GENERAL REVELATION AND THE
ANTHROPIC COSMOLOGICAL PRINCIPLE:
REASONS FOR OPTIMISM THAT GOD
HAS MADE HIMSELF “KNOWN” TO EVERYONE
by Hal N. Ostrander, Ph.D.

A Paper Presented to
The Evangelical Theological Society
November 22, 1997

INTRODUCTION

The last quarter of the twentieth century is producing an increasing number of scholars characterized by a growing concern for ultimate questions, particularly with respect to those addressing the origin and destiny of the universe. These scholars include philosophers, theologians, and scientists alike, some demonstrating a surprising richness of proficiency in all three disciplines. With the entire cosmos as the object of their intense scrutiny, both on microcosmic and macrocosmic scales, a plethora of penetrating questions is raised at the bidding of these contemporary metacosmologists. Why is the universe the way it is? Why does it appear to be finite? Why does it even exist at all? What are the driving forces behind space, time, matter, energy, and consciousness, and why are they so delicately balanced that the slightest difference in their fundamental makeup would prevent both the creation and perpetuation of life? Furthermore, what cosmic ingredients are necessary for a universe to exist, and how has it, been enabled to support intelligent life? Could there be a range of conceivable universes, each with its own potential for giving rise to special states of existence for various forms of conscious life? Is it possible to construct universes with different sets of natural laws in which life, intelligence, and self-consciousness could exist? And the questions go on interminably.

The purpose of the present study is not to provide answers to the above questions but to emphasize the fact that the very createdness of the universe itself can serve us well as the impetus for exploring such matters within theistic frameworks. The universe, then, insofar as it displays its “createdness” aspects by way of general revelation and by virtue of the kinds of questions it rightfully engenders as a result, gives us a number of reasons to be optimistic about the fact that God has indeed made himself “known” to us naturally, and this has always been the case. But if

---

1 The term metacosmologist is meant as an all-inclusive term, signifying a person of broad scientific interests, namely, someone engaged in the study of metaphysics, cosmology, philosophy of science, physics and nature. Perhaps the best synonym for it is quantum cosmologist.

2 Realize that the study's operative assumption agrees in principle with the overall approach taken by one of general revelation's finest advocates—Bruce Demarest. See Bruce Demarest, General Revelation: Historical Views and Contemporary Issues (Grand Rapids: Zondervan, 1982). 238-41. In brief, Demarest sets forth three comprehensive assertions with respect to general revelation: 1) human beings can properly perceive truth about God.
the revelatory insights normally attributed to general revelation *per se* are viewed from the perspective of a single overarching, metacosmological rubric of sorts--that of the *anthropic cosmological principle*--they seem to take on a collective cogency far more energetic and effectual than at any previous time in the history of theological, philosophical and scientific trialogues.

**The Anthropic Cosmological Principle**

As fascinating as the above questions are, perhaps the supreme metacosmological question, cutting to the heart of all previous matters, is expressed in the philosophically familiar words, “Why is there something rather than nothing?” When such a question is placed before today’s scientific community at large, it is usually examined within the paradigmatic confines of cosmic and/or biological evolution. Hence, it is appropriate to note that a relatively new interpretive approach is making its mark within the overarching paradigm of cosmic evolutionary studies.

As this new proposal attempts to answer the “Why is there something rather than nothing?” question, some believe that the solutions it provides are actually gaining the ascendancy, at least with respect to how the human race could have come to inhabit a cosmos initially and how the cosmos itself could have come to be instantiated so perfectly with a view to our continued existence. Others believe, however, that it by no means deserves being titled and touted so axiomatically as the “anthropic cosmological principle.”

Assuming the validity of its given designation, there are four recognized formulations of the ACP, but only two will be investigated for present purposes: the weak *anthropic principle* and the *strong anthropic principle*. These two versions of the ACP are defined as follows:

1. The **weak anthropic principle** (WAP): “The observed values of all physical and cosmological quantities are not equally probable but they take on values restricted by the requirement that there exist sites where carbon-based life can develop and the requirement that the Universe be old enough for it to have already done so.”

2. The **strong anthropic principle** (SAP): “The Universe must have those properties which allow life to develop within it at some stage in its history.”

---


4 As an acronym for the “anthropic cosmological principle,” “ACP” will be used frequently throughout the study.

This two-fold definition of the ACP, however, involves more than a simple cataloging of the invariant physical constants it seeks to outline. A number of metacosmologists are beginning to understand this, contending that certain ontological, cosmological, and teleological implications are more intrinsic to the ACP definitions than previously recognized, primarily the WAP and SAP.\(^6\)

Historically, the first in-depth versions of anthropic principles committed to print can be traced back to R. H. Dicke's seminal article written in 1961,\(^7\) but it was first given its said designation by physicist Brandon Carter in 1974.\(^8\) Prior to instituting the Carter nomenclature, "anthropic" lines of reasoning had been applied for decades by such scientific notables as Alfred R. Wallace, Lawrence Henderson, George Wald, G. J. Whitrow, Sir Arthur Eddington, Paul Dirac, Sir Fred Hoyle, Edward R. Harrison, J. B. S. Haldane, Carl Sagan, et al., all of whom contributed to its “cosmic coincidences” line of argumentation and its growing list of physical properties seemingly intrinsic to the universe.\(^9\) Since Carter's time, however, many thinkers have dismissed the ACP as “a mere curiosity,”\(^10\) or have equated it with a “bootstrap” principle of sorts (an idea going back as far as the Greek philosopher Anaxagoras),\(^11\) or have placed it within agnostic

---

6. Rather than continually referring to the Barrow/Tipler definitions, less technical explanations of the WAP and SAP will suffice at this point. When the weak and strong principles are subsequently referred to, the following definitions should be consulted: the weak version should be considered simply as the pure variables, the straight numbers that seem to have extremely improbable coincidental relations to the observed properties of the universe. In contrast, the strong version should be denoted as the organizing principle for why the fundamental constants and parameters of the universe must exist as they do.


frameworks. Regardless of how the ACP has been sketched out historically, a growing body of metacosmologists believes that “it's virtually impossible to avoid it in discussing the major issues of modern physics.”

