haunts evolutionary theory: A modern perspective on Charlesworth, Lande, and Slatkin (1982)," *Evolution* 75 (2021): 1245.

for the evolution of life while allowing for the ongoing understanding of the underlying mechanisms as revealed by modern scientific techniques.[45]

One facet of Darwin's groundbreaking work that is often overlooked is that, despite the name of his book, Darwin was not proposing a theory on the origin of life. Indeed, at the conclusion of his book, Darwin ascribes originating power to the Creator who breathed life into the first being.[46] It was not Darwin's intention at that time to provide a single theory that described both origin and operation but rather to propose a natural biological mechanism that could explain the evolution of life once it began. That there might need to be a distinction between origins and operations, or historical and experimental sciences as Hunter calls it,[47] was not something that the scientific naturalist community was eager to explore at that time, although Darwin did believe that natural laws and processes would be sufficient to address the issue of biological origins.[48] However, secular scientists were not of the opinion that there was a cosmological origin, as physicists in the first half of the 20th century such as Einstein, Eddington, and Hoyle made clear with their theories involving a static or steady-state universe.[49] Perhaps then it was out of a failure to recognize the scope of origins science that the scientific community thought that the paradigm of scientific naturalism was sufficient to address questions of both operations and origins science.

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[45] Hancock, Lehmberg, and Bradburd, "Neo-darwinism," 1245.

[46] Darwin, *On the Origin of Species*, 366.

[47] Hunter, *Science's Blind Spot*, 28.

[48] Keas, "Christianity Cultivated Science," 927.

[49] Stephen C. Meyer, *Return of the God Hypothesis* (New York: HarperOne, 2021), 96.

## Scientific Naturalism and Philosophy of Science

It would be imprudent to suggest exactly what Huxley intended from his defense of scientific naturalism, though Haught suggests that Huxley perhaps thought of scientific naturalism as "more a method of inquiry than a worldview."[50] Huxley did, however, see that "Science, in the acceptation of systematised [sic] natural knowledge," was the enemy of "extant forms of supernaturalism."[51] Gradual, progressive, scientific findings would seemingly continue to legitimize the appeal to nature over the supernatural.[52] Therefore, while it may not have been the stated intent of Huxley to crown scientific naturalism as the only appropriate worldview for modern man, that was the inevitable conclusion of his writings. Today, it is undeniable that scientific naturalism is now the prevailing philosophy of science, establishing the paradigm within which most acceptable study occurs.

It is essential to recognize that the foundation for this paradigm was solidified based upon scientific theories emanating from biology and geology, utilizing the best scientific instruments and data available to scientists in the nineteenth century. Other fields of scientific inquiry found themselves working within the confines of the scientific-naturalism paradigm, allowing for key assumptions and parameters imposed by this paradigm to shape their theories. One of these constraints seems to have been derived from Hume's concept of causal reasoning, whereby scientific naturalism best addressed issues of ongoing operations science with observable, measurable evidence. Issues dealing with origins, however, lacked the repeatability that would facilitate the identification of some natural cause, leaving open uncertainty as to the true causal

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[50] Haught, *Is Nature Enough?* 5.

[51] Huxley, *Essays*, 29.

[52] Ibid., 6–7.

agent. When Einstein proposed his General Theory of Relativity, he built into his equation a cosmological constant with a value that corresponds to a static universe,[53] allowing him to avoid the appearance of suggesting that the universe might be dynamic. According to Meyer, this was a philosophical decision that "allowed him (Einstein) to conceive of the universe as eternal and self-existent,"[54] thereby avoiding the need to deal with origins.

## Causal Agents of Naturalism

In his efforts to explain the existence of certain naturally-observed phenomena, Craig suggests that there are ultimately three possible causes: physical necessity, chance, or design.[55] However, as the design argument implies a supernatural designer, scientific naturalists must discard design as a discoverable cause when engaging in scientific inquiry. The remaining categories are themselves quite broad, and it is the role of the scientist to bring specificity to the causal elements within that category such that a physicist might suggest inertia, a chemist may call upon a level of acidity, and a biologist might invoke an absent chromosome. The scientist can look at those factors and the context within which a certain outcome was derived to determine whether it was ultimately physical necessity or chance that was the underlying causal agent, as both represent impersonal forces that have no guidance outside of nature.

Chance and necessity are at the heart of Darwin's theory of evolution, as he allowed for unplanned mutation (chance) that would then create a beneficial trait (physical necessity) that, through a process of natural selection, would encourage the survival of the beneficial trait with

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[53] Meyer, *Return of the God Hypothesis*, 91.

[54] Ibid.

[55] William Lane Craig, *Five Arguments for God: the New Atheism and the Case for the Existence of God* (London: Christian Evidence Society, 2016), 25–26.

future generations.[56] Merlin, when discussing biochemist Monod's published work *Chance and Necessity*, explains that *chance* describes the genetic mutations that take place on a microscopic level, while *necessity* describes the impact of that change as experienced on the macroscopic level of the organism, when a competitive advantage is conferred that leads to natural selection.[57] Theoretical physicist Hertog uses slightly different language to convey the same sentiment, declaring "that life as we know it is the joint product of law-like regularities and a particular history."[58] It is significant that a philosopher of science (Merlin), a biochemist (Monod), and a theoretical physicist (Hertog) all point towards the same causal agents, as that would seem to indicate acceptance across various scientific disciplines that these are the forces that are responsible for not simply life on earth but for the formation of the universe itself.

Darwin bristled at the notion that chance might be assigned some causal agency, proclaiming that when it comes to variation, chance "is a wholly incorrect expression, but it serves to acknowledge plainly our ignorance of the cause of each particular variation."[59] However, given the ongoing use of the term in discussions about causal agents today, particularly when it comes to the discussion of the appearance of fine-tuning with the formation of our universe,[60] many seem to have grown quite comfortable ascribing causal power to chance.

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[56] Darwin, *On the Origin of Species*, 52.

[57] Francesca Merlin, "Monod's conception of chance: Its diversity and relevance today," *Comptes Rendus Biologies* 338, no. 6 (June 2015): 408.

[58] Thomas Hertog, *On the Origin of Time: Stephen Hawking's Final Theory* (New York: Bantam, 2023), 18.

[59] Darwin, *On the Origin of Species*, 103.

[60] This is the basis of the multiverse theory. See Philip Goff, "Did the universe design itself?" *International Journal for Philosophy of Religion* 85, (2019): 99–122.

As Sproul and Mathison declare, "the assumption that 'chance equals an unknown cause' has come to mean for many that 'chance equals cause.'"[61]

**Methodology of Scientific Naturalism**

Drawing upon the work of Hume, Darwin, Huxley, and others, the paradigm of scientific naturalism has become the paradigm within which modern scientific study is undertaken. While a strong case could have been made to exempt origins science from this paradigmatic structure, Darwin was among the scientists from the late nineteenth century who effectively pushed to keep the study of biological origins within the scientific naturalism framework.[62] The net result is that scientific naturalism has developed an accepted methodology that is heavily influenced by Hume's *a posteriori* approach to causal reasoning, seeking observable and measurable evidence from within the natural realm.

While it would be technically correct to state that there is no such thing as a unified definition of the scientific method,[63] the need to produce results that are accepted within the paradigm of scientific naturalism did lead to a broadly accepted methodology for scientific inquiry. According to Cowles, what has become acknowledged as "the scientific method" can be traced back to a psychologist named Dewey who, after two decades of studying how children learn in the classroom, published a book in 1910 titled *How We Think*.[64] Dewey proposed a five-step approach: "(i) a felt difficulty; (ii) its location and definition; (iii) suggestion of possible

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[61] Sproul and Mathison, *Not a Chance,* 44.

[62] Keas, "Christianity Cultivated Science," 927.

[63] J. P. Moreland and William Lane Craig, *Philosophical Foundations for a Christian Worldview*, 2d ed. (Downers Grove, IL: IVP Academic, 2017), 337.

[64] Henry M. Cowles, *The Scientific Method: An Evolution of Thinking from Darwin to Dewey* (Cambridge, MA: Harvard University Press, 2020), 2.

solution; (iv) development by reasoning of the bearings of the suggestion; (v) further observation and experiment leading to its acceptance or rejection."[65] Dewey's approach can clearly be seen as meeting Hume's evidentiary requirements for observable and measurable data, and it therefore provided a methodology that would stay neatly within the predetermined parameters of scientific naturalism.

In their survey of various approaches to scientific methodology, Ioannidou and Erduran found that there were acceptable variations in specific methodology to account for the differences between "historical and experimental sciences."[66] When it comes to fields of study such as evolutionary biology or cosmology, the authors found "that the perception of the hypothetico-deductive reasoning being the best or only way in which scientific knowledge develops is misguided."[67] From their conclusion, it would appear that the effort to keep origins science in the same paradigm as operational science that was so effective at the end of the nineteenth century is now up for reconsideration within the scientific community.

One feature of scientific naturalism that seems to be barred from reconsideration, however, is the acceptance of any supernatural cause. The foundation of the entire paradigm is that "the world is governed by natural laws and forces that can be understood, and that all phenomena are part of nature and can be explained by natural causes, including human cognitive, moral and social phenomena."[68] Of course, this creates a rather significant limitation on modern

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[65] Cowles, *The Scientific Method*, 2.

[66] Olga Ioannidou and Sibel Erduran, "Beyond Hypothesis Testing: Investigating the Diversity of Scientific Methods in Science Teachers' Understanding," *Science & Education* 30, no. 2 (April 2021): 346.

[67] Ioannidou and Erduran, "Beyond Hypothesis Testing," 346.

[68] Michael Shermer, "Scientific Naturalism: A Manifesto for Enlightenment Humanism," *Theology and Science* 15, no. 3 (2017): 221.

scientific endeavors because the unwillingness to accept a supernatural answer “doesn't mean that God didn’t do it, whatever ‘it’ is—only that, if God exists and if God did do it, science will fail to discover that fact as the correct answer.”[69]

Hunter contends that this rigid stance has created a significant blind spot as scientific naturalism continues to be presented with evidence with teleological implications.[70] Dawkins took a novel approach to defending his own discipline of scientific study, declaring, “Biology is the study of complicated things that give the appearance of being designed for a purpose.”[71] Dawkins choses to double down on the precepts of scientific naturalism that only chance and physical necessity can serve as legitimate causal agents for the Universe as we know it, leaving the secular scientific community both restricted by and vulnerable to the blind spot that it readily imposes upon itself.

