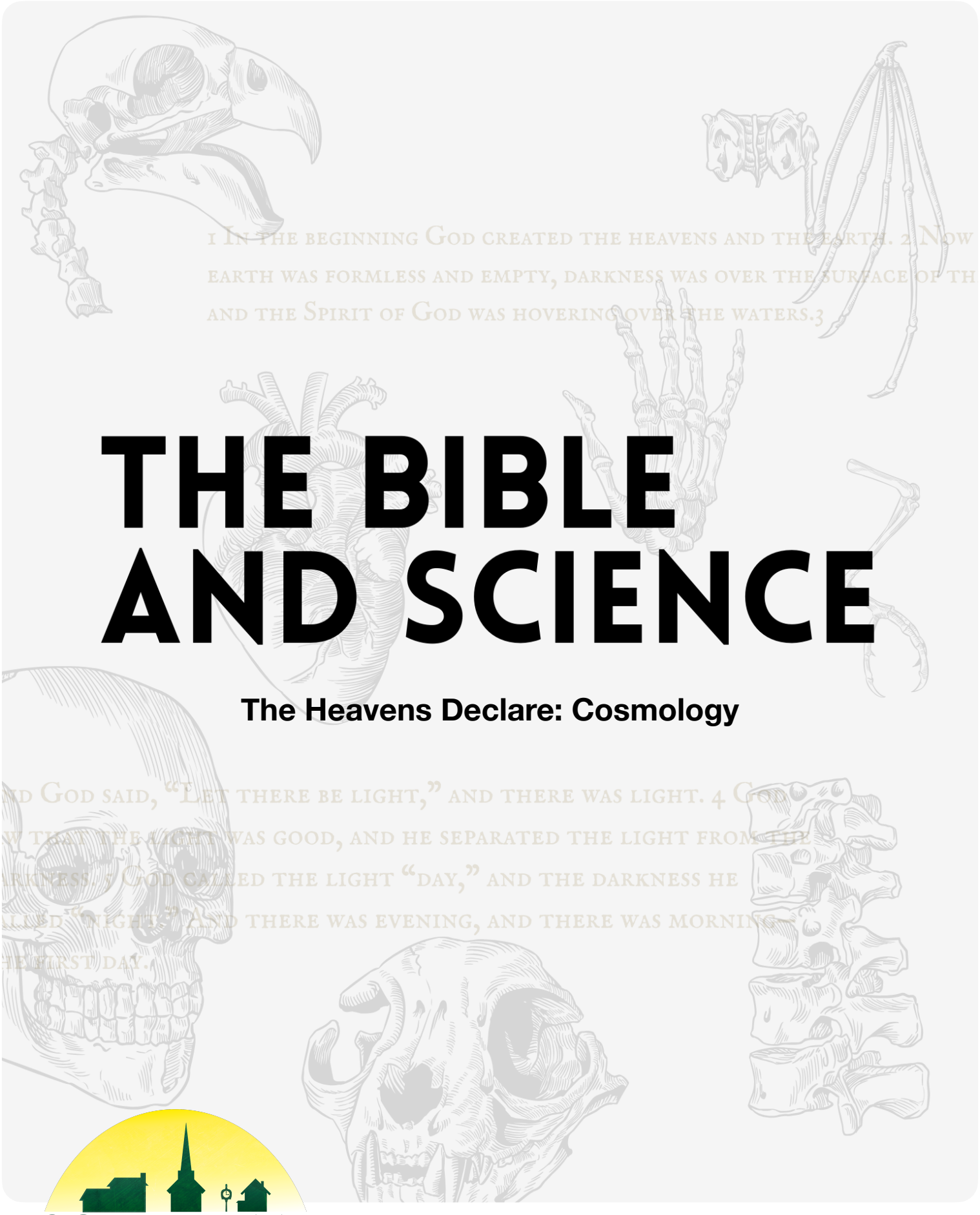

THE BIBLE AND SCIENCE

The Heavens Declare: Cosmology

COMMUNITY BIBLE CHURCH

The Heavens Declare: Cosmology

Cosmology: The Finite Universe points to a TRANSCENDENT CAUSE

In 1800, Pierre-Simon Laplace (the French Newton), developed an explanation of the formation and stability of our solar system that did not call for any divine intervention. This development in astronomy coincides with discoveries and subsequent theories in geology and biology. Scientific "progress" appeared to make it possible to explain our solar system, our planet, and life on earth in purely naturalistic terms.