Quantum Cosmology

Quantum cosmology is not only in search of what could be described as the “origination event” of the universe, but as the most sophisticated branch of theoretical physics it is equally concerned with how the universe has developed and maintained itself since its initially created time-frame. By way of investigation, today's quantum cosmologists often conduct their initial-moment-of-creation research on the level of quantum reality, as perplexing a microcosm as it is. The preeminent challenge faced by researchers on this level is that of identifying and measuring the stuff of which reality is made and determining why its microphysical constants are precise enough to hold the quantum world together (quite literally).

On the other hand, researchers at the cosmic level proceed to delve as deeply as possible into the complexities of how the universe developed into its present-day, large-scale structure, as vast a macrocosm as it is. The challenge here is not only accounting for the extraordinary vastness of the universe but also for the phenomenal accuracy of the physical cosmological constants and parameters that enables it to exist and sustain sentient life. The essential vision of quantum cosmology, then, is to account for these cosmic events and forces on both microcosmic and macrocosmic scales of reality, implying that a knowable theory of the entire universe will someday be achieved via the unification of all physics.

A number of today's physicists and mathematicians are boldly seeking to establish such a theory of the universe, one that is simple and complete and in which the difficulties of quantum theory (Niels Bohr et al.) and relativity theory (Albert Einstein) will be synthesized mathematically to formulate what has been dubbed a *quantum theory of gravity*, the alleged missing component to a unified theory of the cosmos. Their eventual goal, which for some seems rather peremptory in nature, is to compile not only a reliable but a final recipe for the cosmos as well.

On the quantum level the ingredients for the recipe to date include four fundamental forces--gravity, electromagnetism, and the subatomic strong and weak forces--which interact continuously with hundreds of atomic/subatomic particles in bizarre and unpredictable ways. At this level the recipe for reality is fuzzy and difficult to decipher; the quantum uncertainty built

---

12 John Barrow holds the position that “strong anthropic coincidences cannot be the basis of a cogent argument for God's existence from apparent anthropocentric design in the universe, although they are consistent with such a conclusion.” John D. Barrow, “Life, the Universe, and the Anthropic Principle,” *The World and 12* (August 1987): 186. As he develops his position further, 187, he concludes: “There cannot be an inevitable logical proof of God's existence, nor one of his nonexistence either. There will always be a choice about the credibility of assumptions.”


into these subatomic interactions often yield strange phenomena. The cumulative outcome, then, of all this curious quantum activity over a timescale, of apparently ten to fifteen billion years is nothing less than the universe as it appears today in all its astronomical grandeur.\(^\text{15}\)

For the most part, metacosmologists agree that whatever cosmic evolutionary processes are in fact at work assembling the universe into its present form must not only be depicted in terms of having originated from a primeval cosmic explosion--the “big bang”--but must also be portrayed in terms of a continuous, law-sustaining cosmic nexus. In other words out of big bang cosmology emerges a universe of almost unfathomable axial dimensions as well as an equally unfathomable richness and diversity of life (at least on this one planet), and out of continuous law-like, nexal activity a universe of endless teleological diversity is cosmically extended.

**The Anthropic Cosmological Principle and Quantum Cosmology**

The present discussion, then, takes the position that the weak and strong versions of the ACP not only give us a stimulus to reflect upon the laws of nature that oversee the cosmos but also the opportunity to see our humanity in light of beneficent anthropic privileges. Simply put, did God create the universe in such a way that human beings, made expressly in his image, could enjoy a prominent contingency role in his cosmic undertakings?\(^\text{16}\) Many theorists answer the question with a confirmed, “Yes!”

If such is the case, the ACP may be legitimately and actively engaged to reinterpret theories of universal origins in terms of what will be called a *theistic quantum cosmology*, the kind of cosmology that understands more fully the exceptional significance of the cosmic/anthetic constants and parameters than does its more naturalistic counterpart, quantum cosmology *per se*. Insofar, then, as the ACP may be construed as the operative or regulative principle for defining and propagating a theistically-based quantum cosmology, any new cosmology based on its redefining capacities could then serve as a theistic alternative to the now dominant cosmic/biological evolutionary paradigm, based as it is on the tenets of *methodological naturalism*.\(^\text{17}\)

---

\(^\text{15}\) For a sweeping survey of how the universe is thought to be constructed, see Herbert Friedman, *The Astronomer's Universe: Stars, Galaxies, and Cosmos* (New York: Ballantine Books, 1990).

\(^\text{16}\) As Eman McMullin states, “if the universe is taken to be the work of a Creator who wills that conscious life should develop in it, then the presence of such life would in this sense ‘explain’ the co-presence in the universe of whatever physical features are necessary as means to that end. In the traditional Christian perspective, the act of Divine Creation has man as its focus.” Eman McMullin in Arthur R. Peacocke, ed., “How Should Cosmology Relate to Theology?” in *The Sciences and Theology in the Twentieth Century* (Notre Dame: University of Notre Dame Press, 1981), 44.

Cosmic Coincidences and Anthropic Cosmology

En route to a more comprehensive interpretation of the ACP, trained mathematicians are more likely than the average person to understand mathematical expressions of the universal constants and parameters per se, but theologians and philosophers at least make attempts to explore their many and varied implications. As a consequence, efforts are being launched to develop and promote anthropic cosmologies that use the cosmic coincidences and their apparent “design” characteristics to best advantage, the advantage of a theistically-interpreted universe. For instance, on the one hand, theist Patrick Wilson believes "there must be some hard-to-define features of human beings that . . . are what make the possibility of our presence in the universe significant enough to call for an anthropic sort of explanation,” even as more overtly Christian positions are being espoused by others.