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[69] Walter Fitch, *The Three Failures of Creationism: Logic, Rhetoric, and Science* (Berkeley: University of California Press, 2012), 8.

[70] Hunter, *Science’s Blind Spot*, 98.

[71] Richard Dawkins, *The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe Without Design* (New York: W. W. Norton & Company, 2015), 17.

# CHAPTER 3

# THE PROBLEM OF FINE TUNING IN THE UNIVERSE

## Introduction

The challenge of formulating a paradigm for scientific inquiry and holding to it dogmatically is that it seemingly belies the fundamental purpose of science, whereby we advance by discovering what was previously unknown and building upon this new knowledge. As Kant pointed out, it is when we learn that we begin to understand the depths of our ignorance and the limits of true reason.[72] When the advances in scientific discovery over the last 150 years are taken into consideration, based upon the development of technological innovations such as electron microscopes and space-based telescopes, we see that our collective understanding of what lies deep within and far without has been both shaped and constrained by the paradigm that was conceived in a very different technological era. While the assumptions of scientific naturalism have driven these advances, they have also been unable to reasonably explain some of what has been discovered, giving support to the argument that perhaps scientific naturalism's causal agents of physical necessity and chance cannot adequately address questions of origins. One of the most befuddling of these examples is the appearance that our universe has been fine-tuned for life.

## A Universe-Generating Machine?

When Paley put forth his famous analogy of a watch being found in the heath, he was drawing the connection between the precision, gearing, and functionality of a watch with the intricate subcomponents of the human body, including the multiple elements found within the

[72] Kant, *Critique of Pure Reason,* 609.

eye and the skeletal system.[73] Paley's brilliance in conveying the intricacy and craftsmanship that we normally associate with a machine provided a compelling argument for design, based upon the best observations of the natural world possible by the scientific tools and minds of that era. Cambridge physicist John Polkinghorne introduced a similar correlation between machinery and our universe that has once again strengthened the teleological argument. In his book *Return of the God Hypothesis*, Meyer tells of a presentation by Polkinghorne that Meyer attended on the appearance of fine tuning where Polkinghorne invoked the idea of an imaginary machine that existed for the purpose of creating a universe.[74]

Polkinghorne's universe-generating machine would contain a number of dials or slides, with each adjustable component representing a known cosmological factor that contributed to the development of the universe as we know it to be. Subsequent research has further refined and expanded these adjustable components that would necessarily be incorporated into such a machine, with categories including the laws of nature, the constants of physics, and the initial conditions of the universe.[75] Precisely how many dials is uncertain, as Adams points out that "the standard model of particle physics has at least 26 parameters, with those subject to being termed fine-tuned perhaps more or less than those 26.[76] Gonzalez and Richards argue that there are additional parameters that are local to our own galaxy and solar system that allowed for life to

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[73] Paley, *Natural Theology*, 36.

[74] Meyer, *Return of the God Hypothesis*, 143.

[75] Robin Collins, "The Teleological Argument: An Exploration of the Fine Tuning of the Universe," in *The Blackwell Companion to Natural Theology*, eds. William Lane Craig and J. P. Moreland (Newark: John Wiley & Sons Ltd., 2009), 202.

[76] Adams, "The Degree of Fine-Tuning in our Universe — and Others," 6.

develop on Earth, such as the size of our moon,[77] our proximity to the Sun,[78] and the existence of gas giant planets such as Jupiter orbiting further out in our solar system.[79] While not necessarily dials on the universe-generating machine, Gonzalez and Richards argue that if the universe that is generated did not subsequently generate a solar system such as ours, life likely would not have developed.[80]

Notwithstanding the importance of those key local factors within our solar system or galaxy that Gonzalez and Richards present, the fact that our universe has developed to a point where something such as the moon could factor into the development of life on Earth could only come about if the cosmological conditions associated with Big Bang cosmology fell within an incredibly precise range. Atheist astrophysicist Sir Fred Hoyle was the first to stumble onto the concept of fine tuning when he was researching the formation of carbon during nuclear reactions taking place within stars. Hoyle realized that at least three of the four fundamental forces had to function within a very precise range and that the masses of certain atomic constituent parts also required precise values if sufficient volumes of carbon were to be created.[81] As he reflected on the blind forces of nature and contemplated the numerical precision that was required to achieve the outcome that we experience today, Hoyle concluded that "a commonsense interpretation of the facts suggests that a superintellect has monkeyed with the physics."[82]

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[77] Guillermo Gonzalez and Jay Richards, *The Privileged Planet: The Search for Purpose in the Universe* (Washington, DC: Regnery, 2020), 107.

[78] Gonzalez and Richards, *The Privileged Planet*, 132.

[79] Ibid., 115.

[80] Ibid., 116.

[81] Gonzalez and Richards, *The Privileged Planet*, 199.; Meyer, *Return of the God Hypothesis*, 136–137.

[82] Hoyle, "The universe: Past and present reflections," 12.

Oxford mathematician John Lennox suggests that the most extreme case of numerical precision is associated with the low entropy level discovered by Sir Roger Penrose that was required at the beginning of the universe such that there would be a second law of thermodynamics and the subsequent development of our universe.[83] Penrose calculated the number to be precise to the factor of 1 part in 10 to the power of $10^{123}$. To better explain how absurdly large that is, Penrose stated that it would require that a person wishing to write out the number fully to place a zero "on each separate proton and on each separate neutron in the entire universe—and we could throw in all the other particles as well for good measure" and still fall short of the zeros needed to complete the task.[84]

The observations and calculations put forth by Hoyle, Penrose, and others collectively demonstrate the precision of the dials on Polkinghorne's universe-generating machine. Explaining why those cosmological components are what they are or why they work together as they do are questions targeted at the notion of origins and are therefore not questions easily handled. However, better understanding what some of these components are and how they function falls within the realm of operations science and will help to more deeply explore theories that address origins.

## Fundamental Forces

The Standard Model of Particle Physics provides a framework within which physicists and astrophysicists can explore Big Bang cosmology and the operation of the universe. At the foundation of the Standard Model are elementary particles, their antiparticles, and three of the

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[83] John Lennox, *Cosmic Chemistry: Do God and Science Mix*? (London: Lion Books, 2021), 149.

[84] Sir Roger Penrose, *The Emperors New Mind: Concerning Computers, Minds, and the Laws of Physics* (Oxford: Oxford University Press, 2002), 490.

four fundamental forces: electromagnetic, strong nuclear, and weak nuclear.[85] As Hoyle was attempting to study the heart of a star to understand the processes that created the abundance of carbon in the universe, it was the precision with which the fundamental forces had to work together for the universe to exist as it does today that struck him so significantly.

What Hoyle was thinking of as fundamental forces have historically been recognized as the different and basic ways in which bodies in the material world interact. Explaining that further, each force has both a specifically-targeted type of interaction and a corresponding strength of that interaction. If these forces do not exist either prior to or simultaneously with the introduction of particles, the particles have no instructions about how to interact, and nothing develops beyond what was already there.

As demonstrated by the name "fundamental," these forces sit at the most basic level of physics and perhaps show the best illustration of the challenges faced while attempting to explain origins through the same processes that explain operations. These fundamental forces work to allow everything in the universe to have function and form, yet there is nothing that works together to create the fundamental forces themselves. Without them, nothing else comes into being, but they exist simply as they are. Fundamental forces are not the result of natural processes; rather, fundamental forces drive natural processes. As a result, while experimentation can reveal fundamental forces, experimentation cannot cause natural forces. While this thesis pays particular attention to the fundamental force of gravity, it is helpful to have a cursory understanding of the other three fundamental forces as well.

[85] Eitan Abraham and Andrés J. Kreiner, *Elementary Particles and the Early Universe: A Synergy of Particle Physics and Cosmology in the Birth and Evolution of the Universe* (Boca Raton, FL: CRC Press, 2022), 55.

The strong nuclear force, or strong force, is the force that is responsible for maintaining the structure of nuclei, holding together protons and neutrons.[86] As quarks represent the constituent particles in protons and neutrons, it is more precise to state that strong force acts upon quarks,[87] and the interaction is mediated by gluons.[88] Due to the strength required to hold like-charged particles together in the nucleus, the strong force is categorized as strong, but it is also marked by the extremely short range over which it functions, as it is only felt within the distance of a single nucleus.[89]

The weak nuclear force, or weak force, "is responsible for the transmutation of some nuclear particles into others."[90] This weak force acts on both quarks and leptons, a classification of particles that includes electrons and neutrinos,[91] and is perhaps better thought of as being responsible for radioactive decay.[92] The effective range of the weak force is even shorter than the strong force, and it lives up to its name by having a strength that is eleven orders of magnitude weaker than the strong force.[93] The weak force is mediated by vector boson particles that have mass.[94]

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[86] Gonzalez and Richards, *The Privileged Planet*, 201.

[87] Hertog, *On the Origin of Time,* 134.

[88] Abraham and Kreiner, *Elementary Particles*, 60.

[89] Hertog, *On the Origin of Time,* 134.

[90] Ibid.

[91] Ibid.

[92] Abraham & Kreiner, *Elementary Particles*, 60.

[93] Richard Rennie and Jonathan Law, eds., *A Dictionary of Physics*, 8th ed. (Oxford: Oxford University Press, 2019), "fundamental interactions."

[94] Abraham and Kreiner, *Elementary Particles*, 60.

