INTELLIGENT DESIGN SESSION 2:

The anthropic principle was first proposed by Brandon Carter, a British mathematician around 1973-74. It states that the universe appears "designed" for the sake of human life.

More than a century of astronomy and physics research yields this unexpected observation: the emergence of humans and human civilization requires physical constants, laws, and properties that fall within certain narrow ranges—and this truth applies not only to the cosmos as a whole but also to the galaxy, planetary system, and the planet humans occupy.

To state the principle more dramatically, a preponderance of physical evidence points to humanity as the central theme of the cosmos.

Support for the anthropic principle comes from an unwavering and unmistakable trend line within the data: the more astronomers learn about the universe and the requirements of human existence, the more severe the limitations they find governing the structure and development of the universe to accommodate those requirements. In other words, additional discoveries are leading to more indicators of large-scale and small-scale fine-tuning.

In 1961, astronomers acknowledged just two characteristics of the universe as "fine-tuned" to make physical life possible.[1]

The more obvious one was the ratio of the gravitational force constant to the electromagnetic force constant.

It cannot differ from its value by any more than one part in 10^{40} (one part in ten thousand trillion trillion trillion) without eliminating the possibility for life. Today, the number of known cosmic characteristics recognized as fine-tuned for life—any conceivable kind of physical life—stands at around **38 (see later table)**. Of these, the most sensitive is the **space energy density** (the self-stretching property of the universe). Its value cannot vary by more than one part in 10^{120} and still allow for the kinds of stars and planets physical life requires.

Evidence of specific preparation for human existence shows up in the characteristics of the solar system, as well. In the early 1960s astronomers could identify just a few solar system characteristics that required fine-tuning for human life to be possible.

By the end of 2001, astronomers had identified more than 150 finely-tuned characteristics. In the 1960s the odds that any given planet in the universe would possess the necessary conditions to support intelligent physical life were shown to be less than one in ten thousand.

By 2001 those odds had shrank to less than one in a number so large it might as well be infinity (**10^{173}**).

As Sir Fred Hoyle commented, `A commonsense interpretation of the facts suggests that a super-intellect has monkeyed with physics, as well as chemistry and biology, and that there are no blind forces worth speaking about in nature."

In the opinion of physicist Paul Davies, `The impression of design is overwhelming."

The predictions about the Big Bang have been consistently verified by scientific data.

Moreover, they have been corroborated by the failure of every attempt to falsify them by alternative models. Unquestionably, the Big Bang model has impressive scientific credentials."

The Big Bang was not a chaotic, disorderly event.

Instead, it appears to have been fine-tuned for the existence of intelligent life with a complexity and precision that literally defies human comprehension.

In other words, the universe we see today-and our very existence-depends upon a set of highly special initial conditions. This phenomenon is strong evidence that the Big Bang was not an accident, but that it was designed.

As recently as twenty-five years ago, a reasonable person weighing the purely scientific evidence on the issue would likely have come down on the side of skepticism. That is no longer the case.

Today the concrete data point strongly in the direction of the Intelligent Designer hypothesis. It is the simplest and most obvious solution to the anthropic puzzle."

Where is the Big Bang model today?

It's the standard paradigm of contemporary cosmology, its broad framework is very securely established as a scientific fact. Stephen Hawking has said, `Almost everyone now believes that the universe, and time itself, had a beginning.'

Do recognized Physicists support this principle?

Tony Rothman, (a theoretical physicist):
The medieval theologian who gazed at the night sky through the eyes of Aristotle and saw angels moving the spheres in harmony has become the modern cosmologist who gazes at the same sky through the eyes of Einstein and sees the hand of God not His angels but in the constants of nature. . . . When confronted with the order and beauty of the universe and the strange coincidences of nature, it's very tempting to take the leap of faith from science into religion. I am sure many physicists want to. I only wish they would admit it.

Bernard Carr (*cosmologist):*

One would have to conclude either that the features of the universe invoked in support of the Anthropic principle are only coincidences or that the universe was indeed tailor-made for life. I will leave it to the theologians to ascertain the identity of the tailor!

Stephen Hawking:

It would be very difficult to explain why the universe should have begun in just this way, except as the act of a God who intended to create beings like us."

Allan Sandage, winner of the Crawford prize in astronomy (equivalent to the Nobel prize), remarked,
"I find it quite improbable that such order came out of chaos. There has to be some organizing principle. God to me is a mystery but is the explanation for the miracle of existence, why there is something instead of nothing.""

Robert Griffiths, who won the Heinemann prize in mathematical physics, observed,
"If we need an atheist for a debate, I go to the philosophy department. The physics department isn't much use."