On the other hand, certain well-known opponents to Christian faith also perceive the import of the anthropic constants and parameters. In view of all the possibilities, arguments for the ACP’s validity are beginning to emerge out of interpretive contexts fraught with religious implications, resulting in a synthesizing perspective that sees the ever-growing number of verified constants and parameters as having been cosmically engineered into the overall operation of the universe with a mathematical precision nearing that of sheer perfection. For many, the collective forcefulness of their delicate values points convincingly to a divinely instantiated anthropic design for the universe.

---

18 See Appendices One and Two.

19 Patrick A. Wilson, “What is the Explanadum of the Anthropic Principle?” American Philosophical Quarterly 28:2 (April 1991): 169-70. Wilson's greater concern, however, is for establishing permanent criteria by which certain of these features (e.g., intelligence, morality, consciousness, etc.) may be adjudged valuable enough for inclusion in the ACP’s claim to being an ipso facto principle. Wilson also demonstrates, 168, that the ACP, in all of its versions corporately, betrays both teleological and anthropocentric concerns: the teleological, “insofar as the very notion of fine tuning is intimately linked to a person or principle responsible for the tuning,” and the anthropocentric to the degree that the necessary conditions for galaxies and stars, and even cats and dogs, “can . . . be seen as fine tuning just as much for these objects as for human beings.”

20 For instance, W. Jim Neidhardt transforms the various anthropic principles into what he calls the “extended theistic principle,” arguing that it “represents a comprehensive integration of the ‘anthropic evidence’ and biblical revelation. But this . . . principle will only be accepted as knowledge in communities that acknowledge the validity of all experience, including religious experience, and that, furthermore, perceive all reality to be open-ended in structure always pointing beyond to a transcendent order that provides its meaning.” W. Jim Neidhardt, “The Anthropic Principle: A Religious Response,” Journal of the American Scientific Affiliation 36:4 (December 1984): 206.

21 Atheist J. L. Mackie affirms: “There is only one actual universe, with a unique set of basic materials and physical constants, and it is therefore surprising that the elements of this unique set-up are just right for life when they might easily have been wrong.” J. L. Mackie, The Miracle of Theism: Arguments For and Against the Existence of God (Oxford: Clarendon Press, 1982), 141.

22 Vincent Cronin refers to these constants and parameters as those “knife-edge factors prerequisite for life built in to the cosmos.” Vincent Cronin, The View from Planet Earth: Man Looks at the Cosmos (New York: William Morrow, 1981), 10. Cronin concludes, 305, that these factors would “have had to intermesh in space and time in order to provide those narrow margins within which [the] living . . . can exist.”
THE ANTHROPIC COSMOLOGICAL PRINCIPLE
AND QUANTUM COSMOGENESIS

Even in light of what contemporary science has ascertained with respect to the secret
machinery of the cosmos and its uniform operation, the question--“Why is there something
rather than nothing?”--is still undoubtedly the ultimate question lying back of a cosmic genesis, a
question suggesting the fact that the existence of the cosmos is by no means self-explanatory.23
In addition, it is a question that must be addressed directly.

A working definition of the term quantum cosmogenesis is therefore in order. An obvious
synonym is simply that of the word creation, but a fuller definition is more difficult to come by
and will always sacrifice its definitional clarity on the altar of lack of completeness, an
incompleteness intrinsic to the very universality of the concept. Beginning with the definition of
quantum cosmology provided by James Hartle, quantum cosmogenesis may be said to focus in on
the self-same following elements:

We aim, in quantum cosmology, to provide a theory of the initial condition of the
universe which will predict testable correlations among observations today . . . . These
include the large scale homogeneity and isotropy of the universe, its approximate spatial
flatness, the spectrum of density fluctuations that produced the galaxies, the homogeneity of
the thermodynamic arrow of time, and the existence of classical spacetime.24

In other words, the more familiar definition of quantum cosmology can be utilized as the
basis for determining the definitional boundaries of quantum cosmogenesis, the major difference
between the two concepts only being a shift in emphasis. Quantum cosmogenesis, then, requires
something of an increase in focus, one that not only takes the elements of quantum cosmology
into account but also sharpens its vision more in the direction of the very moment of creation
itself. How that singular moment affects subsequent spacetime events can be explained best by
incorporating a set of insights derived only from the triune sharing of philosophy, theology and
science as disciplines.25 The moment of creation, therefore, involves both the realm of the
quantum world and the realm of the cosmos at large, hence the term -quantum cosmogenesis.-26 In
turn, quantum cosmogenesis must be examined in terms of the interpretive framework for
creation it has produced--“big bang” cosmology.

23 Howard J. Van Till, Robert E. Snow, John H. Stek, and Davis A. Young, Portraits of Creation: Biblical
and Scientific Perspectives on the World's Formation (Grand Rapids: Eerdmans, 1990), 122.
24 James B. Hartle, “The Quantum Mechanics of Cosmology,” in S. Coleman, ed., Quantum Cosmology and
25 “Theoretical cosmology is but the starting point fro deeper philosophical inquiries.” E. A. Milne, Relativity,
26 “The very largest structures of nature appear to be inextricably linked to the very smallest. Because of this
symbiotic relationship between the sciences of the macro- and micro-worlds cosmologists and elementary particle
physicists have joined forces in their quest to elucidate the earliest moments.” John D. Barrow and Joseph Silk, The
214.
Big Bang Cosmology

By way of introduction, big bang cosmology is a catch-all term for models of the universe that reason backward from the speed at which countless galaxies are presently moving apart to postulate a time—or better, a beginning of time—when all matter and energy were contained in a superdense, primeval mass which has come to be known as a “singularity.” For some reason this singularity (or “cosmic egg” in less scientific nomenclature) eventually exploded cataclysmically, with the cosmic blast apparently emerging out of a set of unknown initial conditions within the singularity to create the very set of manifest spacetime conditions necessary for galaxies, stars, and planets to form.27

Adherents of such a cosmology believe that the big bang explosion occurred anywhere from eight to twenty billion years ago, with either limit of the spectrum accounting in different ways for the time needed to structure the still-expanding universe into its present large-scale form. Contemporary metacosmologists seek to describe the whole process mathematically by constructing frameworks of explanation broad enough to support the big bang theory's credibility. With regard to the universe having had a beginning, an actual creation moment in spacetime, the mathematics involved becomes so ingenious and complicated that many of the world's top theoretical physicists are challenged by the deductive sequences they present. In large measure these mathematical sequences stem primarily from Einstein's relativity theories and their consequent field equations.