The third fundamental force of the Standard Model is the electromagnetic force that governs interaction between charged particles and, as such, controls "atomic structure, chemical interactions, and electromagnetic phenomena."[95] Although one hundred times weaker than the strong nuclear force, it "operates not only on atomic and molecular scales, binding electrons to atomic nuclei and atoms in molecules, but acts across macroscopic distances as well."[96] Mediating the electromagnetic force are massless particles called photons, which enable the extensive range of electromagnetism.[97]

An important part of Hoyle's observations about the role of fundamental forces in the formation of carbon was their interconnectedness in the process. It is not enough for the strong nuclear force to have the precise strength that it does or for the electromagnetic force to have the precise strength that it does. These forces had to be both precise and balanced with each other,[98] in a manner that Gonzalez and Richards refer to as "multi-tuning."[99] Remarking on Hoyle's findings, Hawking and Mlodinow state that these results amounted to "a good measure of serendipity."[100] Stated another way, one of the greatest scientific minds of the last century proclaimed that we are winners of the cosmic lottery, lucky enough to live in a universe where all the constituent components came together just right simply by the causal mechanism of chance.

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[95] Rennie and Law, *A Dictionary of Physics*, "fundamental interactions."

[96] Hertog, *On the Origin of Time,* 134.

[97] Abraham and Kreiner, *Elementary Particles*, 59.

[98] Meyer, *Return of the God Hypothesis*, 136.

[99] Gonzalez and Richards, *The Privileged Planet*, 205.

[100] Stephen Hawking and Leonard Mlodinow, *The Grand Design* (New York: Random House Publishing, 2010), 92.

Reaching back to the question of origins versus operations science, the Standard Model works *a posteriori*, not addressing where these forces may have come from but instead working from observation and experience to put forth theories that are embraced today. The framework of the Standard Model and the understanding of these fundamental forces themselves flow out of the scientific-naturalism paradigm, which remains an important assumption as we consider the approach to scientific learning. Yet the Standard Model does not actually incorporate *all* of the fundamental forces. One force remains—one that is critical to our understanding of Big Bang cosmology—but due to compatibility issues with general relativity and the quantum theory of microscopic physics, it has not been incorporated into the Standard Model.[101] That force is gravity, which will be discussed next.

## Gravity and the Gravitational Constant

This paper has chosen to focus on gravity as the fine-tuning parameter worthy of deeper discussion. The fact that gravity has not been successfully integrated into the Standard Model is reason alone to consider it apart from the other fundamental forces or any of the other fine-tuning parameters. However, it was a comment made by theoretical physicist and author Stephen Hawking that put gravity in a different league. Writing with Mlodinow in *The Grand Design*, Hawking ascribed creative power to gravity, stating, "Because there is a law like gravity, the universe can and will create itself from nothing…. Spontaneous creation is the reason why there is something rather than nothing, why the universe exists, why we exist."[102] Hawking elevates gravity above anything else in the universe, ascribing causal power to it, without explaining

[101] Abraham and Kreiner, *Elementary Particles*, 59.

[102] Hawking and Mlodinow, *The Grand Design*, 106.

where it came from and why it is the strength that it is. In the process, Hawking revealed the willingness of leading secular scientists to violate their own, self-imposed rules of scientific engagement in pursuit of a theory of cosmological origins, as this statement defies Hume's general maxim regarding experience as it pertains to both logic and observational experimentation: defying logic by having something (gravity) simultaneously exist as nothing; and observational experimentation, by declaring that an interactive force can create when there is nothing to interact with.

As a fundamental force, gravity rules the interaction between conglomerations of matter.[103] This stands in distinction to the other three fundamental forces, where the primary interaction is seen at the molecular level.[104] Therefore, one of the challenges within particle physics, as Hertog puts it, is determining "at what microscopic scale…particle physics without gravity transmute[s] into particle physics with gravity."[105] Scientists theorize that gravity is mediated by a yet-to-be observed tensor boson called graviton, which is also massless.[106]Further, gravity is $10^{40}$ times weaker than the electromagnetic force,[107] which is part of the reason why it is so difficult to unify gravity with the other fundamental forces into one comprehensive theory.[108] Yet despite the weakness of the gravitational interaction between particles, the effect

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[103] Roy R. Gould, *Universe in Creation: A New Understanding of the Big Bang and the Emergence of Life* (Cambridge, MA: Harvard University Press, 2018), 83.

[104] Gould, *Universe in Creation*, 83.

[105] Hertog, *On the Origin of Time,* 134.

[106] Abraham and Kreiner, *Elementary Particles*, 61–62.

[107] Frank Wilczek, *The Lightness of Being: Mass, Ether, and the Unification of Forces* (New York: Basic Books, 2009), 146.

[108] Wilczek, *The Lightness of Being*, 148.

of gravity is proportional to the mass of the body experiencing the force.[109] As a result, when the mass of a particular body is large enough, the cumulative effect of gravity is sufficient to overwhelm the other fundamental forces.[110]

The strength of gravity, which in a scientific formula would be portrayed by the value of the gravitational constant, is critical to the overall effect that gravity has on the form that our universe had taken. Hawking understood the importance of the role of gravity as the governing force of the expansion of the universe when he wrote, "If the rate of expansion one second after the big bang had been smaller by even one part in a hundred thousand million, the universe would have recollapsed before it ever reached its present size."[111] Had the gravitational constant been weaker, the universe would have continued to expand at a rate that prohibited the formation of stars and planets.[112]

In a similar manner, the strength of the gravitational constant dictates the size, life, and luminosity of stars. A stronger gravitational constant would have led to fewer atoms needed to make a star, leading to a less-dense, shorter-lived, lower-luminosity star that would have burned out long before organic evolution could begin.[113] Weakening gravity would have had the opposite effect, increasing the number of atoms required to obtain the sort of pressures at the core required to overcome the other fundamental forces and begin the fusion process.[114]

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[109] Ibid., 149.

[110] Gonzalez and Richards, *The Privileged Planet*, 203.

[111] Hawking, *A Brief History of Time*, ch. 8.

[112] Gonzalez and Richards, *The Privileged Planet*, 203.

[113] Ibid.

[114] Ibid.

When Einstein presented his General Theory of Relativity, it was driven by the appearance of gravity as a universal force, influencing space and time in a consistent manner across the observable universe.[115] In this manner, it is like the other fine-tuning parameters such as the laws of physics, which appear to be fixed in both form and application and truly universal in scope and immutable. Indeed, it is this concept of universality that drives scientific inquiry, giving scientists reason to believe that, for every effect, there was a knowable cause.[116]

There has been speculation that there may have been a time when the gravitational constant had a different value, or that gravity behaved differently, during the moments preceding the Big Bang. Cosmologists noticed that the traditional Big Bang model seemingly predicted a universe that looked slightly different than our universe, particularly when it came to the homogeneity and flatness of the universe.[117] To account for the differences, an inflationary period was theorized, occurring in the split-second between the beginning of the universe and the actual Big Bang, whereby the universe would have expanded on a scale that would approximate going from "between an atom and the Milky Way"[118] in size. It is during this incredibly brief moment that Linder suggests an evolution in gravity, and he is not alone in pursuing this notion.[119] While this may be a course of study that theoretical physicists and cosmologists believe they must delve into as they attempt to resolve inconsistencies and perhaps uncover the

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[115] Wilczek, *The Lightness of Being*, 148.

[116] Mendel Sachs, *Physics of the Universe* (London: Imperial College Press, 2010), 11.

[117] E. H. Baffou, M. J. S. Houndjo, I. G. Salako, T. Houngue, "Inflationary cosmology in f(R,T) modified gravity," *Annals of Physics* 434 (2021): 1.

[118] Hertog, *On the Origin of Time,* 110.

[119] E. V. Linder, "The Direction of Gravity," *Journal of Physics: Conference Series* 484, no. 1 (2014): 7; cf. Panayiotis Stavrinos and Emmanuel N Saridakis, eds. *Modified Theories of Gravity and Cosmological Applications* (Basel: Multidisciplinary Digital Publishing Institute, 2023).

much-sought-after unifying theory, it may lead to even greater odds associated with fine-tuning, as it would suggest that gravity needed to begin with one finely-tuned setting and then evolve, somehow, to a second precise setting moments later.

What is clear is that gravity, and the precise value of the gravitational constant, is an indispensable force that had to exist at the very beginning of our universe for the Big Bang model to be successful with the presence of the first particles. Whether that means that, as Hawking proposed, gravity actually caused the rest of the universe to come into existence, or merely that it somehow came into existence simultaneously with all other components necessary to create our universe, the bottom line is that there was no time for gravity to be guided by some other blind forces to attain both form and strength. For the universe to exist as it does today, gravity had to come into being at the very beginning, fully formed and ready to shape the entirety of the universe.

Proponents of scientific naturalism declared that their paradigm of scientific inquiry was sufficient to address the issue of origins, and modern-day scientists have continued to embrace the concept that all natural phenomena can and must be explained through the actions of the causal agents of either chance or physical necessity and then demonstrated through a process that generates observable and repeatable results. However, as further scientific exploration reveals the precise nature of gravity and the role that it played in the creation of a universe that has brought forth life, the challenge of presenting an acceptable theory regarding the origins of the cosmos that can fit within the parameters of scientific naturalism seems to become more daunting. Multiple theories have been proposed and will be explored in the following chapter but, as will be shown, they push at the limits of what might be considered acceptable scientific practice.

# CHAPTER 4

# NATURALISTIC EXPLANATIONS FOR GRAVITY

## Introduction

At the risk of stating the obvious, it is because we exist as we do—as sentient beings capable of observing and deducing—that we are compelled to seek an explanation for the existence and strength of gravity. This is at the heart of the *anthropic principle*, which is stated in both a weak and strong manner. The *weak* anthropic principle suggests that, because we live in an environment that allows us to develop, our observations about what makes our circumstances conducive to life will necessarily be shaped by our understanding of our own underlying conditions.[120] The *strong* anthropic principle "suggests that the fact that we exist imposes constraints not just on our environment but on the possible form and content of the laws of nature themselves."[121] Regardless of how unlikely it may be that the universe would develop to a point where we could exist, the simple fact is that it *has* developed, and the implication is, therefore, that it doesn't really matter how unlikely a life-sustaining universe may be because we are proof that the cosmic lottery has a winner. However, because the scientific community has embraced scientific naturalism as the only acceptable paradigm for both origins science and operations science, attempts to explain Big Bang cosmology and cosmogeny must fit either into the categories of chance or necessity, which has led to certain theories that will be explored further here.