Astrophysicist Robert Jastrow, a self-proclaimed agnostic:
For the scientist who has lived by his faith 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."

Over the past thirty years or so, scientists have discovered that just about everything about the basic structure of the universe is balanced on a razor's edge for life to exist. The coincidences are far too fantastic to attribute this to mere chance or to claim that it needs no explanation.

Few concepts stretch the mind as much as the fine-tuning of the universe. For example, Oxford physicist Roger Penrose said one parameter, the "original phase-space volume," required fine-tuning to an accuracy of one part in ten billion multiplied by itself one hundred and twenty three times.

Penrose remarked that it would be impossible to even write down that number in full, since it would require more zeroes than the number of elementary particles in the entire universe! This showed, he said, "the precision needed to set the universe on its course."

As Discover magazine marveled: "The universe is unlikely. Very unlikely. *Deeply, shockingly unlikely."*

It's not conclusive in the sense that mathematics tells us two plus two equals four, Instead, its a cumulative argument. The extraordinary fine-tuning of the laws and constants of nature, their beauty, their discoverability, their intelligibility-all of this combines to make the Intelligent Designer hypothesis the most reasonable choice we have. All other theories fall short.

Table 1: 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 physical life of any conceivable 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 too 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; inadequate quantities of either carbon or oxygen
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: gravity would dominate electromagnetism, 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
f smaller: universe would collapse prior to star formation

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

10. **baryon or nucleon 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 clusters, 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 larger than 0.06: matter would be unstable in large magnetic fields

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. . .

20. **decay rate of ^{8}Berylhum (^{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: neutron decay would produce so many neutrons as to 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 …

32. **total mass density**

if smaller: universe would expand too quickly for solar type stars to form

if larger: universe would expand too slowly, resulting in unstable orbits and too much radiation

33. **space energy density**

if smaller: universe would expand too slowly, resulting in unstable orbits and too much radiation

if larger: universe would expand too quickly for solar type stars to form

35. **uncertainty magnitude in the Heisenberg uncertainty principle**

if smaller: oxygen transport to body cells would be too small; certain lifeessential elements would be unstable; certain life-essential chemical reactions would not function properly

if larger: certain life-essential elements would be unstable; certain life essential chemical reactions would not function properly

One particularly important category of fine-tuning is that of the constants of physics. The constants of physics are a set of fundamental numbers that, when plugged into the laws of physics, determine the basic structure of the universe. An example of such a constant is the gravitational constant G that is part of Newton's law of gravity, F = GM1M2/r2. G essentially determines the strength of gravity between two masses. If one were to double the value of G, for instance, then the force of gravity between any two masses would double.

So far, physicists have discovered four forces in nature - gravity, the weak force, electromagnetism, and the strong nuclear force that binds protons and neutrons together in an atom. Each of these forces has its own coupling constant that determines its strength, in analogy to the gravitational constant G. Using one of the standard dimensionless measures of force strengths, gravity is the weakest of the forces, and the strong nuclear force is the strongest, being a factor of 10^{40} - or ten thousand billion, billion, billion, billion - times stronger than gravity.

Various calculations show that the strength of each of the forces of nature must fall into a very small life-permitting region for intelligent life to exist. As our first example, consider gravity. If we increased the strength of gravity on earth a billionfold, for instance, the force of gravity would be so great that any land-based organism anywhere near the size of human beings would be crushed. (The strength of materials depends on the electromagnetic force via the fine-structure constant, which would not be affected by a change in gravity.)

Of course, a billion-fold increase in the strength of gravity is a lot, but compared to the total range of strengths of the forces in nature (which span a range of 10^{40} as we saw above), this still amounts to a fine-tuning of one part in 10^{31}. (Indeed, other calculations show that stars with life-times of more than a billion years, as compared to our sun's life-time of ten billion years, could not exist if gravity were increased by more than a factor of 3000. This would have significant intelligent life-inhibiting consequences.

Some examples:

<u>The Moon – Total Solar Eclipes & Lunar Impactor Hypothesis:</u>

Solar system – 9 planets with 63 moons but only one allows viewer total solar eclipse. By use of spectroscopes, etc able to study – 1919 – Einstein test; check of historical calendars; etc. Only our habitat offers such unique opportunities to measure our universe. Also moon essential is size, position for tides (nutrient exchange), etc.

The Earth:

Earth's location,. its size, its composition, its structure, its atmosphere, its temperature, its internal dynamics, and its many intricate cycles that are essential to life-the carbon cycle, the oxygen cycle, the nitrogen cycle, the phosphorous cycle, the sulfur cycle, the calcium cycle, the sodium cycle, and so on-testify to the degree to which our planet is exquisitely and precariously balanced.

