

1 **Origin of the Cosmos**

- Module: Science
- Lesson 25

2 **Some Sources on the Beginning of the Universe**

- God's Undertaker, Has Science Buried God?, John Lennox
- God and the Astronomers, Robert Jastrow
- God and Stephen Hawking, John Lennox
- 40 Questions About Creation and Evolution, Kenneth D. Keathley and Mark F. Rooker
- Reasonable Faith, William Lane Craig
- The Existence of God, Richard Swinburne
- Creation out of Nothing, Paul Copan and William Lane Craig

3 **The Biblical View of the Origin of the Cosmos**

- The universe had a beginning.
 - Genesis 1:1—"In the beginning God created..."
 - John 1:3—"All things came into being through Him."
 - All things that came into being were caused by Jesus (God).
 - There is something (God) that has not "come into being" but always existed.
- Belief in an eternal universe tends to the worship of the creation rather than the creator. (Romans 1:25)
- The beginning of the universe is foundational to Christian theology.

4 **Review: The Cosmological Argument**

- Everything which begins to exist has a cause.
- The universe began to exist.
- Therefore, the universe had a cause.
- (Note, the argument does not say that everything had a cause, but that everything that begins has a cause.)

5 **When Discussing the Origin of the Universe**

- Don't be bamboozled with fancy "science" talk...
 - ...by someone who has no real knowledge of the science they are talking about. (Ask them "how do you know?")
 - ...by someone who uses speculative or "just so" theories as supposed evidence. (Theories are a dime a dozen, evidence is much harder to provide.)
 - ...by someone who gets what they know about science from popular movies and science fiction.

- When encountering someone with substantial knowledge of the subject...
 - ...don't attempt to bluff your way through, you will only discredit yourself and your message.
 - ...introduce them to someone who can honestly and intelligently address their questions or objections.
 - ...direct them to some published books or video or audio sources on the subject.

6 A Long History of Eternalism

- From ancient times, nearly all people believed the universe was eternal.
 - Some wondered why it existed, but almost no one doubted that the universe was eternal and static (except the ancient Hebrews and later the Christians).
 - With the spread of Christianity, eternalism gave way in the West to belief in a temporal universe.
 - Scientific confidence in eternalism encountered strong resurgence in Western civilization during the Enlightenment with the rise of Newtonian physics and "steady state cosmology".
 - Eternalism was the "received orthodoxy" of Western science from the Enlightenment until the twentieth century.

7 Three Earth-shaking Scientific Discoveries that Overturned Eternalism

- The Second Law of Thermodynamics (19th century)
- The Expanding Universe (early 20th century)
- The Background Radiation Echo (1965)

8 1. The Second Law of Thermodynamics

- While the amount of energy in a closed system (such as our universe) remains constant (according to the First Law), the amount of useable energy is decreasing, hence the amount of unusable energy (entropy) is increasing. (In nature, the entropy in a closed system tends to increase.)
 - Entropy: The measure of the amount of unusable or unavailable energy for doing work. A high entropy state, therefore, would be one in which most or all of the energy in a closed system is unusable (or expended), and a low entropy state is one in which there is much free energy still available to do work.

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10 1. The Second Law of Thermodynamics

- Our universe is in a low entropy state, meaning that we have a great deal of useable energy in the cosmos. (e.g. energy in the stars, petroleum, atomic particles, living organisms, your dinner vegetables, etc.)
- Two important questions are raised by our universe's current low entropy state:
 - If the universe has existed eternally, then why wasn't all the useable energy exhausted long ago (an infinite time ago)? Why is there still some around to be used? The low entropy state of the cosmos points to a beginning point a finite time ago.
 - If the universe is "running down" (energy wise), like a clock, what or Who wound it up in the first place, and when?

11 2. The Expanding Universe

- Albert Einstein's theory of General Relativity (1915)
 - General Relativity implied an expanding cosmos.
 - Initially Einstein "fudged" his numbers (by including a constant in his equation) to avoid the conclusion of an expanding universe due to its implications countering eternalism.
- Alexander Friedman and George Lemaître (a Belgian priest): working from Einstein's GR predicted an expanding universe (1920's).

12 2. The Expanding Universe

- Edwin Hubble: Discovered the red shift in light from distant galaxies (similar to the Doppler Effect in sound) proving the universe is expanding. (1929)
 - In 1931 Einstein visited Hubble at the Mt. Wilson Observatory and witnessed for himself the Red Shift evidence of the expanding universe. He is said to have called his "cosmological constant" the biggest mistake of his career.
 - Given the expansion of the universe, extrapolating backwards, matter, space, and time reach a "boundary" (called the singularity) beyond which they cannot have existed. This point is often referred to as the "Big Bang."

13 Standard Big Bang Model

14 3. Background Radiation Echo

- Discovered in 1965 by Arno Penzias and Robert Wilson
- A level of background radiation was detected which cannot be traced to origination in any existing source.
- The photons must have been emitted during a hot and dense phase of the universe's existence.
- Background radiation discredits the idea of an historically constant universe (steady state cosmology) and points to an explosive beginning event.