The Initial Moment of Creation

Questions surrounding the initial moment of creation from the perspective of big bang cosmologies are bound up necessarily with both the theoretical and observational sides of quantum cosmology, each of which attempts to explore the subsequent unfolding and ultimate fate of the universe in terms of what transpired post-quantum cosmogenesisly, that is, within a few milliseconds of the creation event itself.28 But this does not preclude, from the theoretical side at least, the possibility of pursuing cosmological models featuring a first-moment-in-time

27 As Jayant Narlikar formulates it: “So we have the following description of a big bang Universe. At an epoch, which we may denote by \(\tau = 0\), the Universe explodes into existence. . . . The epoch \(\tau = 0\) is taken as the event of ‘creation.’ Prior to this there existed no Universe, no observers, no physical laws. Everything suddenly appeared at \(\tau = 0\). The ‘age’ of the Universe is defined as the cosmic time which has elapsed since this event. . . . Although scientists are not in the habit of discussing the creation event or the situation prior to it, a lot of research has gone into the discussion of what the Universe was like immediately after its creation.” Jayant V. Narlikar, The Structure of the Universe (Oxford: Oxford University Press, 1977), 125. Interestingly, Narlikar makes it clear elsewhere that “the \(\tau = 0\) instant does not warrant ‘miracles’ or ‘divine intervention’.” Jayant V. Narlikar, “The Concepts of ‘Beginning’ and ‘Creation’ in Cosmology,” Philosophy of Science 59:3 (September 1992): 366.

28 Narlikar, one of the big bang’s most ardent opponents, complains that too many cosmologists are ignoring the real creation event for the sake of focusing in on the sequence of spacetime events immediately following it, i.e., post-creation events. He remarks: "The most fundamental question in cosmology is, ‘Where did the matter we see around us originate in the first place?’ This point has never been dealt with in the big bang cosmologies in which, at \(\tau = 0\), there occurs a sudden and fantastic violation of the law of conservation of matter and energy. After \(\tau = 0\) there is no such violation. By ignoring the primary creation event most cosmologists turn a blind eye to the above question.” Narlikar, The Structure of the Universe, 136-37.
construct, “an instant that has no temporal predecessor,” although the observational side of such primordial constructs lacks indisputable empirical support.²⁹

A Spacetime Singularity Creation

Inasmuch as the spacetime singularity creation event allowed the present configuration of the spacetime cosmos to arise and take shape within a set of seemingly prearranged mathematical parameters, it is viewed by some as the perfect mathematical event. Created human realities, as finitudinally and temporally ensconced as they are by three dimensions of space and one of time, are mirrored clearly by a certain indispensableness of contingency within creation, the kind of necessity that calls for a series of anthropic restraints to work out the preconditions for our existence within a spacetime dimensionality, the actual place of our existence.

In addition, a set of creation parameters manufactured and laid out for the very possibility of importing human existence into a four dimensional universe, more specifically a nine to ten planet solar system, is required for the eventual creation of a habitat for humankind. Some metacosmologists purport that both sets of creation parameters, when considered in toto statistically, border on one chance in infinity of having been constructed to such levels of anthropic near-perfection; the window for human existence in the cosmos/solar system is indeed narrow. If any other set of universal conditions (i.e., other than those listed in Appendices One and Two) had prevailed at the singularity, “the cosmos would have winked out of existence the instant after it had been created.”³⁰

This raises a serious question: How did the initial conditions of the singularity, characterized by particular ACP-parameters, get so prearranged prior to the big bang explosion, so much so that they virtually guaranteed the continued existence of the universe after the blast, much less sending it on its way to becoming the future home of the human species? And how did the singularity's initial conditions determine (predetermine?) the configuration of the cosmos during those exceedingly important post-creation micromoments? However these questions are eventually answered in the future, responses will not be found in the notion that the naked singularity itself qualifies as deity but the answers reasonably point in the direction of God's existence.

²⁹ Adolf Grünbaum, “The Pseudo-Problem of Creation in Physical Cosmology,” *Philosophy of Science* 56:3 (September 1988): 380 (emphasis original). As Hawking once affirmed: “If, as is the case, we know only what has happened since the big bang, we could not determine what happened beforehand. As far as we are concerned, events before the big bang can have no consequences, so they should not form part of a scientific model of the universe. We should therefore cut them out of the model and say that time had a beginning at the big bang.” Hawking, *A Brief History of Time*, 46.

The Planck Era Barrier

Named after Max Planck, Planck time is defined as that infinitesimally small moment of time ($10^{-43}$ second) after the big bang in which, as far as the operational laws of physics are concerned, the cosmos was born. It is the smallest quantity of time imaginable with any intracosmic signification, a time when there was no earlier time, at least that can be defined meaningfully. Theoretically, then, the Planck era was that incomprehensibly small time frame from the actual big bang creation moment, $t = 0$ up to $10^{-43}$ second, a time represented mathematically by the inequality, $[t] < t_p$.

The initial conditions of the cosmos during the Planck era are almost entirely unknown, but there is unanimity among cosmologists that regardless of what conditions did in fact prevail at the time, the Newtonian-framed law of conservation of matter and energy and the accepted rules of general relativity were explicitly violated. Then, an instant after $10^{-43}$ second after the big bang, the universe would have then begun following conventional laws of physics. Hence, the Planck era may not be spelled out comprehensively enough by researchers until a theory of quantum gravity is achieved, and if the theory is brought to light at all, it will come through yet simpler mathematical theories as well as further quantal experiment.