At the time, physicists who adopted a naturalist/materialist philosophy believed that the universe was infinite in TIME & SPACE — they assumed that the universe had always existed.

Materialist Model of the Universe:

- Eternal
- Self-existent
- Self-creating
- Self-organizing
- Autonomous from any outside forces
- No design, no purpose, no God

Signs of A Beginning

In the 1920s Edwin Hubble, a lawyer turned astronomer has access to new technology, gigantic dome telescopes. These giant telescopes allowed scientists for the first time to resolve the tiny points of light we could see in the distant night sky so that we could confirm that there are other galaxies out there besides our own.

Hubble discovered that these little tiny points of light had structure. He discovered that, as far back as we could look into the field, there were more and more galaxies in every direction. Hubble also discovered that, the further away a galaxy appear to be, the faster it was receding (Hubble's Law). His discoveries served as evidence that the universe is expanding. A key implication of this discovery is that if you wind the clock backwards, at some point you arrive at a ***beginning*** to the expansion — a beginning of the universe.

A few years prior to Hubble's discovery, Albert Einstein's theories were leading him to the very same conclusion. Einstein saw the implications but wasn't a fan. The implication was clearly that there must've been a cause to the universe that is not a part of the universe, that is beyond the universe. In order to counter this implication, Einstein introduced an arbitrary factor into his equations which he called the "cosmological constant".

> **Cosmological Constant:** a "term reluctantly added by Albert Einstein to his equations of general relativity in order to obtain a solution to the equations that described a static universe, as he believed it to be at the time. The constant has the effect of a repulsive force that acts against the gravitational attraction of matter in the universe. When Einstein heard of the evidence that the universe is expanding, he called the introduction of the cosmological constant the "biggest blunder" of his life. However, recent observations have detected a repulsive force, somewhat similar to the cosmological constant, that is dubbed dark energy and is the dominant component of the universe."[1]

After seeing the evidence for himself, firsthand, Einstein acknowledged to the media that, "I now see a necessity of a beginning." The reason this idea is resisted is because, if matter can be infinite in time, then it can be the thing from which everything comes. It allows an escape from the ages old claim from the philosophers and theologians that there was a beginning and that, because the universe had a beginning, the universe had a cause that transcends the itself.

Allan Sandage (astronomer) was a student of Edwin Hubble's who helped in the experimental work confirming the red shift and expansion of the universe and who continued Hubble's research program after Hubble died in 1953. Sandage stated in a presentation at a conference on the subject of human consciousness in 1985 that, "Here is evidence for what can only be described as a supernatural event. There is no way that this could have been predicted within the realm of physics as we know it."[2] A former agnostic, he confessed at this conference, to the surprise of many in attendance, that his work in the field of astronomy had convinced him that there must be a transcendent creator and he was now a Christian.

I mentioned an astrophysicist that I've found helpful over the years who's story is very similar. Her parents were atheists and she had adopted their views as a young adult headed into the university to study astrophysics. Her testimony is that her study of the cosmos and her special field of studying black holes led her to consider theism and she eventually became a Christian,.

This is not an uncommon occurrence. Astronomer Robert Jastrow, in *God and the Astronomers* observes,

> "This is an exceedingly strange development, unexpected by all but the theologians. They have always accepted the word of the Bible: In the beginning God created heaven and earth. ... It is unexpected because science has had such extraordinary success in tracing the chain of cause and effect backward in time. … For the scientist who has lived by his faith

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[1] https://www.britannica.com/science/cosmological-constant

[2] Quote recounted by Dr. Stephen Meyer in TrueU #1, Episode 2 as an attendee of the conference at which Allan Sandage delivered the cited comments.

> in the power of reason, the story ends like a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries."[3]

Steady State Theory

Sir Fred Hoyle was the architect of steady state model of the universe in 1974. He sought a theory that allowed for the obvious expanding universe but didn't imply a beginning. His model posited a universe that has always been expanding, maintaining a steady density. One of the challenges for his model is that, as it expands, there is more space but less matter in the space. As a result, there has to be more matter popping into existence as time and space go on expanding (continuous creation model). Hoyle's theory didn't really solve the problem, he just spread the mystery out over time.