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[120] Hawking and Mlodinow, *The Grand Design*, 89.

[121] Ibid, 91.

## Physical Necessity

While it is the underlying conundrum of the fine-tuning argument that it is physically necessary for the various parameters, including gravity and the gravitational constant, to be precisely what they are, that is not the same as suggesting that an interactive force such as gravity had to exist and that the gravitational constant had to be the strength that it is. If the causal agency of physical necessity is to be a factor when explaining the origins of gravity, there must be some sort of explanation as to why there was some advantage conferred upon gravity for it to have the sort of interaction and strength that it does. When explaining physical necessity as a causal agent in biology, the claim is that a particular trait conveys an advantage to survival over others that lack that particular trait, thereby allowing that trait to be preserved and propagated as the species with that advantage has an increased ability to survive. Using this same line of thinking, the existence of gravity and the strength of the gravitational constant as we experience it in this universe would need to convey some sort of advantage to this universe that allows it to develop better than it would have either without gravity or with a different gravitational constant.

When Hume was supporting his argument for what would become known as *scientific naturalism*, he stated that "such is the nature of material objects, and that they are all originally possessed of a faculty of order and proportion."[122] Using the secular scientific knowledge of the time, which included the notion that the universe is static, Hume felt no need to go beyond the observation that gravity was simply a part of the inherent nature of matter. With a static-universe model that exists without a beginning, Hume had no reason to question whether gravity might not have existed, or whether it might have existed at a different strength. Perhaps unknowingly, Hume's conclusions were shaped by the anthropic principle, leading him down a path that did

[122] Hume, *Dialogues,* 50.

not consider the difference between a world that needs gravity and the gravitational constant to be what they are and a universe where gravity and the gravitational constant could have theoretically been anything or nothing at all.

## Big Bang Cosmology

As discussed briefly in Chapter 2, there are philosophical reasons for secular scientists to prefer the static universe model. Einstein preferred not to consider origins, which is what led to his creation of a cosmological constant within his General Theory of Relativity.[123] Yet science continues to advance, with new scientific theories building upon the work of previous generations and advances in scientific instrumentation. In 1929, Edwin Hubble would verify with his Los Angeles-based telescope a theory first proposed by Aleksandr Friedmann in 1922, and then independently developed five years later by Georges Henri LeMaître, that the universe is expanding.[124] Shortly thereafter, LeMaître would build upon his theory to propose that, since the universe is expanding, there must have been some point previously when the universe began from a central point, and this would become the foundation of Big Bang cosmology.

The critical challenge raised by Big Bang cosmology surrounds the nature of that central point from which everything is said to have begun. When discussing LeMaître's theory, Craig observes that a key aspect of this standard Big Bang model is that "the origin it posits is an absolute origin out of nothing."[125] To even propose such a condition seems to violate the Law of Non-Contradiction, whereby something cannot be both A and non-A at the same time and in the

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[123] Meyer, *Return of the God Hypothesis*, 91.

[124] Don Lincoln, *Understanding the Universe: From Quarks to Cosmos*, rev. ed. (Singapore: World Scientific Publishing Company, 2012), 459.

[125] Craig, *Reasonable Faith,* 127.

same relationship.[126] Nothing cannot simultaneously be something, lending truth to Parmenides' statement that *ex nihilo nihil fit* (nothing comes from nothing). Therefore, to even move forward with the Big Bang model, conventional logic must be set aside to allow for something to come out of nothing.

From the information presented previously in this paper, it must be presumed that, in Big Bang cosmology, out of nothing comes something like the fundamental forces or, at the very least, gravity. If that were the case, it would seem gratuitous that gravity would be exactly what it is and at the strength that it is. Certainly, Hawking could conceive of a universe where gravity was a different strength, as he was willing to suggest that a stronger gravitational constant would have led to a universe that would have collapsed back upon itself.[127] Adams has proposed that Big Bang nucleosynthesis could take place even if the various fine-tuning parameters, including the gravitational constant, were altered.[128] The very notion of the Multiverse Theory is built upon the concept that gravity does not have to be exactly what it is in our universe and that it would take billions of variations of universes to find one with the gravitational strength (and other finely-tuned parameters) at just the proper value to allow for life. These different theories from different scientific minds suggest that it is conceivable that gravity would still function as an interactive force even if it had a different strength. The resulting structure of a universe would change—perhaps drastically—but gravity would still perform its job as an attractive force between two bodies with absolutely no regard for whether the resulting universe was capable of producing life.

[126] Sproul and Mathison, *Not a Chance*, 26.

[127] Hawking, *A Brief History of Time*, ch. 8.

[128] Adams, "The Degree of Fine-Tuning in our Universe — and Others," 78.

## No-Boundary Model

Hawking and Mlodinow answer the question of what existed prior to the beginning differently. They suggest that gravity must exist, saying that because it does, the universe "can and will create itself from nothing."[129] However, it would be more technically accurate to say that their concept of what existed prior to the beginning is different from the point of beginning envisioned in LeMaître's Big Bang theory. Hawking, working with James Hartle, proposed a quantum theory of gravity cosmology that eliminated the initial singularity that was the foundation of Big Bang cosmology and replaced it with a rounded, boundary-less feature that existed beyond the observable horizon prior to the existence of time, thereby allowing for the seemingly contradictory appearance of a finite past with no actual beginning.[130] Hawking's contention is that it is our concept of time, which cannot extend beyond the observable horizon, that creates the perception of a finite beginning, while the conditions beyond the horizon could reveal a universe without an actual starting point. This concept receives further attention later in this chapter, in the section "Infinity and Nothing." Left with gravity and a gravitational constant that have seemingly always been, Hertog suggests that modern-day Platonists looking to skirt the teleological issue will cite necessity, but instead of appealing to Darwinian physical necessity, they will instead appeal to mathematical necessity.[131]

The No-Boundary model is not without its own challenges. The major weakness is how the model addresses the issue of time. To make the model work, Hawking switches from real

[129] Hawking and Mlodinow, *The Grand Design*, 106.

[130] Hertog, *On the Origin of Time*, 101; Craig, *Reasonable Faith*, 134–35.

[131] Hertog, *On the Origin of Time*, 15.

time to Euclidian time,[132] which uses imaginary numbers that are introduced only for computational convenience."[133] As Craig points out, when the imaginary numbers are converted to real numbers, "then the singularity reappears."[134] This objection was echoed by Vilenkin, who felt that the model lost its appeal because our universe exists in real time, not Euclidian time.[135] The nail in the coffin for the No-Boundary model comes from Hawking himself, who, as quoted by Hertog, would declare some thirty-five years later that "the universe may have a boundary after all."[136]

## Oscillating Model

An older and slightly-different cosmological theory that seeks to avoid the concept of an absolute beginning of the universe is the oscillating model, whereby the universe is in a never-ending cycle of expansion followed by contraction.[137] When contemplating how it is that the initial conditions of the universe could achieve a state of both instability and maximum density that characterize Big Bang cosmology, Sachs maintains that it is logical that "the matter of the universe had been imploding (contracting) from a less-dense state."[138] As with Hawking's No-Boundary model, by avoiding the issue of origins, it can be posited that gravity always existed as an eternal component of the eternal universe—existing as it were, out of mathematical necessity.

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[132] Alex Vilenkin, *Many Worlds in One: The Search for Other Universes* (New York: Hill and Wang, 2006), 166.

[133] Vilenkin, *Many Worlds*, 159.

[134] Craig, *Reasonable Faith*, 136.

[135] Vilenkin, *Many Worlds*, 166.

[136] Hertog, *On the Origin of Time*, 248.

[137] Craig, *Reasonable Faith*, 129.

[138] Sachs, *Physics of the Universe*, 38.

Interestingly, while the oscillating model allows for gravity to be eternal and unchanging, Alexander, Cormack, and Gleiser have proposed a model that allows for the random shuffling of coupling constants at the quantum level during the bounce that marks the end of one cycle and the beginning of another.[139] By introducing a periodic but negative ghost scalar, they demonstrated the possibility that coupling constants could change during the bounce and then hold their value during the subsequent expansion and contraction phases.[140] The authors pursued this hypothesis in an attempt to provide a reasonable account of the values of fine-tuning parameters that does not depend on mathematical necessity while also providing an alternative to the Multiverse Theory.

The oscillating model faces significant challenges when seeking acceptance as a cosmological theory. Craig cites the singularity theorems formulated by Penrose and Hawking that demonstrate the inevitability of an initial cosmological singularity as an argument against a previous contracting phase.[141] Craig also cites two additional issues facing the oscillating model, with the first being that there is not currently a model of physics that leads to an expansion as the result of a collapse.[142] Second, current observations of the expansion of the universe indicate the rate of expansion is increasing, which is the *opposite* of what would be necessary to mark the transition from an expansion phase to a contraction.[143] Silk points out that entropy will increase

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[139] Stephon Alexander, Sam Cormack, and Marcelo Gleiser, "A Cyclic Universe Approach to Fine Tuning," *Physics Letters B* 757 (2016): 247.

[140] Alexander, Cormack, and Gleiser, "A Cyclic Universe Approach to Fine Tuning," 250.

[141] Craig, *Reasonable Faith*, 130.

[142] Ibid.

[143] Ibid.

with each cycle, due to the loss of information in black holes, with the end result being a finite limit on the number of cycles.[144]

## Biology Versus Physics

It is also worth pointing out the problem that arises when a scientific paradigm born out of operational biology is thrust upon cosmological origins. The very term "physical necessity" as envisioned by Darwin and then embraced by the secular scientific community suggests a learning process within an organism as the genetic information that created a benefit for survival is retained and passed along to future generations.[145] Yet, as Barbieri points out, "natural selection, the cornerstone of Darwinian evolution, does not exist in inanimate matter" since the inorganic world lacks biological information and the genetic code.[146] While gravity affects the organic world, Big Bang cosmology declares that it predates it, being at work for billions of years upon the inanimate matter that constitutes more than ninety-nine percent of the material in our universe. Whether this fact was completely understood when Darwin and others pushed for including origins science under the umbrella of scientific naturalism is unknown, but the net result is that, having first eliminated design as a causal mechanism in scientific naturalism, further scientific efforts have also ruled out physical necessity. By working within self-imposed parameters, scientific naturalists are left with only one causal mechanism: chance.