“Rather than being one planet among billions, Earth now appears to be the uncommon Earth," said science educators Jimmy H. Davis and Harry L. Poe. "The data imply that Earth may be the only planet `in the right place at the right time.

They note how its atmosphere filters out harmful ultraviolet radiation while working with the oceans to moderate the climate through the storing and redistributing of solar energy, and how the Earth is just large enough so that its gravity retains the atmosphere

The earth’s core is a gigantic but delicately balanced heat engine fueled by radioactivity.... were it running more slowly- . . the continents might not have evolved to their present form.... Iron may never have melted and sunk to the liquid core, and the magnetic field would never have developed.... If there had been more radioactive fuel, and therefore a faster running engine, volcanic dust would have blotted out the sun, the atmosphere would have been oppressively dense, and the surface would have been racked by daily earthquakes and volcanic explosions."

Not only do we inhabit a location in the Milky Way that's fortuitously optimal for life, but our location also happens to provide us with the best overall platform for making a diverse range of discoveries for astronomers and cosmologists.

Our location away from the galaxy's center and in the flat plane of the disk provides us with a particularly privileged vantage point for observing both nearby and distant stars.

We're also in an excellent position to detect the cosmic background radiation, which is critically important because it helped us realize our universe had a beginning in the Big Bang. The background radiation contains invaluable information about the properties of the universe when it was only about three hundred thousand years old. There's no other way of getting that data. And if we were elsewhere in the galaxy, our ability to detect it would have been greatly hindered."

Even stars that are the most stable and in the most stable parts of their burning cycles experience changes in luminosity that can be detrimental for life. The sun's luminosity, for example, has increased by more than 35% since life was first introduced on Earth. Such a change is more than enough to exterminate life. But life survived on Earth because the increase in solar luminosity was exactly cancelled out each step of the way by a decrease in the efficiency of the greenhouse effect in Earth's atmosphere. This decrease in greenhouse efficiency arose through the careful introduction of just the right species of life in just the right quantities at just the right times. The slightest "evolutionary accident" would have caused either a runaway freeze-up or runaway boiling.

Climatic Runaways:

Earth's biosphere is poised between a runaway freeze-up and a runaway evaporation. If the mean temperature of the earth's surface cools by even a few degrees, more snow and ice than normal *will form. Snow and ice reflect' solar energy much more efficiently than other surface materials. The reflection of more solar energy translates into lower surface temperatures, which in turn cause more snow and ice to form and subsequently still lower temperatures.*

If the mean temperature of the earth's surface warms just a few degrees, more water vapor and carbon dioxide collect in the atmosphere. This extra water vapor and carbon dioxide create a better greenhouse effect in the atmosphere. This in turn causes the surface temperature to rise again, which releases even more water vapor and carbon dioxide into the atmosphere resulting in still higher surface temperatures.

Here, the materialists offer no explanation. How could strictly natural Darwinist processes possibly have anticipated the physics of solar burning?

Rotation and Life

The rotation period of a life-supporting planet cannot be changed by more than a few percent, if the planet takes too long to rotate, temperature differences between day and night will be too great. On the other hand, if the planet rotates too rapidly, wind velocities will rise to catastrophic levels. A quiet day on Jupiter (rotation period of ten hours), for example, generates thousand mph (1600 kph) winds. Though our hurricanes and tornadoes are tough to endure, we are better off with their occasional blasts than we would be with more extreme differences between day and night temperatures.

Our present-day hurricanes provide some notable benefits. Recent studies done off Australia, Bermuda, and Nicaragua establish that hurricanes help us in five ways:

1. They significantly increase the diversity of species in the habitats they affect,
2. They counterbalance the oceans' tendency to leach carbon dioxide from the atmosphere. This leaching, if unchecked, would result in catastrophic cooling of the planet.
3. They help disperse greenhouse gases globally.
4. They prevent heat buildup by shading local areas of the oceans that normally trap the sun's heat. Such shading saves some sea creatures from extinction.
5. They help regulate the salinity of the oceans, the salt cycle, and the water cycle.

Rotation periods of life-supportable planets, however, are not constant. Though Earth does not suffer catastrophic tidal interaction with the sun as Venus does, it still experiences enough that its rotation period is gradually braked. Every year, Earth's rotation period is slowed by the sun and moon by a small fraction of a second.

If Earth was much younger than its 4.6 billion years, it would be rotating too quickly for life. If it were much older, it would be rotating too slowly Since primitive life can tolerate more rapid rotation than advanced life, life can and did survive being placed on Earth when Earth was only 0.7 billion years old.