With two competing theories attempting to explain the same evidence, an expanding universe, more evidence would be required to help scientists judge which theory was more likely the answer.

The Discovery of the Cosmic Microwave Background (CMB)

George Gamow, a theoretical physicist and cosmologist, proposed a way of testing the theories. He predicted that, if everything began in a single hot, dense point, then there would be a remnant of radiation such a "singularity" would have produced. He predicted it should be coming from every direction and that it should be approximately 2.7 degrees above absolute zero.

In 1965, Robert Wilson & Arno Penzias were physicists working for Bell Labs. They kept getting interference in their giant antenna. They wondered if it was being caused by birds interacting with it or something similar. No matter what they tried, they couldn't get rid of the interference. They connected with another physicist, Robert Dickie, who helped them interpret this interference and confirm that it was the CMB at 2.7 degrees above absolute zero that was predicted by Gamow.

In the years that followed, cosmologists began to find the explanation of the big bang to make better sense of the evidence they were seeing than the explanation of Steady State cosmology. Hoyle eventually admitted that his theory was wrong.

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[3] Jastrow, Robert. *God and the Astronomers* (1992), p. 107.

Oscillating Universe Theory

The Oscillating Universe is another theory suggested as a possible alternative to the Big Bang. This theory acknowledges that the universe is expanding, but because of the force of gravity from all the matter in the universe, it will eventually begin to collapse back into itself. This theory posits that the universe "oscillates" back and forth between a "big bang" and a "big crunch" state.

The Oscillating Universe Theory attempts to explain the expanding universe but in a way that permits it still to be an infinite, eternal universe. What does the evidence seem to say? The mechanism that would cause the collapse in this model is gravity. Gravity is the product of mass. Is there enough mass in the universe to cause this collapse? It turns out that there is not. There is only a small fraction of the matter that would be required for this collapse in existence in the universe. Further, not only have we discovered that the universe is expanding, but many scientists think it is increasing its rate of expansion. It's going faster and faster. The expansion force is vastly out-stripping the counter gravitational force.

Creation Ex Nihilo

In 1968, a physicist named Stephen Hawking, was able to solve the field equations of general relativity. The implication of his solution was that, if you could go back in time, the curvature of space-time would get infinitely tight. If you go back far enough, there is zero spatial volume. According to Hawking's solution, not only is there a zero point in time, there is a zero point in space. The obvious implications of these developments can be a little unsettling to a "materialist" philosophy.

The evidence we get from the theory of general relativity and big bang cosmology is remarkably similar to the idea of creation *ex nihilo* that the Bible presents to us in the book of Genesis. Using the most popular theory of cosmic origins among cosmologists today, we're finding that, if we go back far enough in time, you get to a place where time itself begins. If you go back far enough in space, space just evaporates (along with the matter and energy inside space). Arno Penzias, the Nobel Laureate who discovered the CMB, said, "The best data we have (concerning the Big Bang) are exactly what I would have predicted, had I nothing to go on but the five books of Moses, the Psalms, and the Bible as a whole."[4]

All that we have been discussing from the field of cosmology so far is confirmation of a theistic hypothesis. If the biblical model of creation is true, then we have reason to expect evidence of a

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[4] Browne, Malcolm W. Quoting Arno Penzias in "Clues to Universe Origin Expected", *The New York Times* (March 12, 1978

finite universe. We have evidence of a finite universe. Therefore, we have a scientific reason to think that the biblical model of creation is true. The consensus view in cosmology today is that the evidence points to a definite beginning to the universe that requires a cause that is beyond the universe, one that transcends matter, energy, time, and space.

Interestingly, Christians have always conceived of God in this way. God reveals Himself as the I AM—the eternal self-existent one. Something has to be the thing from which everything comes. The evidence seems to rule out matter as a candidate for being that thing.

Astrophysics: The Finely Tuned Universe points to an INTELLIGENT CAUSE

All of the discoveries we've discussed so far point to our universe having a finite beginning and a transcendent cause. Subsequent discoveries about the laws of physics and chemistry lead to the Inference to the Best Explanation (IBE) that there is an intelligent cause to the universe.