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[144] Joseph Silk, *The Infinite Cosmos: Questions from the Frontiers of Cosmology* (Oxford: Oxford University Press, 2006), 184-85.

[145] Merlin, "Monod's conception of chance," 407.

[146] Marcello Barbieri, "What Is Information?" *Philosophical Transactions: Mathematical, Physical and Engineering Sciences* 374, no. 2063 (2016): 2–3.

## Chance

When Paley authored his groundbreaking work, *Natural Theology: Or Evidences of the Existence and Attributes of the Deity*, from which the watchmaker analogy was derived, he had the foresight to extend the implications of his work beyond the field of biology. Paley wrote that astronomy "is not the best medium through which to prove the agency of an intelligent Creator; but that, this being proved, it shows, beyond all other sciences, the magnificence of his operations."[147] At the time that he was writing, Paley and his contemporaries had no way of knowing how finely-tuned the universe is and how unlikely it was that scientific naturalism could account for such precision revealed in astronomy.

Smolin, writing at the end of the 20th century, undertook an effort to determine more clearly what the cumulative impact of the multiple fine-tuning parameters looked like and to ascertain what the chances of stars forming in the universe might be. Smolin's calculations suggest that the odds that a universe with randomly-selected parameters would produce stars is $10^{229}$.[148] By way of comparison, Smolin points out that there are $10^{22}$ stars visible from Earth, collectively containing $10^{80}$ protons and neutrons.[149] Given the sheer enormity of the odds against stars forming in the universe—let alone the development of *life* on Earth—Smolin declared that "we need some rational explanation of how something this unlikely turned out to be the case."[150]

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[147] Paley, *Natural Theology*, 188.

[148] Lee Smolin, *The Life of the Cosmos* (Oxford: Oxford University Press, 1999), 44–45.

[149] Smolin, *The Life of the Cosmos,* 45.

[150] Ibid.

## Multiverse Theory

The rational explanation that Smolin demanded came courtesy of a theory that posed the possibility of a potentially infinite number of universes beyond our own. If the collective likelihood of the fine-tuning parameters is something less than an infinite number, then from a logical perspective, there would be at least one universe like ours out of the total population of universes. Or, as Friederich succinctly states, "if there is a sufficiently diverse multiverse where the parameters (describing the forms of the laws, the constants, and the boundary conditions) differ between universes, it is only to be expected that there are at least some universes where the parameters are right for life."[151] However, if the concept of infinity is accurately applied, then the expected number of universes that have the necessary set of fine-tuning parameters for life would not properly be described as "at least one" or "some," but rather would also be infinite.

There are subsets of this Multiverse Theory that will be discussed below, each with different concepts of their own causality. What is curious about these multiverse theories is that they presume to have some mechanism that results in different fine-tuning parameters in each version of a universe.[152]

## String Theory

String Theory has held the world of physics captive for the last several decades as the most likely opportunity to move beyond the Standard Model to a unification model that incorporates gravity with the other fundamental forces.[153] Instead of photons, quarks, and

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[151] Simon Friederich, *Multiverse Theories: A Philosophical Perspective* (Cambridge: Cambridge University Press, 2021), 4.

[152] Meyer, *Return of the God Hypothesis*, 327.

[153] Friederich, *Multiverse Theories*, 9.

electrons filling the role of the fundamental components of matter, String Theory proposes that one-dimensional strings of energy are the basis upon which the universe is constructed.[154] Accordingly, the elementary particles observed under particle physics represent "excitation modes of strings as they appear to an observer who lacks an apparatus with the resolution required to resolve the string structure."[155]

While scientists in the 21st century have the benefit of scientific instruments such as electron microscopes and the Large Hadron Collider, the instrumentation required to detect and observe theorized strings is currently lacking. As Ehrlich pointed out, even on a larger scale, where theorized differences in gravitational behavior would be required to facilitate the extra six or seven dimensions posited in String Theory, the scope of these theorized interactions are beyond the current ability to observe.[156] However, this has allowed string-theory proponents to declare that this unseen realm is ripe with opportunity for naturalistic possibilities. The current understanding of String Theory suggests that there is an ensemble of $10^{500}$ different configurations of dimensions that are beyond our ability to observe,[157] which has been interpreted by proponents of the Multiverse Theory to mean that there are approximately $10^{500}$ different universes.[158] Goff identifies the resulting Multiverse Theory as postulating "an enormous, perhaps infinite, number of physical universes other than our own, in which many

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[154] Meyer, *Return of the God Hypothesis*, 330.

[155] Friederich, *Multiverse Theories*, 9.

[156] Robert Ehrlich, "What Makes a Theory Testable, or Is Intelligent Design Less Scientific Than String Theory?" *Physics in Perspective* 8 (March 2006): 87.

[157] Frank Cabrera, "String Theory, Non-Empirical Theory Assessment, and the Context of Pursuit," *Synthese* 198 (2021): 3674–75.

[158] Craig, *Reasonable Faith*, 163.

different values of the parameters are realized."[159] Whether the number of potential universes is $10^{500}$ or potentially infinite, the likelihood that one of the universes contains all of the life-requiring, fine-tuned parameters seems not simply likely but inevitable. As Darwin's evolutionary theory required the broadening of the scientific community's understanding of geological timescales, so scientific naturalism requires seeing beyond the limits of our own universe to embrace the promise of a nearly (or potentially) infinite number of universes.

While the Multiverse Theory has been embraced by popular culture and seems to be the best answer to support scientific naturalism when countering the teleological implications of fine-tuning, there is a critical weakness to this theory. The basis of scientific naturalism is observation and verification with theories and calculations that have been derived and validated in the physical world. However, the foundation for String Theory is vastly weaker. According to Cabrera, even proponents of String Theory will acknowledge that "there is no direct empirical evidence that strongly confirms that reality is actually described by string theory."[160] Erlich was harsher in his assessment of String Theory, declaring that "if one keeps at a theory for over twenty years, and evidence keeps accumulating that it does not work, at some point it becomes unclear if it still deserves to be called science."[161] If the Multiverse Theory is a derivative of String Theory due to the possibility of $10^{500}$ different universes—and there has been, to date, no evidence of which scientific naturalism would demand to validate String Theory—then it seems tenuous at best to build a cosmogony on such a thin foundation. Other issues associated with the

[159] Goff, *Did the Universe Design Itself,* 106.

[160] Cabrera, "String Theory," 3674.

[161] Ehrlich, "What Makes a Theory Testable," 87.

string-theory based multiverse model will be addressed shortly, but there is an additional multiverse model that should first be introduced.

### Inflationary Multiverse

Towards the end of Chapter 3, an inflationary period was discussed as having been theorized by physicists to account for certain observed realities that differed from what would have been expected if the universe had simply radiated out evenly from a point of singularity. Some proponents of this inflationary cosmological model, including Vilenkin, have proposed the existence of an outwardly- and eternally-expanding "inflation field" of vacuum energy from which our universe and others arose.[162] Craig terms this theory the "Many Worlds Hypothesis"[163] due to language used by Vilenkin when describing his theory in his book *Many Worlds in One: The Search for Other Universes*. According to Vilenkin's theory, as the field continues to expand, areas of the field will sporadically decay and create islands that are subdivided into regions containing both an event horizon and an observable universe.[164]

The appeal of this inflationary model is that if the inflation field is eternally expanding, then the means by which universes are spawned is globally eternal even as each individual universe experiences time individually.[165] Each universe has its own "Big Bang" that establishes its own construct of the beginning of time, but collectively there is the appearance of an infinity of both time and space.[166] With infinite time, infinite space, and an infinite configuration of

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[162] Meyer, *Return of the God Hypothesis*, 329.

[163] Craig, *Reasonable Faith*, 166.

[164] Vilenkin, *Many Worlds in One*, 180.

[165] Friederich, *Multiverse Theories*, 8.

[166] Craig, *Reasonable Faith*, 167.

universes, that which seems improbable or even impossibly unlikely in one universe becomes inevitable.[167] Applying the theory of the inflationary multiverse, not only should we expect our universe to exist, but we should expect that there are other universes with precisely the same configuration of finely-tuned parameters that allow for the development of life. As a theory about the origins of our universe, the inflationary multiverse theory is not without challenges. Fortunately, for proponents of this theory, the underlying theory of inflation has better withstood criticism than has String Theory, but that may amount to nothing more than a temporary advantage if further study is unable to provide evidential support.

## Observing Origins?

This paper has previously discussed how the limitations of scientific instrumentation constrain our ability to observe certain phenomena that can confirm or falsify theories. Yet the multiverse theories propose a naturalistic phenomenon that is beyond our event horizon. Similar to Hawking's No-Boundary model, there is no theorized method by which the fundamental conditions of these theories could be observed. As Barnes points out, while that makes the multiverse hypothesis unfalsifiable, it also makes it unprovable.[168] For this reason, Goff concludes, "The multiverse hypothesis comes at great ontological cost, in postulating an enormous number of concrete, unobservable universes distinct from our own."[169] The *a posteriori* foundation of scientific naturalism suffers greatly if it hinges on a theory that is never able to generate an experiential outcome.

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[167] Meyer, *Return of the God Hypothesis*, 329.

[168] L. A. Barnes, "The Fine-Tuning of the Universe for Intelligent Life," *Publications of the Astronomical Society of Australia* 29, no. 4 (2012): 558.

[169] Goff, *Did the Universe Design Itself,* 106.