Closely associated with Planck time is the concept of Planck length. Planck length is defined as the distance light can travel in $10^{-43}$ second; it is that tiny stretch of spacetime ($10^{-33}$ cm) into which the entirety of the mass-energy of the universe was once compressed so that the tremendous gravitational forces at work had to be counterbalanced almost exactly with the force of the big bang's outward expansion rate. Planck length, then, is the complement to Planck time in that it also demands a theory of quantum gravity in order for it to be a workable unit of spacetime measurement so close to $t = 0$, the ultimate creation moment.

In summary, the Planck barrier represents a very important aspect of quantum cosmology, serving to drive cosmologists in the direction of formulating theories of quantum gravity. But, in turn, theories of quantum gravity incite at least some quantum cosmologists to acknowledge the very existence of God. Anthropic parameters, then, somehow embedded deep inside the initial

---

31 Max Planck was the German physicist (1858-1947) who discovered that radiation in its various forms is emitted in discrete bundles or packets of energy called quanta. His story is told in Leon Lederman, The God Particle: If the Universe Is the Answer, What Is the Question? (New York: Houghton Mifflin, 1993), 146-49.

32 It is believed that the initial gravity of the universe at the Planck era ($10^{-43}$ second) was 1027 times greater than the present gravity of the earth. No natural force of conventional physics, says Mark Mahin, would have been sufficient to overcome even a tenth of this gravitational pull in order to allow the cosmic expansion to proceed. Mark Mahin, The New Scientific Case for God’s Existence (Boston: Mindlifter Press, 1985), 36.

33 “We need a theory of quantum gravity instead of classical general relativity to extrapolate our model to epochs earlier than $t_p.” Narlikar, “The Concepts of ‘Beginning’ and ‘Creation’ in Cosmology,” 369. Other scientists agree: “Although physicists have devised quantum theories that unite three of the forces [electromagnetism, the weak nuclear force, and the strong nuclear force], one by one, through eras going back to the Planck Time, they have so far not been able to bring gravity into the fold. To do so, they must reconcile the laws of quantum mechanics, which operate at microcosmic scales, and Einstein’s theory of gravitation.” George Constable and Ellen Phillips, eds., Voyage Through the Universe--The Cosmos (Richmond, Virginia: Time-Life Books, 1988), 105.

34 Gribbin, In the Beginning, 166.
conditions of the singularity, seem to take on the robust status normally accorded only to laws of nature. As Corey states: “[T]he laws of Nature had to have been in existence prior to the initial unfolding of the Big Bang,” that is, they “must have in some sense preceded the actual Big Bang itself” so that when the explosion did in fact take place “[the singularity] would . . . have been able to explode in such a precise and coherent manner as to produce our miraculous life-supporting universe.”

Subsequently, those same laws of nature would have begun to coalesce and stabilize themselves into the conventional laws of physics known to be operative today.

Briefly, then, the $10^{-43}$ second Planck era and the $10^{-33}$ cm Planck length are prime examples of fundamental constants that must have in some sense existed prior to the big bang in order to have later become essential ingredients for the exploding singularity, for cosmogenesis itself. What still needs to be explained, however, is how the cosmic egg singularity came into existence in the first place, simply to be there awaiting its chance explosion. Not only this, but how could the singularity have been imparted its existence in a way that insured the ACP parameters/laws of nature/fundamental constants having been embedded deeply within it as part of its primordial characteristics, as elemental pieces of its “cosmic eggishness”? The answer compels the serious thinker toward considering the reasonableness of God's existence.

**CONCLUSION**

**On the SAP and the WAP**

Concerning the strong anthropic principle, there is a sense in which it is already a theistic form of the ACP, because it can be defined and implemented as such from the outset. But it is not simply a matter of definitional perspective operating here; it is also a matter of ideological ground motive, a factor that comes into play openly when it becomes necessary to begin interpreting the must aspect of the SAP definition. There are two options for interpreting the must: either the must must connote a cosmic evolutionary force at work within a coincidentally ACP-parametered universe, or it must have a theistic connotation for the same, with the ACP parameters taking on intentioned aspects over against coincidental ones. Granted the universe must possess those characteristics which enable it to support human life (since we are actually here), the question then becomes, “Who or what drives the must, God or chance cosmic evolution?”

Theistic versions of the ACP provide an answer to the question of how an emerging universe came to be so poised initially for a fine-tuning process of sorts, that is, for an anthropically-guided quantum cosmogenesis. In order for the ACP to instantiate its anthropic-driven constants into the proto-spacetime universe at $t = 0$, the principle must be assumed to have been fully in place and quantumly operative at the creation moment itself, the very moment of quantum cosmogenesis. As this organizing principle for the cosmos awaited its

---

appointed emergence from deep within the naked singularity, the SAP became mediately responsible for the optimal arrangement of fundamental constants and WAP descriptive variables now seen to be universally extant.

With this optimal arrangement being built into the cosmic blueprint from the very beginning, ACP constants seem to achieve a maximal triadic consonance in their outworking: 1) they obeyed God's originating, spoken command (as recorded in Gen. 1:3); 2) they brought the infant cosmos into being by way of a creatio ex nihilo modus operandi; and 3) they configured the whole of the geospatial cosmos over the course of some unascertained period of time. The universe, then, must be seen to have been anthropically engineered by God for the sake of the eventual creation of human beings, which, of course, also had its appointed time. It is as if anthropic principles take on the accouterments of a deeper physical mechanism whose purpose it is to fix the apparent parameters of the constants so that human beings can exist within the cosmos.