A Goldilocks Universe

The strength of gravity is just one of at least 30 separate parameters that must be finely tuned to produce a life-sustaining universe. Another is the cosmological constant which describes the expansion speed of space in the universe. If the universe spreads out too quickly, then material objects can't form. There would be no stars of galaxies or planets. Physicists have determined that the cosmological constant is fine tuned to 1 part in 1 hundred million, billion, billion, billion, billion, billion. That's a 1 with 53 zeros after it.

These evidences are sometimes called the "anthropic fine-tuning evidences". John Polkinghorne, a theoretical physicist at Cambridge, suggested illustrating this as a control panel on an imaginary "universe creating machine". Imagine such a machine on which each dial is set to the precise setting that would ensure that the universe would have exactly the right properties needed to sustain human life on this one planet, in this one solar system, in this one sector, of this one galaxy. Polkinghorne said that such a discovery in which all the dials are set just right should lead to the natural inference that all the dials are set just right because someone set them that way intentionally. The universe is a "set-up" job.

Why do these "coincidences" defy any explanation that attributes their occurrence to chance? We are rightly suspicious of chance as an explanation in instances when we're dealing with incredibly small probabilities. Further, when we see an incredibly improbable event that produces an outcome that is a meaningful, a functional pattern, we justifiably infer design. In other words, the correlation of the conditions that allow for life and the values of the constants of fine-tuning forms a "functionally significant" outcome.

William Dembski describes this formula in his book, *The Design Inference*. Dembski says that when you have an improbable event that produces a pattern or functional outcome, the inference of design is justified. For example, Mount Rushmore illustrates this principle in a way that is easily understood. The shapes carved into the mountain are very improbable. But improbability alone does not necessarily indicate design. The shapes next to the presidents are also improbable, but there they are. What triggers the justifiable inference to design is when you have an extremely improbable event that also conforms to an independently given pattern.

This is how we detect design: fine-tuning allows life to exist. That the universe is precisely tuned to allow life on our planet is a functionally significant outcome that heightens our intuition that design has been involved.

Alternatives to Intelligence Behind Fine-Tuning

There are some counter-arguments to the fine-tuning argument for design in the universe.

Weak Anthropic Principle

The *Weak Anthropic Principle*, sometimes referred to as the "puddle argument", says that we shouldn't be surprised that we live in universe in which the conditions that are necessary for our existence are present. If they were not, we wouldn't be here to observe that fact. While the statement is true, it must be noted that it holds no explanatory power. For example, an insurance investigator who listed the cause of a fire as "oxygen in the air" would not really be identifying the cause of the fire. He correctly identified true factors related to the event. However, there was oxygen in the air before *and* after the fire. The cause of the fire was not the oxygen but the person who placed the accelerant and added a heat source like a lit match.

The *Weak Anthropic Principle* doesn't explain why the necessary conditions of life in the universe exist despite being so improbable. It simply observes that they're there. It confuses a necessary condition with a cause.

Many Worlds Hypothesis

The *Many Worlds (Multi-verse) Hypothesis* proposes that, if there are other universes that exist, we can explain our universe as a chance in a cosmic lottery. If we conclude that our universe is the only one, then the fact that it is so finely-tuned carries a number of inconvenient theological implications. If, on the other hand, we can posit that our universe is just one of an almost infinite number of universes, then chance gets a new lease on life. We can imagine that there are all kinds of universes in which life is not possible, and we just so happen to be sitting in the one that does permit life. Lucky us! We're here to ponder and comment on it.

This hypothesis is not unrelated to the reasoning that goes into using the vastness of our universe and the concept of deep time to make the idea of abiogenesis more palatable despite the insurmountable odds such a concept faces. This concept is purely theoretical. In other words, there is zero evidence that it has any basis in fact.

Further, this proposed solution to fine-tuning simply pushes the problem back a layer. If there is some mechanism that is able to generate universes on the scale that is needed to provide enough possibilities that eventually *ours* is generated, this mechanism itself must be fine-tuned. In attempting to get around fine-tuning, this attempt at an alternative explanation ends up invoking fine-tuning itself.