Another argument against the Multiverse Theory is that it does not actually address the question of origins. The Multiverse Theory reinforces the idea that somewhere there is a universe-generating machine producing an infinite number of universes, but it has no answer for where that machine came from and what started it up. Further, under the Multiverse Theory, the machine becomes even more complicated, as this revised model of a universe-generating machine requires an additional level of machinery that can constantly adjust the settings.[170] Multiverse theories are based upon the concept that there will be a near infinite combination of parameters that can create a necessary outcome when there exists an infinite number of universes, but these theories don't shed any light at all on why there is such a thing as gravity. We have gravity here, because it is necessary here, but if the starting point is *nothing* (as has been maintained by secular scientists), then it is unreasonable to suggest that any particular outcome other than *nothing* is inevitable—especially one in which gravity has precisely the interaction and strength needed to generate this universe. It is perhaps unsurprising that one of the fathers of the No-Boundary model would also oppose the Multiverse Theory. Referring to the philosophical principle established by William of Ockham that "entities are not to be multiplied without necessity," Hawking concludes that the fervor surrounding the Multiverse Theory is an artifact of outdated thinking.[171]

### Infinity and Nothing

The failure of Multiverse Theory to explain how the mechanism that creates these separate universes originated raises what may be the most difficult issue for scientific naturalists to address through the chosen mechanism of chance. The appeal to multiverses invokes an

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[170] Meyer, *Return of the God Hypothesis*, 328.

[171] Cited in Hertog, *On the Origin of Time*, 246.

infinite number of universes, along with spontaneous creation out of nothing. On the one hand, multiverses represent an unending set of everything, but on the other hand, they come from a starting point of absolutely nothing. Logically, this is not an argument that looks promising, as it flies in the face of the previously mentioned Law of Non-Contradiction. These are not new issues, but they are important to mention here.

The concept of infinity is enormously valuable for those trying to explain the origins of the universe through scientific naturalism. Vilenkin explained this best when, while discussion Boltzmann's theory of thermal fluctuations, he wrote, "improbable things do eventually happen if you wait long enough, and they will definitely happen if you have infinite time at your disposal."[172] Infinite time leads to infinite universes according to these multiverse theories, which allows for an infinite combination of fine-tuning parameters, thereby making our universe inevitable. However, an actually infinite number of universes would require there to be no actual beginning, for when you deal with infinity, you can always go forward or back one more, and at all times you will still be infinitely away from a possible beginning.[173]

Craig's philosophical argument against this is that we experience time in a manner that he refers to as the A-Theory of time, whereby the future, which does not yet exist, and the past, which no longer exists, are not real in the same sense as the present. [174] In this model, there is a sequence to events such that events that have led to the creation and development of our universe happened in a concept representing chronological order even if our ability to observe time had not yet developed. However, for us to experience an actual "today", there must have been a finite

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[172] Vilenkin, *Many Worlds in One*, 28.

[173] Craig, *Reasonable Faith*, 116.

[174] Craig ascribes the nomenclature of this view of time to J. M. E. McTaggart.

sequence in the past, because crossing an infinite sequence of events to reach today is impossible.[175] Since we do experience an actual "today", then there must be a finite beginning to the cosmos.[176] This philosophical conclusion is supported by the scientific argument presented by Borde, Guth, and Vilenkin, as they determined that "past-eternal inflation without a beginning is impossible."[177] Therefore, from both a scientific and philosophical perspective, the leading conclusion is that there is a finite, absolute beginning to the cosmos.

Affirming that there is an absolute beginning brings with it two primary considerations. First, an absolute beginning indicates that only a finite amount of time has passed since that beginning, which presumably places practical limitations on the ability of the laws and constants of physics to interact with the matter and energy of the universe, thereby constraining the number of scenarios that could manifest. Second, as Craig has proclaimed through the Kalam Cosmological Argument, everything that has a beginning has a cause; ergo, the universe has a cause.[178]

This notion that the universe has both a beginning and a cause takes on greater significance when it is then paired with the assertion by Hawking and Mlodinow that "the universe can and will create itself from nothing."[179] The notion that there was nothing, and then spontaneously there was a universe, sits at the very heart of Big Bang cosmology, as the theory depicts the universe beginning from a point of singularity where, as previously stated, it is "an

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[175] Craig, *Reasonable Faith*, 122.

[176] Ibid.

[177] Vilenkin, *Many Worlds in One*, 154.

[178] Craig, *Reasonable Faith*, 111.

[179] Hawking and Mlodinow, *The Grand Design*, 106.

absolute beginning from nothing."[180] Yet precisely what is meant by "nothing" is not as clear as one might expect in a field of study that routinely requires precision.

The Merriam-Webster online dictionary defines "nothing" as: 1) not any thing; no thing; 2) no part; or 3) one of no interest, value, or consequence.[181] However, Vilenkin declares that a "vacuum is empty space" that is "often regarded as synonymous with nothing."[182] To be synonymous with something is not the same as being identical to something. In this particular case, the differences mean everything, for a vacuum, while regarded as empty space, "is a physical object; it can be charged with energy and come in a variety of different states."[183] As has been pointed out previously, Hawking and Mlodinow assert that it was gravity, existing in that nothingness, that was the causal agent that brought forth the universe.[184] Most reasonable people would agree that gravity and a vacuum are each something, and if they are "some thing," then they are not "no thing."[185]

The assertion that the universe came from something makes considerably more sense than the claim that it came from nothing. The Law of Non-Contradiction demands this, and such phrasing would seem to more honestly capture what physicists like Hawking, Mlodinow, Vilenkin, Friederich and others are suggesting. However, such a suggestion still leaves the physicist with the need to explain why there was something at that very beginning moment

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[180] Craig, *Reasonable Faith,* 127.

[181] Merriam-Webster Dictionary, "nothing," accessed March 13, 2024, https://www.merriam-webster.com/dictionary/nothing.

[182] Vilenkin, *Many Worlds in One*, 48.

[183] Ibid.

[184] Hawking and Mlodinow, *The Grand Design*, 106.

[185] This represents the argument put forth by Sproul and Mathison, *Not a Chance*, 222.

instead of nothing. If causality is to be ascribed to gravity or to a vacuum with elementary particles excited by some charge of energy, the presence of those things prior to the beginning would still need to be explained. Yet Krauss, in his book *A Universe from Nothing: Why There is Something Rather than Nothing*, admits up front that he has no intention of answering that question. Rather, he prefers to focus on those questions that he believes science can answer, and then declares that his answers sufficiently address creation *ex nihilo.*[186]

Is Chance Really Causal?

Considering the overwhelming odds against a universe containing the precise combination of fine-tuned parameters to facilitate a life-bearing planet in our universe, the scientific naturalist approach to providing an answer has been to propose solutions that create at least enough universes to equal or surpass the number of universes needed to offset those odds. It is essentially the scientific equivalent of buying one million lottery tickets representing one of every possible combination of numbers if your chances of winning are one in one million. Yet we should remind ourselves of how Darwin felt about chance, when he wrote that chance "is a wholly incorrect expression, but it serves to acknowledge plainly our ignorance of the cause of each particular variation."[187] Darwin did not see any causal agency behind chance; instead, he merely saw an expression of ignorance.

Sproul and Mathison understood what Darwin meant and, equally importantly, what a failure to understand Darwin could mean. As they explained, "the assumption that "chance equals an unknown cause" has come to mean for many that "chance equals cause.""[188] The

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[186] Lawrence Krauss, *A Universe from Nothing: Why is There Something Rather than Nothing* (New York: Simon and Schuster, 2012), xvii.

[187] Darwin, *On the Origin of Species*, 103.

[188] Sproul and Mathison, *Not a Chance*, 44.

ability to determine a statistical possibility of some outcome does not simultaneously convey the means by which that outcome becomes possible. Chance is nothing more than a mathematical expression that helps to describe, not create.[189] Therefore, chance has no place as a causal agent.[190] Instead, it serves as a categorical placeholder for some yet-to-be understood cause.

[189] Ibid, 22.

[190] Ibid.

# CHAPTER 5

# IMPLICATIONS AND CONCLUSIONS

## Introduction

Scientific inquiry should reflect a genuine quest for truth about how the universe and its constituent parts function, ideally performed without bias, and with the understanding that our findings today may undermine our assumptions from yesterday. Kant stated about true reason that it has "its limitation, which consists in a general recognition of our never entirely removable ignorance, (but it) may be realized *a posteriori* also, by seeing how much remains to be known in spite of all that can be known."[191] Therefore, it should be the job of scientists to constantly assess what remains to be learned in the light of what has recently been discovered, understanding that paradigms and their assumptions need to be constantly tested and, if needed, adjusted to fit with scientific evidence.

The scientific instrumentation of the 21st century fueling discoveries and theories pertaining to cosmological origins is likely far beyond what scientists in the 18th and 19th centuries could have imagined. Space-based telescopes beaming back images of galaxies formed billions of years ago, the Large Hadron Collider that smashes particles as small as protons together at enormous speeds to reveal the smallest building blocks of matter, and numerous other tools are yielding data that are far beyond the reach of any of the great scientific minds of any era preceding the current times. In the process, key scientific assumptions that had been seen as foundational for secular scientists, such as the static nature of the universe, have been clearly

[191] Kant, *Critique of Pure Reason*, 609.

shown to be incorrect. Today, secular scientists have embraced Big Bang cosmology, applying a variety of different theories to account for the existence of our universe. To that extent, secular scientists have recognized the wisdom of Kant's observation—at least, partially. This thesis has sought to demonstrate how the paradigm of scientific naturalism and its dependence upon the causal mechanisms of physical necessity and chance have prevented the scientific community from seeing more clearly that which remains to be known regarding the origins of the cosmos.

## Implications

The paradigm of scientific naturalism demands a natural, material explanation for everything that can be observed, which had caused leading scientific minds like Einstein to resist the notion of a universe that had an origin. So deeply ingrained was this concept in Einstein's thought that he adjusted his General Theory of Relativity to account for his bias. In other words, Einstein allowed the requirements of a particular paradigm to sufficiently influence his theory to the extent that he fudged his work to fit within that paradigm. Fortunately, Einstein would later acknowledge that to be his greatest scientific mistake after he was presented with evidence of an expanding universe. However, we should not lose sight of the fact that a faulty assumption—one that could not be proven wrong until sufficient scientific instrumentation was developed and utilized—had caused one of the greatest scientific minds of recent history to propose a flawed theory.