**TOWARD A THEISTIC QUANTUM COSMOGENESIS**

**Quantum Cosmogenesis as Biblically Warranted**

In the context of present concerns, because the cosmos is finite though unbounded (as the equations of Einstein, Hawking, Roger Penrose, et al. have established), it is reasonable to see the universe as something within the purview of the comprehensible, as being within reach of the discriminable. It is something the human mind can in fact delineate. In keeping, then with the spirit of the incisive statement—“We have no reason to suppose that the rationality of the world is a human artifact”—it becomes legitimate to compare and contrast, if not openly equate, the statement of Genesis 1:1—“In the beginning God created the heavens and earth”—to the whole of things described by cosmology proper. One noted scientist even affirms that the stress placed by Genesis, chapter one, on “a ‘beginning’ and the initial roles of ‘void,’ ‘light,’ and a ‘structureless’ state, may be uncannily close to the verified evidence with which modern science has already supplied us.” In short, the pursuit of quantum cosmogenesis is biblically warranted and may be explored, modified, and redefined as warranted within theistic frameworks only.

---

36 Hugo Meynell places this notion within an apologetics context saying: “Where theism at least is concerned, the stress in apologetics... is an explanation for the intelligibility of the world, rather than... accounting for the gaps in that intelligibility.” Hugo Meynell, “More Gaps for God?” in John M. Robson, ed., *Origin and Evolution of the Universe: Evidence for Design?* (Kingston: McGill-Queen’s University Press, 1987), 253.


39 Benjamin Gal-Or, *Cosmology, Physics, and Philosophy* (New York: Springer-Verlag, 1981), 5. Gal-Or is a physicist employed by the Jet Propulsion Laboratory, Technion-Israel Institute of Technology, Haifa, Israel.
Supracosmic Transcendence

If an ACP model is designated, in turn, as the basis for reinterpreting what scientific disclosures of naturalistic quantum cosmologies bring to us--transforming them logically and empirically into arguments for a theistic quantum cosmogenesis by virtue and permission of the apologetic mandate established in 1 Pet. 3:15), then the ACP variables (as outlined by its weak version) and the ACP constants (as supplied by the stronger version) may be understood to have been creationally and cosmically instantiated \textit{ex nihilo} at \( t = 0 \), and to have unfolded accordingly and subsequently via an ACP-delineated, God-sanctioned process seemingly spanning aeons of cosmic time. If this is the true cosmic picture, then an ACP-eventuality of such magnitude and universal consequence should be understood as the defining moment for the cosmos and human race; it is the point at which the manifold structural objectives of the universe were first introduced and set in motion, even as they are now being carried through to completion as if the cosmic drama had no other alternatives available to it for playing. Moreover, if this kind of an ACP-defined, spacetime inaugural event came about at the instigating hands of a Being transcendent to the material universe, then big bang cosmology has just entered (unknowingly for many of its adherents) the jurisdiction of metaphysics. It suddenly becomes bare cosmogenesis laying hold of theistic explanatory opportunity, only to regard the existence of something or someone \textit{before} the big bang as an undeniable cosmogonic possibility. Insofar, then, as ancient-to-current cosmic structures were instantiated (instanced?) and developed across epochal time according to God’s will and power, they were also simultaneously and operationally defined by a universal set of theistically-devised ACP constants and parameters, the very ones necessary for human beings to have a place to live someday on the grand scale of a universe.

Insofar, then, as it is recognized that the cosmos itself provides no self-caused cause for its own ACP parameters, it must be understood to have received its humanity-engendering variables and constants for human \textit{being}, both ontologically and materially, from something transcendent to it. Hence, to conclude that such a supracosmic transcendence is capable of being expressed to some extent in quantum cosmological terms is to attempt to resolve the difficult issues associated with it by moving either above, or beyond, or perhaps behind the Planck era itself to postulate a time of sorts (an omnitime?) even before the big bang, before \( t = 0 \).\footnote{“To say that ‘before the Planck era there is the wall of ignorance, beyond which we can say nothing’ is a mental self-castration which is the typical outcome of that laziness of intelligence called skepticism.” Giancarlo Cavalleri, “The Finite Past Life of the Universe Demands Its Creation Thus Lending Support to the Anthropic Principle,” in Francesco Bertola and Umberto Curi, eds., Venice Conference of Cosmology and Philosophy, \textit{The Anthropic Principle: Proceedings of the Second Venice Conference on Cosmology and Philosophy}, November 18-19, 1988 (New York: Cambridge University Press, 1989), 221.}

In brief this is the direction theistic quantum cosmology must now take, with a biblically legitimized anthropic cosmological principle as its traveling companion. True, there is a sense in which our current milieu is taking place within a post-Einsteinian paradigm chock-full of ACP-interpretive material, and perhaps realizing this should lead us to agree with Stanley Jaki,
the Hungarian physicist-priest, that “Everything is fully dependent on [God] and the dictum ‘creatio ex nihilo’ will merely reveal the very fullness of that dependence.”

A Final Word

If David as psalmist could say—“When I look up at thy heavens, the work of thy fingers, the moon and the stars set in their place by thee, what is man that thou shouldst remember him, mortal man that thou shouldst care for him?” (Psalm 8:3-4)—how much more then can we empathize with such sentiments here at the dawn of the new millennium. Reasons for optimism, then, abound with respect to the validity of general revelation's ability to reveal the depths of created reality, only to pass on its insights into God's power, intelligence and creativity to us in ways previously unimaginable.

Anthropic cosmological principles are perhaps only the tip of the iceberg as far as mechanisms for unlocking the mysteries of the universe are concerned. There are undoubtedly further cosmic enigmas to be explored by way of the ACP or some such other yet-to-be-discovered principle, and if these enigmas are locked up deep inside the regulatory rules of created reality itself, a transcendent key of sorts will seemingly be required to unlatch them successfully. But if general revelation keeps on keeping on, keeps on revealing the mind of God, if you will, as it has to date, then general revelation is clearly metascientific, even metaconceptual or metatheoretical, in scope—something to be optimistic about, if for no other reason than the fact it still gives us something to do!