The beginning of the Human race:

Science predicts a single couple; at a single location & relatively recent beginning for mankind. Who may this have been?

Recent genetic DNA testing has proposed a 'mito-chrondrial Eve & y-Chromosomal Adam' with support re location & time scale (< 100k yrs), and support for Noah's flood (– see diagram in associated Session 2 Presentation).

One characteristic that stands out dramatically is the Intelligent Designer's interest in and care for living things, particularly the human race.

We see this care in the vastness and quality of the resources devoted to life support.

For example, the baryon density (density of neutrons and protons) of the universe, as huge as it is, focuses on the needs of humans.

How?

The baryon density determines how efficiently nuclear fusion operates in the cosmos.

The baryon density we measure translates into about a hundred-billion-trillion stars for the presently observable universe. (see previous table)

If the baryon density is too great, too much deuterium (an isotope of hydrogen with one proton and one neutron in the nucleus) is made in the first few minutes of the universe's existence. This extra deuterium will cause the stars to burn much too quickly and erratically for any of them to support a planet with life.

On the other hand, if the baryon density is too small, so little deuterium and helium are made in the first few minutes that the heavier elements necessary for life will never form in stars. What this means is that the approximately hundred billion trillion stars we observe in the universe - no more and no less - are needed for life to be possible in the universe.

The Intelligent Designer has invested heavily in living creatures. He constructed all these stars and carefully crafted them throughout the age of the universe so that at this brief moment in the history of the cosmos humans could exist and have a pleasant place to live!

Is the anthropic principle scientific?

Yes. It invites testing.

A skeptic not yet persuaded that the fine-tuning of the universe reflects more than a lucky coin toss can choose to examine the universe, the "coin," more closely.

If the anthropic principle and its implications for intelligent design are false, research will discover declining evidence for fine-tuning and existing evidence will be erased by new data.

If, on the other hand, the anthropic principle and its implications are true, research will yield an increase in both the number of fine-tuned characteristics and the degree of fine-tuning.

At present evidence for this fine-tuning and the anthropic principle continues to climb. One such example was the publication in December 2005 of research supporting the lunar impact hypothesis.

This is the hypothesis that one of the events that formed the unique atmosphere of the planet earth was an impact with the moon some 50-60 million years after the creation of the solar system.

<u>Predictions</u>

One of the really strong tests of any scientific theory is it's predictive power. If the theory has merit then it will enable predictions to be made about the findings of future research. These predictions, if found to be validated do not prove the theory but they do lend increasing support to it. If however, fewer and fewer of the theories predictions are found to be vindicated, then the theory should be seriously re-examined and perhaps rejected or significantly modified.

So what are some predictions of Evolution and predictions of Intelligent Design, with regard to 'origin of life'?

Table 2 lists some of the most important predictions that reasonably follow from the textbook origin-of-life scenario.

Table 2 Some Predictions Made by the Naturalistic (Evolutionary) Origin-of-life Scenario

1. Chemical evidence for the prebiotic soup will be found in the geological record.
2. Placid chemical and physical conditions existed on the early earth for long periods of time.
3. Chemical pathways leading to the formation of biomolecules will be found.
4. Chemical pathways that produce biomolecules would have been capable of operating under the conditions of the early earth.
5. Life emerged gradually over a long period of time.
6. Life originated only once.
7. Life in its minimal form is simple.

Table 3 lists some of the most important scientific predictions that arise from the biblical (one version of an Intelligent Design/Anthropic Principle hypothesis) description of life's origin.

Table 3 Some Predictions Made by the RTB[1] Biblical Origin-of-life Scenario

1. Life appeared early in Earth's history.
2. Life appeared under harsh conditions.
3. Life miraculously persisted under harsh conditions.
4. Life arose quickly.
5. Life in its minimal form is complex.

THE EVIDENCE OF COSMOLOGY

Thanks to scientific discoveries of the last fifty years, the ancient ***kalam cosmological argument*** has taken on a powerful and persuasive new force.

As described by William Lane Craig, the argument is simple yet elegant:

First, whatever begins to exist has a cause.

Even renowned skeptic David Hume didn't deny this first premise. In fact, atheist Quentin Smith's contention that "we came from nothing, by nothing, and for nothing" seems intuitively absurd.

Second, the universe had a beginning. Based on the data, virtually all cosmologists now agree the universe began in the Big Bang at some specific point in the past. (The lastest estimates being around 13.7 Billion Years + 200 Million)

Even alternate theories for the origin of the universe require a beginning.

The conclusion then follows inexorably from the two premises:

Therefore, the universe has a cause.

End Session 2: Next → Biological Systems

1. **Reason's To Be biblical creation model – www.reasons.org**