What scientific naturalism has revealed in the area of Big Bang cosmology is that the universe is finely-tuned to a level of precision that is utterly mind-boggling. The brilliant minds responsible for formulating the tenets of scientific naturalism likely could not have imagined that the universe seemingly burst forth from a point of singularity, and they most certainly could not have understood that, as Hawking would declare: "If the rate of expansion one second after the big bang had been smaller by even one part in a hundred thousand million million, the universe would have recollapsed before it ever reached its present size."[192] It is impossible to know how those same brilliant minds would have then responded when presented with evidence that there are multiple such instances of fine-tuning that include fundamental forces and constants, laws of physics, and initial conditions of the universe, and that the state of our universe today required not only that these parameters be finely-tuned individually, but also that many needed to be finely-tuned relationally. Cosmological theories today must account for the fact that this fine-tuning is evident at the moment the universe came into existence, and it is reasonable to question whether a scientific paradigm established during a period of relative scientific ignorance should be the inviolable standard by which origins science must be performed.

Under the constraints of scientific naturalism, there can only be two possible causal agents at work when explaining any material phenomena: physical necessity or chance. Therefore, scientists are tasked with proposing theories that account for the creation of the universe that address both the existence of these finely-tuned parameters and the extent to which they are finely-tuned, and the underlying mechanism must fall into one of these two categories of causal agency. Additionally, the methodology of scientific naturalism, with an emphasis on *a posteriori* learning, requires a level of scientific rigor that depends heavily upon the gathering of evidence to support hypotheses. Further, these theories are expected to adhere to the same natural laws that have been observed to be universally governing the cosmos.

Attempting to work within these parameters, several different theories have been presented. Recognizing the extreme odds of winding up with a universe exactly as ours, the resulting theories have suggested various mechanisms that fundamentally represent either

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[192] Hawking, *A Brief History of Time*, ch. 8.

physical necessity or chance as causal agents. The oscillating universe proposes that our experience is within a universe that has been through a seemingly endless cycle of expansion and contraction, with some mechanism causing the value of the constants to change with each crunch/bang cycle. The discovery that the rate of expansion of our universe is increasing, which is inconsistent with a theory requiring not simply that the expansion slows down, but then reverses direction and contracts, suggests a fatal flaw with this theory.

Multiverse theories have also been quite popular, driven primarily by String Theory or an inflationary theory to propose the existence of an infinite number of universes with an infinite combination of fine-tuning parameters that would then necessarily yield a universe with the necessary conditions for life to develop. These theories reveal the importance of finding the right combination of fine-tuning parameters, but they fail to address their actual origins. Further, the inability to see beyond the event horizon of our universe precludes the ability to ultimately falsify a theory about universes that might exist elsewhere. This last point reveals a significant issue for a discipline that demands evidence, as it would imply an unconquerable barrier situated between a proposed theory and a tested hypothesis. When attempting to advance beyond the observable, scientists risk building upon a foundation that extends beyond the parameters established by scientific naturalism.

When Hawking and Mlodinow wrote their famous statement: "Because there is a law like gravity, the universe can and will create itself from nothing…. Spontaneous creation is the reason why there is something rather than nothing, why the universe exists, why we exist,"[193] they risked falling into the same trap that Einstein had when he gave his cosmological constant a value that supported a static universe. Einstein felt compelled to modify his General Theory of

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[193] Hawking and Mlodinow, *The Grand Design*, 106.

Relativity so that it conformed with his scientific beliefs. For Hawking and Mlodinow, their scientific beliefs caused them to ignore the Law of Non-Contradiction by explaining that nothing can simultaneously be something—in this case, not merely gravity, but the particles with which gravity will subsequently interact. When it appears that neither chance nor physical necessity can adequately explain the origins of the cosmos, Hawking and Mlodinow ignore the laws of logic in an attempt to allow the laws of physics to prevail.

Concerned with the directions that it seems scientists are willing to go to provide and defend theories of cosmological origins, Ellis and Silk take up a defense of physics in their article in the publication *Nature*. Pointing out a movement within science that calls for the weakening of the requirements for testability in fundamental physics, they raise the concern that such actions threaten to undermine public confidence in science.[194] The greatest scientific minds are not immune to conjecture, as previously shown by Hawking and further demonstrated by Penrose, who, in a conversation with Craig, highlighted his preference that the symmetry and beauty of mathematics serve as the ultimate causal agent of the cosmos.[195] Ellis and Silk address this fascination with beautiful and simple theories, pointing to the failure of such efforts in the past and declaring that "conclusions arising from mathematics need not apply to the real world."[196] To get scientists pointed back in the proper direction, the duo recommends asking the following question: "What potential observational or experimental evidence is there that would persuade you that the theory is wrong and lead you to abandoning it?"[197]

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[194] Ellis and Silk, "Scientific Method: Defend the Integrity of Physics," 322.

[195] "Sir Roger Penrose and William Lane Craig, The Universe: How did it get here, and why are we a part of it?" accessed March 15, 2024, https://www.youtube.com/watch?v=9wLtCqm72-Y&t=446s.

[196] Ellis and Silk, "Scientific Methods," 322.

[197] Ibid.

Ultimately, what Ellis and Silk are proposing is that only that which is testable be granted the label of science.[198] By making this point, and by criticizing the various theories of cosmological origins, they are, by default, declaring that origins science does not fit within the paradigm of scientific naturalism. Their conclusion is not so much an effort to discredit origins science as it is an acknowledgment that when addressing concepts that are beyond the limits of observation, the rules of scientific naturalism cannot be strictly followed.

## Conclusion

Scientific naturalism is deeply ingrained as the guiding paradigm of the scientific world today, and the standard of living for the world's inhabitants is much higher as a result. Scientists working in fields of operations science within the framework of scientific naturalism and its underlying methodology have extended our lifespans by addressing issues such as food scarcity, water quality, transportation, communication, health care, and a host of other areas that impact the quality and longevity of our lives. As it pertains to operations sciences guided by the paradigm of scientific naturalism, humanity has much to appreciate. As it pertains to origins science, efforts that have taken place thus far within the paradigm of scientific naturalism have revealed a veritable treasure trove of data pertaining to the fundamental building blocks of our universe and the laws that govern them. The fine-tuning parameters can be clearly seen, and the necessity of their nearly unfathomable precision recognized, through scientific naturalism. However, the construct of scientific naturalism prevents it from being able to explain why those parameters exist and how they got here.

The causal agents of scientific naturalism fail to explain the physical origins of the cosmos. Physical necessity works in biology, where living systems can gain an advantage, but

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[198] Ibid, 323.

cosmogeny does not begin with life, and there are no such systems that can gain an advantage in the moments of cosmological origins. Chance is no more effective, as it is ultimately a mathematical expression of probability, and math has no causal power. Darwin was right to categorize chance as merely an expression of ignorance, suggesting a process that was not yet properly understood. Yet what has been understood for centuries is that out of nothing, nothing comes—no matter how much time one might have. Even gravity, when given an infinite amount of time, will not simply begin to exist out of nothing through the causal agents of chance or physical necessity. These causal agents are inadequate, and when the methodology of scientific naturalism is added into the discussion, with requirements for testable hypotheses that generate observable results, it becomes obvious that scientific naturalism is not the proper paradigm to guide origins science.

Ioannidou and Erduran found through their research that scientists are beginning to acknowledge the need for different scientific methodologies to account for the differences between operations and origins science.[199] This may be partially a reflection of the trend that Ellis and Silk noted when they warned of weakening the testability requirements in physics, but it is certainly a reflection of an understanding that sometimes parameters that were established long ago need to be modified to account for advances in technology and scientific understanding. Perhaps, if the scientific community is willing to allow for different scientific methodologies, it is time to encourage the scientific community to allow for the scientific study of the long-discarded third causal agent—design.

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[199] Ioannidou and Erduran, "Beyond Hypothesis Testing," 346.

In the aforementioned conversation with Craig, Penrose stated that his objection to a designer is that he simply does not know how to proceed with that information as a scientist.[200] Having spent a lifetime working within the parameters of scientific naturalism, Penrose is of the opinion that science is the pursuit of how nature did everything. Yet as has been discussed, the singular focus on natural causation has encouraged scientific inquiry of origins in directions that may, at best, never yield fruit or, at worst, promote further acceptance of theories that bend or break the laws of logic and establish their own methodologies. Unfortunately, Penrose could not see the value in shifting the definition slightly so that science is instead the pursuit of how God (or some designing agent) did everything. Admittedly, this introduces metaphysics into physics, but what is the benefit of strictly adhering to a scientific paradigm that would rather deny the correct answer than allow for a supernatural cause, no matter how considerable the evidence may be? Mankind can choose to impose restrictions on the search for truth, but truth, even if it is never discovered or if it is denied, is still truth. By willfully confining this pursuit to only those parameters that have been deemed by man to be acceptable, truths not established by man may remain out of reach, to the detriment of humanity.

The self-imposed restrictions of scientific naturalism, and the dependence on the causal agents of chance and physical necessity must be removed if origins science is to be permitted to explore all possible causes in the search for truth. While doing so would push this particular discipline beyond what Ellis and Silk would comfortably call "science", it does not mean that scientific processes and rigor are relaxed. Rather, it means allowing for the possibility that the evidence could lead to conclusions that would have otherwise been forbidden under scientific naturalism, while expecting that the laws of logic prevail, even if those conclusions appear to

[200] "Sir Roger Penrose and William Lane Craig," 32:50.

lead beyond the laws of nature. To that end, Hume proclaimed: "That no testimony is sufficient to establish a miracle, unless it would be a greater miracle for the testimony to be false than for the thing reported to be true."[201] It is reasonable to wonder if Hume would have studied the testimony of the finely-tuned parameters and concluded that the greater miracle would have been to believe that out of nothing would come something so exquisitely precise, rather than to allow for a designer who is responsible for the origins of the universe. Perhaps Hume would have been willing to concede that the act of creating the laws of nature cannot be a violation of those laws because, prior to the act of creation, there is no law to violate, and that, as a result, origins science requires a different paradigm than operations science. Regardless, the evidence uncovered since the establishment of scientific naturalism reveals the difficulties of forcing scientists to use only physical necessity or chance to formulate theories of cosmological origins. If we are to obtain further scientific understanding of the origin of the universe, scientists must be able to look towards other causal agents, even if the evidence points towards Hoyle's super-intellect.