41 Jaki, Cosmos and Creator, 63.

42 As Steven Weinberg notes: “There are mysteries at the outer boundaries of our science, matters that we cannot hope to explain in terms of what we already know. When we explain everything we observe, it is in terms of scientific principles that are themselves explained in terms of deeper principles. Following this chain of explanations, we are led at last to laws of nature that cannot be explained within the boundaries of contemporary science.” Steven Weinberg, “Life in the Universe,” Scientific American, October 1994, 45.
APPENDIX ONE

EVIDENCE FOR THE FINE TUNING OF THE UNIVERSE

More than two dozen parameters for the universe must have values falling within narrowly defined ranges for life of any kind to exist.

1. strong nuclear force constant
   - if larger: no hydrogen; nuclei essential for life would be unstable
   - if smaller: no elements other than hydrogen

2. weak nuclear force constant
   - if larger: too much hydrogen converted to helium in big bang, hence too much heavy element material made by star burning; no expulsion of heavy elements from stars
   - if smaller: too little helium produced from big bang, hence too little heavy element material made by star burning; no expulsion of heavy elements from stars

3. gravitational force constant
   - if larger: stars would be too hot and would burn up too quickly and to unevenly
   - if smaller: stars would remain so cool that nuclear fusion would never ignite, hence no heavy element production

4. electromagnetic force constant
   - if larger: insufficient chemical bonding; elements more massive than boron would be too unstable for fission
   - if smaller: insufficient chemical bonding

5. ratio of electromagnetic force constant to gravitational force constant
   - if larger: no stars less than 1.4 solar masses, hence short stellar life spans and uneven stellar luminosities
   - if smaller: no stars more than 0.8 solar masses, hence no heavy element production

6. ratio of electron to proton mass
   - if larger: insufficient chemical bonding
   - if smaller: insufficient chemical bonding

7. ratio of numbers of protons to electrons
   - if larger: electromagnetism would dominate gravity, preventing galaxy, star, and planet formation
   - if smaller: electromagnetism would dominate gravity, preventing galaxy, star, and planet formation

8. expansion rate of the universe
   - if larger: no galaxy formation
   - if smaller: universe would collapse prior to star formation

9. entropy level of the universe
   if larger: no star condensation within the proto-galaxies
   if smaller: no proto-galaxy formation

10. mass density of the universe
    if larger: too much deuterium from big bang, hence stars burn too rapidly
    if smaller: insufficient helium from big bang, hence too few heavy elements forming

11. velocity of light
    if faster: stars would be too luminous
    if slower: stars would not be luminous enough

12. age of the universe
    if older: no solar-type stars in a stable burning phase in the right part of the galaxy
    if younger: solar-type stars in a stable burning phase would not yet have formed

13. initial uniformity of radiation
    if smoother: stars, star dusters, and galaxies would not have formed
    if coarser: universe by now would be mostly black holes and empty space

14. fine structure constant (a number used to describe the fine structure splitting of spectral lines)
    if larger: DNA would be unable to function; no stars more than 0.7 solar masses
    if smaller: DNA would be unable to function; no stars less than 1.8 solar masses

15. average distance between galaxies
    if larger: insufficient gas would be infused into our galaxy to sustain star formation over an adequate time span
    if smaller: the sun's orbit would be too radically disturbed

16. average distance between stars
    if larger: heavy element density too thin for rocky planets to form
    if smaller: planetary orbits would become destabilized

17. decay rate of the proton
    if greater: life would be exterminated by the release of radiation
    if smaller: insufficient matter in the universe for life

18. $^{12}$Carbon ($^{12}$C) to $^{16}$Oxygen ($^{16}$O) energy level ratio
    if larger: insufficient oxygen
    if smaller: insufficient carbon ground state energy level for $^4$Helium ($^4$He)
    if larger: insufficient carbon and oxygen
    if smaller: insufficient carbon and oxygen

20. decay rate of $^8$Beryllium ($^8$Be)
    if slower: heavy element fusion would generate catastrophic explosions in all the stars
    if faster: no element production beyond beryllium and, hence, no life chemistry possible

21. mass excess of the neutron over the proton
    if greater: neutron decay would leave too few neutrons to form the heavy elements essential
for life
*if smaller:* proton decay would cause all stars to collapse rapidly into neutron stars or black holes

22. initial excess of nucleons over anti-nucleons
   *if greater:* too much radiation for planets to form
   *if smaller:* not enough matter for galaxies or stars to form

23. polarity of the water molecule
   *if greater:* heat of fusion and vaporization would be too great for life to exist
   *if smaller:* heat of fusion and vaporization would be too small for life's existence; liquid water would become too inferior a solvent for life chemistry to proceed; ice would not float, leading to a runaway freeze-up

24. supernovae eruptions
   *if too close:* radiation would exterminate life on the planet
   *if too far:* not enough heavy element ashes for the formation of rocky planets
   *if too frequent:* life on the planet would be exterminated
   *if too infrequent:* not enough heavy element ashes for the formation of rocky planets
   *if too late:* life on the planet would be exterminated by radiation
   *if too soon:* not enough heavy element ashes for the formation of rocky planets

25. white dwarf binaries
   *if too few:* insufficient fluorine produced for life chemistry to proceed
   *if too many:* disruption of planetary orbits from stellar density; life on the planet would be exterminated
   *if too soon:* not enough heavy elements made for efficient fluorine production
   *if too late:* fluorine made too late for incorporation in proto-planet

26. ratio of exotic to ordinary matter
   *if smaller:* galaxies would not form
   *if larger:* universe would collapse before solar type stars could form
APPENDIX TWO

EVIDENCE FOR THE DESIGN OF THE GALAXY-SUN-EARTH-MOON SYSTEM FOR LIFE SUPPORT

The following parameters of a planet, its moon, its star, and its galaxy must have values falling within narrowly defined ranges for life of any kind to exist. Characteristics 2 and 3 have been repeated from Appendix One since these apply to both the universe and the galaxy.