Design Hypothesis

The *Design Hypothesis* is a much simpler solution than the *Many Worlds Hypothesis*. It employs a natural extrapolation of what we know about the cause and effect structure of the world. When you have a finely tuned system that also produces a function, then you know that intelligence is involved.

London Times science writer, Clifford Longley, points out that the desperation of these counter arguments illustrates in just how tight of a spot atheists find themselves:

> No such argument can ever be absolutely conclusive, and the anthropic fine-tuning argument stops just short of knock-down proof. For there could've been millions and millions of different universes created each with different settings, of the fundamental ratios and constants, so many in fact that one with the right set was eventually bound to turn up by sheer chance. We just happened to be the lucky ones. But there is no evidence for such a theory what-so-ever.
>
> On the other hand the evidence for the truth of the anthropic fine-tuning argument is of such an order of certainty that in any other sphere of science we would regard it as absolutely settled. To insist otherwise is like insisting that Shakespeare was not written by Shakespeare because it might have been written by billions of monkeys sitting at billions of keyboards over billions of years. But so it might.
>
> But the sight of the scientific atheist clutching at such desperate straws has put new spring in the step of the theists. For the first time in more than a hundred years, they no longer feel the need to apologize for their beliefs. Perhaps now, they should apologize for their previous apologies.[5]

[5] Longley, Clifford. “Focusing on Theism”, *London Times* (January 21, 1989), p. 10.

We find multiple competing hypotheses to explain the fine tuning of the universe for life: design, weak anthropic principle, and the multiverse hypothesis. What we have are these increasingly speculative models being proposed to get around what would ordinarily be our intuitive, reasonable conclusion to the observations and data.

We have seen that even from from the details of widely accepted big bang cosmology that the cause of the universe transcends matter, time, space, and energy. We have seen from the fine-tuning of the universe for life that the cause of the universe seems to be rational, intelligent. While this comes as no surprise to those of us who are already convinced of a biblical cosmology, there are some challenges we face if we want to accept the biblical account of creation.

Starlight, Time, and Biblical Cosmology

One of the most common objections to a biblical cosmology or a biblical account of creation in general is the question of evidence for "deep time". It is widely held in the scientific community that the universe is somewhere around 13.8 billion years old and that the earth is about 4.5 billion years old. If those estimates are true, they present a problem for a biblical creation model on a number of levels. In particular, relative to the topic of cosmology/cosmogony, we read in the opening chapter of Genesis that God created the heavens and the earth in six days. Regardless of how you then understand the subsequent chronology of events that unfold in the remaining chapters of Genesis, the time scale since creation that the Bible appears to be presenting is in the range of thousands of years rather than millions or billions. The question is: How do we reconcile the evidence we find in our observations with the biblical account?

For this portion of the class, we're assuming the need for a scientific solution rather than a textual one. Pastor Ken may deal with proposed textual solutions later in the class. There are and have been a number of possible scientific solutions presented by biblical creationists over the years. Some have been abandoned (as should be the case with any scientific theory when new evidence is discovered and its plausibility is diminished) and new and better explanations are developed as we learn more about the amazing universe God has created. What does not change is our confidence that the description from our Creator is the proper starting point from which to explore and search for better understanding of the universe God has created.

At this point, a skeptic would want to point out that this *a priori* commitment to a creationist solution hinders our search for understanding. But it is important that we remember what we established at the outset of this series. One must begin every scientific endeavor from the vantage point of one's worldview. All scientists necessarily do this, including the materialist/naturalist.

Big Bang, Big Problems

Just a few years ago, there was an opinion piece published on the blog of well respected publisher *Scientific American*. The article, "Cosmology Has Some Big Problems", highlights fundamental problems with the current prevailing model of cosmology. Creation.com has a great review of this article that I recommend, especially for any Star Trek fans.[6]

As we've already seen, big bang cosmology has not been without challenges in the past. Why should this be any different? Ironically, the current critique focusses on its adherents' resistance to reevaluating the assumptions that drove them to adopt the theory in the first place as new evidence is discovered that challenge the way the big bang "story" has been pieced together.