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[201] Hume, Stapleford, and Goldschmidt, *Hume's Enquiry*, 228.

# BIBLIOGRAPHY


Abraham, Eitan and Andrés J. Kreiner. *Elementary Particles and the Early Universe: A Synergy of Particle Physics and Cosmology in the Birth and Evolution of the Universe*. Boca Raton, FL: CRC Press, 2022.

Adams, Fred C. "The Degree of Fine-Tuning in our Universe — and Others." *Physics Reports* 807 (2019): 1–111.

Alexander, Stephon, Sam Cormack, and Marcelo Gleiser. "A Cyclic Universe Approach to Fine Tuning." *Physics Letters B* 757 (2016): 247–50.

Baffou, E.H., M.J.S. Houndjo, I.G. Salako, T. Houngue, "Inflationary cosmology in f(R,T) modified gravity." *Annals of Physics* 434 (2021): 1–12.

Barbieri, Marcello. "What Is Information?" *Philosophical Transactions: Mathematical, Physical and Engineering Sciences* 374, no. 2063 (2016): 1–10.

Barnes, L. A. "The Fine-Tuning of the Universe for Intelligent Life." *Publications of the Astronomical Society of Australia* 29, no. 4 (2012): 529–64.

Cabrera, Frank. "String Theory, Non-Empirical Theory Assessment, and the Context of Pursuit." *Synthese* 198 (2021): 3671–99.

Collins, Robin. "The Teleological Argument: An Exploration of the Fine Tuning of the Universe." In *The Blackwell Companion to Natural Theology*. Edited by William Lane Craig and J. P. Moreland, 202–81. Newark: John Wiley & Sons Ltd., 2009.

Cowles, Henry M. *The Scientific Method: An Evolution of Thinking from Darwin to Dewey.* Cambridge, MA: Harvard University Press, 2020.

Craig, William Lane. *Five Arguments for God: the New Atheism and the Case for the Existence of God*. London: Christian Evidence Society, 2016.

_____. *Reasonable Faith: Christian Truth and Apologetics* 3rd Ed. Wheaton, IL: Crossway, 2008.

Darwin, Charles. *On the Origin of Species*. 1859. Reprint. Alma Books, 2019.

_____. *The Autobiography of Charles Darwin*. New York: Open Road Integrated Media, Inc., 2003.

Dawkins, Richard. *The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe Without Design.* New York: W. W. Norton & Company, 2015.

Dawson, Gowan and Bernard Lightman, editors. “Introduction.” In *Victorian Scientific Naturalism: Community, Identity, Continuity*, 1–24. Chicago: University of Chicago Press, 2014.

Edgar, William and K. Scott Oliphint, editors. *Christian Apologetics Past and Present: A Primary Source Reader, to 1500*. Volume 1. Wheaton, IL: Crossway, 2009.

Ellis, George and Joe Silk. “Scientific Method: Defend the Integrity of Physics.” *Nature* 516 (2014): 321–23.

Ehrlich, Robert. “What Makes a Theory Testable, or Is Intelligent Design Less Scientific Than String Theory? *Physics in Perspective* 8 (March 2006): 83–89.

Fitch, Walter. *The Three Failures of Creationism: Logic, Rhetoric, and Science.* Berkeley: University of California Press, 2012.

Friederich, Simon. *Multiverse Theories: A Philosophical Perspective*. Cambridge: Cambridge University Press, 2021.

Goff, Philip. “Did the universe design itself?” *International Journal for Philosophy of Religion* 85, (2019): 99–122.

Gould, Roy R. *Universe in Creation: A New Understanding of the Big Bang and the Emergence of Life*. Cambridge, MA: Harvard University Press, 2018.

Gonzalez, Guillermo and Jay Richards. *The Privileged Planet: The Search for Purpose in the Universe*. Washington, DC: Regnery, 2020.

Hancock, Z. B., E. S. Lehmberg, and G. S. Bradburd. “Neo-darwinism still haunts evolutionary theory: A modern perspective on Charlesworth, Lande, and Slatkin (1982).” *Evolution* 75 (2021): 1244–55.

Haught, John F. *Is Nature Enough? Meaning and Truth in the Age of Science*. Cambridge: Cambridge University Press, 2006.

Hawking, Stephen and Leonard Mlodinow. *The Grand Design.* New York: Random House Publishing, 2010.

Hertog, Thomas. *On the Origin of Time: Stephen Hawking’s Final Theory*. New York: Bantam, 2023.

Hoyle, Fred, FRS. “The universe: Past and present reflections.” *Engineering and Science* 45, no. 2 (1981): 8–12.

Hunter, Cornelius. *Science’s Blind Spot: The Unseen Religion of Scientific Naturalism.* New York: Brazos Press, 2007.

Hume, David. *Dialogues Concerning Natural Religion*. 1779. Reprint. Luton: Andrews UK Ltd., 2012.

Hume, David, Scott Stapleford, and Tryon Goldschmidt. *Hume's Enquiry: Expanded and Explained.* New York: Routledge, 2018.

Huxley, Thomas. *Essays Upon Some Controverted Questions*. No publisher. 2009.

Ioannidou, Olga and Sibel Erduran. "Beyond Hypothesis Testing: Investigating the Diversity of Scientific Methods in Science Teachers' Understanding." *Science & Education* 30, no. 2 (April 2021): 345–64.

Kant, Immanuel. *Critique of Pure Reason*. Translated by F. Max Muller. London: Macmillan and Co., 1881.

Keas, Michael N. "Christianity Cultivated Science with and without Methodological Naturalism." *Religions* 14, no. 7 (2023): 927.

Krauss, Lawrence. *A Universe from Nothing: Why is There Something Rather than Nothing.* New York: Simon and Schuster, 2012.

Lennox, John. *Cosmic Chemistry: Do God and Science Mix*? London: Lion Books, 2021.

Lincoln, Don. *Understanding the Universe: From Quarks to Cosmos*. Revised edition. Singapore: World Scientific Publishing Company, 2012.

Linder, E. V. "The Direction of Gravity." *Journal of Physics: Conference Series* 484, no. 1 (2014): 1–8.

Lyell, Charles. *Elements of Geology*. Cambridge Library Collection: Earth Science. 1838. Reprint. Cambridge: Cambridge University Press, 2014.

Merlin, Francesca. "Monod's conception of chance: Its diversity and relevance today." *Comptes Rendus Biologies* 338, no. 6 (2015): 406–12.

Meyer, Stephen C. *Return of the God Hypothesis.* New York: HarperOne, 2021.

Moreland, J. P. and William Lane Craig. *Philosophical Foundations for a Christian Worldview*. Second edition. Downers Grove, IL: IVP Academic, 2017.

O'Flaherty, Niall. "The rhetorical strategy of William Paley's *Natural theology* (1802): Part 1, William Paley's Natural theology in context." *Studies in History and Philosophy of Science Part A* 41, no. 1 (2010): 19–25.

Paley, William. *Natural Theology; Or Evidences of the Existence and Attributes of the Deity.* 1802. Reprint. New York: Classic Works, 2013.

Penrose, Roger, OM FRS. *The Emperors New Mind: Concerning Computers, Minds, and the Laws of Physics*. Oxford: Oxford University Press, 2002.

Penrose, Roger, OM FRS and William Lane Craig. "Sir Roger Penrose and William Lane Craig, The Universe: How did it get here, and why are we a part of it?" The Big Conversation season 2 episode 2. Streamed October 4, 2019. YouTube video, 1:28:18. https://www.youtube.com/watch?v=9wLtCqm72-Y&t=446s.

Rajendran, C. P. “Charles Lyell: The Man Who Unlocked the Earth’s Sprawling History.” *Resonance: Journal of Science Education* 25, no. 7 (July 2020): 895–909.

Rennie, Richard and Jonathan Law, editors. *A Dictionary of Physics*. Eighth edition. Oxford: Oxford University Press, 2019.

Sachs, Mendel. *Physics of the Universe*. London: Imperial College Press, 2010.

Shermer, Michael. “Scientific Naturalism: A Manifesto for Enlightenment Humanism.” *Theology and Science* 15, no. 3 (2017): 220–30.

Silk, Joseph. *The Infinite Cosmos : Questions from the Frontiers of Cosmology*. Oxford: Oxford University Press, 2006.

Smith, Benedict. “Hume and Liberal Naturalism.” In *The Routledge Handbook of Liberal Naturalism.* Edited by Mario De Caro and David Macarthur, 26–35. Abingdon: Routledge, 2022.

Smolin, Lee. *The Life of the Cosmos*. Oxford: Oxford University Press, 1999.

Sproul, R. C. and Keith Mathison. *Not a Chance: God, Science and the Revolt against Reaso*n. Expanded edition. Grand Rapids: Baker Books, 2014.

Stavrinos, Panayiotis and Emmanuel N Saridakis, editors. *Modified Theories of Gravity and Cosmological Applications*. Basel: Multidisciplinary Digital Publishing Institute, 2023.

Taliaferro, Charles. “William Paley: Apologetics of Design and for Culture.” In *The History of Apologetics: A Biographical and Methodological Introduction*. Edited by Benjamin K. Forrest, Joshua D. Chatraw, and Alister E. McGrath. Grand Rapids: Zondervan Academic, 2020.

Vilenkin, Alex. *Many Worlds in One: The Search for Other Universes.* New York: Hill and Wang, 2006.

Wilczek, Frank. *The Lightness of Being: Mass, Ether, and the Unification of Forces.* New York: Basic Books, 2009.