1. galaxy type
   - if too elliptical: star formation would cease before sufficient heavy element build-up for life chemistry
   - if too irregular: radiation exposure on occasion would be too severe and heavy elements for life chemistry would not be available

2. supernova eruptions
   - if too close: life on the planet would be exterminated by radiation
   - if too far: not enough heavy element ashes would exist for the formation of rocky planets
   - if too frequent: life on the planet would be exterminated
   - if too infrequent: not enough heavy element ashes would be present for the formation of rocky planets
   - if too late: life on the planet would be exterminated by radiation
   - if too soon: not enough heavy element ashes would exist for the formation of rocky planets

3. white dwarf binaries
   - if too few: insufficient fluorine would be produced for life chemistry to proceed
   - if too many: planetary orbits would be disrupted by stellar density; life on the planet would be exterminated
   - if too soon: not enough heavy elements would be made for efficient fluorine production
   - if too late: fluorine would be made too late for incorporation in protoplanet

4. parent star distance from center of galaxy
   - if farther: quantity of heavy elements would be insufficient to make rocky planets
   - if closer: galactic radiation would be too great, stellar density would disturb planetary orbits out of life support zones

5. number of stars in the planetary system
   - if more than one: tidal interactions would disrupt planetary orbits
   - if less than one: heat produced would be insufficient for life

6. parent star birth date
   - if more recent: star would not yet have reached stable burning phase; stellar system would...

---

44 The entirety of Appendix Two is taken from Ross, The Creator and the Cosmos, 138-41.
contain too many heavy elements
*if less recent:* stellar system would not contain enough heavy elements

7. parent star age
   *if older:* luminosity of star would change too quickly
   *if younger:* luminosity of star would change too quickly

8. parent star mass
   *if greater:* luminosity of star would change too quickly; star would bum too rapidly
   *if less:* range of distances appropriate for life would be too narrow; tidal forces would disrupt
   the rotational period for a planet of the right distance; uv radiation would be inadequate for
   plants to make sugars and oxygen

9. parent star color
   *if redder:* photosynthetic response would be insufficient
   *if bluer:* photosynthetic response would be insufficient

10. parent star luminosity relative to speciation
    *if increases too soon:* would develop runaway greenhouse effect
    *if increases too late:* would develop runaway glaciation

11. surface gravity (escape velocity)
    *if stronger:* planet's atmosphere would retain too much ammonia and methane
    *if weaker:* planet's atmosphere would lose too much water

12. distance from parent star
    *if farther:* planet would be too cool for a stable water cycle
    *if closer:* planet would be too warm for a stable water cycle

13. inclination of orbit
    *if too great:* temperature differences on the planet would be too extreme

14. orbital eccentricity
    *if too great:* seasonal temperature differences would be too extreme

15. axial tilt
    *if greater:* surface temperature differences would be too great
    *if less:* surface temperature differences would be too great

16. rotation period
    *if longer:* diurnal temperature differences would be too great
    *if shorter:* atmospheric wind velocities would be too great

17. rate of change in rotation period
    *if larger:* surface temperature range necessary for life would not be sustained
    *if smaller:* surface temperature range necessary for life would not be sustained

18. age
    *if too young:* planet would rotate too rapidly
    *if too old:* planet would rotate too slowly
19. magnetic field
   *if stronger:* electromagnetic storms would be too severe
   *if weaker:* ozone shield and life on the land would be inadequately protected from hard stellar and solar radiation

20. thickness of crust
   *if thicker:* too much oxygen would be transferred from the atmosphere to the crust
   *if thinner:* volcanic and tectonic activity would be too great

21. albedo (ratio of reflected light to total amount falling on surface)
   *if greater:* runaway glaciation would develop
   *if less:* runaway greenhouse effect would develop

22. collision rate with asteroids and comets
   *if greater:* too many species would become extinct
   *if less:* crust would be too depleted of materials essential for life

23. oxygen to nitrogen ratio in atmosphere
   *if larger:* advanced life function, would proceed too quickly
   *if smaller:* advanced life functions would proceed too slowly

24. carbon dioxide level in atmosphere
   *if greater:* runaway greenhouse effect would develop
   *if less:* plants would be unable to maintain efficient photosynthesis

25. water vapor level in atmosphere
   *if greater:* runaway greenhouse effect would develop
   *if less:* rainfall would be too meager for advanced life on the land

26. atmospheric electric discharge rate
   *if greater:* too much fire destruction would occur
   *if less:* too little nitrogen would be fixed in the atmosphere

27. ozone level in atmosphere
   *if greater:* surface temperatures would be too low
   *if less:* surface temperatures would be too high; there would be too much uv radiation at the surface

28. oxygen quantity in atmosphere
   *if greater:* plants and hydrocarbons would bum up too easily
   *if less:* advanced animals would have too little to breathe

29. tectonic plate activity
   *if greater:* too many life forms would be destroyed
   *if less:* nutrients on ocean floors (from river run off) would not be recycled to the continents through tectonic uplift
30. oceans-to-continents ratio
   if greater: diversity and complexity of life forms would be limited
   if smaller: diversity and complexity of life forms would be limited

31. global distribution of continents (for Earth)
   if too much in the southern hemisphere: seasonal temperature differences would be too severe
   for advanced life

32. soil mineralization
   if too nutrient poor: diversity and complexity of life forms would be limited
   if too nutrient rich: diversity and complexity of life forms would be limited

33. gravitational interaction with a moon
   if greater: tidal effects on the oceans, atmosphere, and rotational period would be too severe
   if less: orbital obliquity changes would cause climatic instabilities; movement of nutrients and
   life from the oceans to the continents and continents to the oceans would be insufficient;
   magnetic field would be too weak