The issues are the same challenges frequently made by young earth creationists but which are dismissed simply on the basis of who is making the objection. Creationists frequently point out that big bang cosmology is founded on important core principles and evidence that everyone recognizes (i.e. the discovery of red shift indicating an expanding universe and the presence of the CMB) but that the foundational assumptions behind the theory and much of the connective tissue holding it together is more narrative than actual observation and ongoing discoveries. The article says essentially the same thing in its opening sentances:

> Born out of a cosmic explosion 13.8 billion years ago, the universe rapidly inflated and then cooled, it is still expanding at an increasing rate and mostly made up of unknown dark matter and dark energy ... right?
>
> This well-known story is usually taken as a self-evident scientific fact, despite the relative lack of empirical evidence—and despite a steady crop of discrepancies arising with observations of the distant universe.[7]

He goes on to list numerous examples of discrepancies such as major differences in measurements of the Hubble constant when using different measuring methods[8] and the recent discovery of "galaxies inconsistent with the theory of dark matter"[9]. The article explains that dark matter is essentially a concept contrived as a place holder to help make the math work. As cosmologists have further developed the theory and grappled with new discoveries, they've

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[6] https://creation.com/big-bang

[7] Ekeberg, Bjørn. "Cosmology Has Some Big Problems", *Scientific American* (April 30, 2019). https://www.scientificamerican.com/blog/observations/cosmology-has-some-big-problems/

[8] Ibid., "Discrepancies on the expansion rate have huge implications not simply for calculation but for the validity of cosmology's current standard model at the extreme scales of the cosmos."

[9] Ibid.

added another place holder which they've called dark energy. As far as science is concerned, it's possible that the effects being attributed to dark matter and dark energy represent something real that we will discover at a later time. But as Ekeberg notes,

> It's perhaps worth stopping to ask why astrophysicists hypothesize dark matter to be everywhere in the universe? The answer lies in a peculiar feature of cosmological physics that is not often remarked. For a crucial function of theories such as dark matter, dark energy and inflation, which each in its own way is tied to the big bang paradigm, is not to describe known empirical phenomena but rather to maintain the mathematical coherence of the framework itself while accounting for discrepant observations.
>
> Fundamentally, they are names for something that must exist insofar as the framework is assumed to be universally valid.[10]

Essentially, what the author is saying is that big bang cosmology is an idea that scientists developed in their effort to connect the dots between the various pieces of evidence they were finding. It turned out to be a very useful theory in many ways, not the least of which was to shift our model of the universe from one that is eternal to one that had a beginning. However, because it has been so useful, cosmologists have resisted the growing signs that a new model is needed as new evidence is discovered. But that is changing. Ekeberg goes so far as to say,

> After spending many years researching the foundations of cosmological physics from a philosophy of science perspective, I have not been surprised to hear some scientists openly talking about a crisis in cosmology. In the big "inflation debate" in *Scientific American* a few years ago, a key piece of the big bang paradigm was criticized by one of the theory's original proponents for having become indefensible as a scientific theory.[11]

Instead of revising or abandoning the model for a better one, scientists have posited a number of place holder entities to help maintain the math and their models. To be fair, this is often how science proceeds. For example, black holes are technically still theoretical, but they persist in helping to explain a number of observations and so they continue to be treated as real phenomenon. Nevertheless, things like dark matter, dark energy, and inflation begin to sound strikingly like Einstein's cosmological constant. This is especially true as theories that do not require the invention of such entities are proposed.

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[10] Ibid.

[11] Ibid.

The article ends with a summary of big bang cosmology that should disarm the criticism with which any of it's adherence may be tempted to level at the creationist's commitment to finding a theory that makes sense from within his own worldview.

> The crux of today's cosmological paradigm is that in order to maintain a mathematically unified theory valid for the entire universe, we must accept that 95 percent of our cosmos is furnished by completely unknown elements and forces for which we have no empirical evidence whatsoever. For a scientist to be confident of this picture requires an exceptional faith in the power of mathematical unification.[12]

The Mystery of Distant Starlight

As we noted at the beginning of this section, one of the most common objections to a biblical cosmology or a biblical account of creation in general is the question of evidence for "deep time". This often takes the form of a question about how we can see distant starlight in "Young Earth Creationist" model. The problem summarized is that, if you assume a young age for the earth (thousands of years, not billions), how is it possible for us to see light originating from distances of more than six to ten thousand light years away?