15 The Implication of these Discoveries

- Since the universe began to exist, it must have had a cause. (All things which begin to exist have a cause.)
- The cause could not have been material or have a scientific explanation. (Science only deals with material explanations.)
- The cause must transcend space, time, and matter, and be immeasurably powerful.
- “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.”
—Robert Jastrow, *God and the Astronomers*, (1978)—

16 The Question of Causation

- What caused the origin of the universe?
- We only know of two kinds of causes which can produce an effect:
 - Material/natural causes
 - e. g. a billiard cue strikes a billiard ball, causing it to roll forcefully and strike another ball.
 - All such causes are open to scientific investigation and discovery because science deals with the material world.

17 The Question of Causation

- Agent/person
 - An agent chooses to move a billiard cue in order to strike a ball.
 - Agent causation may or may not be observable but can often be inferred when it is not observed.
- Note: The existence of a material cause does not preclude the simultaneous existence of an agent cause.
- If the cause of the material cosmos cannot be material or natural, then it must be an agent/person.

18 Attempts to Avoid a Divine Cause of a Beginning

- One could dismiss the question of the cause of the universe as unimportant. (A strange thing for a scientist to do.)
- 20th Century was marked by the proposal of alternate theories to the Standard Big Bang model, such as:
 - Steady State Universe
 - The Oscillating Universe
 - Vacuum Fluctuation Universe
 - Chaotic Inflationary Universe
 - String Theory (or M-theory)

- (Though some of these remain popular among non-professionals, each of these proposed models has either been disproved or is largely doubted by cosmologists in general. The Standard Big Bang model remains undiminished as the best explanation.)
- The quantum vacuum theory (the “free lunch”).
 - The universe “popped into being” in the quantum vacuum before Planck Time. (Planck Time is the smallest measure of time, 10⁻⁴³ of a second.)

19 Answering the Quantum Vacuum Theory

- The implications of the beginning of the universe is that nothing (matter, space, time, energy, or the laws of nature) existed prior to the singularity of the Big Bang.
- Definition: Quantum physics explores the behavior of matter and energy at the atomic and subatomic level. The behavior of matter at the quantum level differs markedly from that of matter in classical Newtonian physics.
- A quantum vacuum is not nothing.
 - It contains space, which is part of the material cosmos.
 - “...[quantum vacuum] is a sea of fluctuating energy endowed with rich structure and subject to physical laws.”
—William Lane Craig—
 - Where do the space, energy, and laws come from which govern the quantum vacuum?
- Even if particles were to arise spontaneously out of the quantum vacuum, which is doubtful, they are not arising out of nothing.

20 Answering the Quantum Vacuum Theory

- Sometimes people cite “quantum indeterminacy,”
 - The claim is that the nature of indeterminacy in quantum mechanics means things happen without a cause.
 - But quantum indeterminacy simply means that in quantum mechanics events cannot be precisely predicted, but says nothing about what causes such events.
 - If things really could have spontaneously popped into existence out of nothing, why don’t they continue to do so today? Why couldn’t a unicorn, or a rock, or a universe just to pop into existence before our eyes?

21 Where Does Our Faith Rest?

- The various discoveries, such as the expanding universe, provide us with scientific arguments, in addition to the biblical and philosophical arguments, for a temporal universe and its Creator.
- However, our faith does not rest on any particular scientific theory, it rests in the cumulative evidences:
 - The testimony of Scripture
 - The witness of the Holy Spirit.

- The evidences God has provided for us in the natural world (general revelation) for his existence and the truthfulness of Scripture.

22 **Christians and the Big Bang**

- There are some apparent difficulties between current Big Bang cosmology and the ways that some Christians, but not all, have historically understood the creation accounts in Scripture.
 - The question of what, if anything, the bible teaches about the age of the cosmos/earth is chiefly an intramural question among Christians who hold to the infallibility and inerrancy of Scripture.
 - Keep the big picture in view. Overwhelmingly science is pointing towards the God of Scripture, not away from him. Questions of precisely how and when God created the world are not as important as the fact that he did.
- If Christianity and science are in deep concord (as we saw last week)—
 - We should expect science to confirm things about the natural world that point to the Christian faith.
 - But scientific progress is uneven, and follows many dead ends before discovering truth. So, there may at times be some superficial discord between contemporary science and Christian faith.
 - As Christians committed to the authority and inerrancy of Scripture, our own understanding of Scripture is also imperfect and uneven. We must be open to the Holy Spirit to lead us to a better understanding of what he is saying through his word.

23 **Christians and the Big Bang**

- Some questions we must simply wait to have answered.
 - Remember that for many years the scientific consensus was that the universe was eternal.
 - Some of the strongest evidences against Darwinism are only recently coming to light.
 - Remember, too, that for many centuries many Christians believed the bible taught a geocentric view of the cosmos. Probably no Christians believe that today. Our understanding of Scripture should grow.

24 **Next Week:**

- The Origin of Life