There have been theories presented by creationists over the years to answer this question. Theories that have been popular and of which you may have heard are "Day Age" (more of a textual theory than a scientific one), "Appearance of Age", or "C Decay Rate" theories. Before we address these and more current theories, it should be noted that big bang cosmology also has a problem with light travel in the universe that is commonly referred to as the "Horizon Problem".

Big Bang's Light Problem

In big bang cosmology, the horizon problem describes the model's inability to explain one of the pieces of evidence that originally led to the theory's adoption in the first place—the uniform presence of the CMB in every direction at the consistent temperature of about 2.7° above absolute zero. The simplified description of this problem is that the big bang model posits that the early universe must have been "lumpy", uneven in temperature, in order for matter to eventually begin to form stars and planets. The unevenness of the expanding universe after the big bang would prevent some regions of the universe from ever being in contact with others.

In 1981, Alan Guth proposed the idea of "inflation" to solve the horizon and flatness problems. Inflation posits that very shortly after the big bang, the universe underwent a very rapid expansion to a much larger size. We saw earlier that, despite it's wide acceptance, inflation

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[12] Ibid.

theory has recently been criticized as "indefensible as a scientific theory" by one of it's original proponents.

Another recent solution offered to explain why there would be an equilibrium in temperature in the CMB radiation (a.k.a. light) across the entire universe in spite of there not being enough time (even with 13.8 billion years) for temperatures to equalize (since the radiation travels at the speed of light) is that the speed of light was much faster—up to 10 times faster—in the past. So, the problem of distant starlight is a problem for the naturalist as well as the creationist. And just like the naturists, creationists have proposed theories to solve this mystery.

Creationist Solutions to the Light Problem

One way some creationists have tried to answer the problem of distant starlight being visible on earth is to interpret the Genesis account such that the days of creation are not normal days as we would understand them to be. The "Gap Theory" or "Day Age Theory" would be versions of that approach. Since those are more textually based than science based approaches, we'll not cover them in this portion of the series other than to say that we don't find them convincing or the proper reading of the texts in question.

Another theory that Creationists have explored is a concept commonly referred to as "Appearance of Age". The reasoning is that, just as God created Adam and Eve as adult humans and trees with their fruit on them in the garden, perhaps he created the stars complete with their light in transit to Earth so that they could be seen from Earth at the moment of their creation. The problem with this theory is that, in a very real sense, light carries data or information. So, while it is not problematic or deceptive for God to create a human or a tree that is "functionally mature", it is a very different thing for God to create the appearance of a supernova[13] (the visual story of a star exploding) that never actually happened. For this reason, our friends at Creation.com include this in their list of arguments they recommend creationists not use.[14]

It's worth reiterating here that, while God's Word does not change, our understanding of our world through our scientific study is constantly changing. Therefore, we should not be apprehensive about shifting scientific theories and models. That is how science works. That is why we hold scientific theories loosely and proceed with humility, aware of our limitations. That is also why we should resist the temptation to modify our understanding of what Scripture says to accommodate the shifting consensus in science.

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[13] For example, SN 1987A was a type II supernova 168,000 light years away from earth in a dwarf satellite galaxy of the Milky Way. Light from the explosion reached Earth on February 23, 1987, and its brightness peaked in May of that year. It was the closest observed supernova since Kepler's Supernova in 1604 and was the first supernova that modern astronomers were able to study in great detail.

[14] https://creation.com/en-us/articles/arguments-we-think-creationists-should-not-use

Current Biblical Cosmology Models

There have been at least four cosmological models offered by Young Earth Creationists that agree with a normal reading of the Genesis account and do not require dark matter, dark energy, or arbitrary inflation to cohere. There is a great discussion of these models by Dr. Robert Carter and Dr. Jonathan Sarfati, both of whom we've had as speakers here at CBC in the past, on one of their podcast episodes not too long ago.[15]

The **Setterfield Hypothesis** was popular in the early 2000s. You might recall hearing creationists talking about the concept of "C Decay". The idea was that the speed of light was faster in the past and that would explain how light from stars so far away could reach the Earth in such a short amount of time. This theory is not talked about much these days, though it is still theoretically possible (as noted in the section above about ideas big bang cosmologists use to solve the light problem from their perspective). Most creationists have concluded that it doesn't ultimately solve the problem.

White Hole Cosmology is a theory proposed by Dr. Russell Humphreys in the mid 90s that still holds a great deal of explanatory power. In his book, *Starlight and Time*, Dr. Humphreys provides a relatively easily digested overview of the theory and then details with all the requisite math how this might work.[16] As we learn more about the implications of Einstein's general relativity and quantum mechanics, this theory has seemed to gain more credibility. Essentially, the theory proposes that the sequence of events described in the first three days of the creation week of Genesis 1 are describing what it would be like it if God created the entire universe initially compressed into a black hole (where there is no time), unformed and unfilled. Then as God continued his creative work, running what we think of as a black hole backwards and spreading the universe out, it would become what cosmologists have theorized as a white hole. Just as nothing—not even light—can escape from a black hole, nothing—not even light—can enter a white hole. As God stretches out the heavens, time would flow incredibly fast on the outside of the event horizon relative to hardly any time at all passing on Earth as it is still inside of the event horizon. But then, as Earth crests the event horizon on day 4 of creation week, all of the stars would immediately become visible from earth. This scenario accounts for the light of stars at vast distances from Earth having enough time to reach Earth while maintaining the very real, normal passage of time on Earth as described in Genesis.

Cosmological or Carmelian Special Relativity is a theory used to explain galactic rotational curve and the expansion of the universe without having to resort "fudge factors" such as dark

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[15] https://creation.com/en-us/videos/ct-distant-starlight

[16] Humphreys, D. Russell. *Starlight and Time: Solving the Puzzle of Distant Starlight in a Young Universe* (1994).

matter and dark energy. Moshe Carmeli was a mathematician and physicist who contributed significantly to the development and understanding of Cosmological Special Relativity. His work explored the mathematical and conceptual foundations of this theory, providing a framework that applies the principles of special relativity to the large-scale structure of the universe, including its expansion and the behavior of galaxies. It differs from traditional special relativity by incorporating the expansion of space as a fundamental aspect of the theory. As we saw earlier, Einstein's special relativity deals with the relationship between space, time, and the speed of light in a static, unchanging universe. In contrast, this theory recognizes that the universe is not static but is expanding, and this expansion affects how we perceive space and time on a cosmological scale. This is not a particularly creationist theory, but it takes on additional relevance when examined from a creationist worldview. Some creation scientists have explored this cosmological model within a five-dimensional framework, suggesting that the expansion of the universe occurred in a short period during the creation week and has remained stable since.[17]

Asynchronous Time Convention is a solution proposed by Dr. Jason Lisle. Essentially, it acknowledges that we have no way to measure light in a one way trip. We must always measure the speed of light in a round trip since it is impossible to truly synchronize two clocks that are in two different locations.[18] The instant you move one of the clocks, they are no longer synchronized since gravitational effects impact the flow of time on both clocks and motion further impacts the flow of time on the clock that has been moved. Dr. Lisle has proposed the possibility that the speed of light is asynchronous. In other words, it is possible that light travels at a different speed when it is moving away from us than when it is moving toward us. We don't know that this is the case, and it is somewhat counterintuitive; however, it is possible. If this were true about light, it is possible that the light we are seeing from distant stars is traveling faster than we have assumed light to travel in our standard symmetrical model. For example, it could be that the speed of light traveling away is C over 2 and the light on the return trip is instantaneous.

Which one of these theories is correct? We're not sure. We *can* be sure that we are all still learning and have much more to learn. We can also be sure that the Biblical account of Genesis has not been shown to be incorrect and that, when we start with its account, we find a wealth of explanatory options available to us as we explore the amazing universe that God has created.

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[17] See paper by creationist John Hartnett who knew and collaborated with Carmeli at https://creation.com/a-5d-spherically-symmetric-expanding-universe-is-young. Hartnett no longer holds this view but it is still a valid theory.

[18] Veritasium has a great video on this concept… https://www.youtube.com/watch?v=pTn6Ewhb27k