

Quarks, Chaos, and Christianity

Introduction.

Is Anyone There?

Sunday, January 6, 2008

10 to 10:50 am, in the Parlor

Presenter: David Monyak

St. John in the Wilderness

Almighty and everlasting God, you made the universe with all its marvelous order, its atoms, worlds, and galaxies, and the infinite complexity of living creatures: Grant that, as we probe the mysteries of your creation, we may come to know you more truly, and more surely fulfill our role in your eternal purpose; in the name of Jesus Christ our Lord.

For Knowledge of God's Creation, *Book of Common Prayer*, p. 827

REVISED AND UPDATED EDITION

JOHN POLKINGHORNE

Templeton Prize Winner and author of Science and Providence

**QUARKS, CHAOS
& CHRISTIANITY**

Questions to
Science and Religion



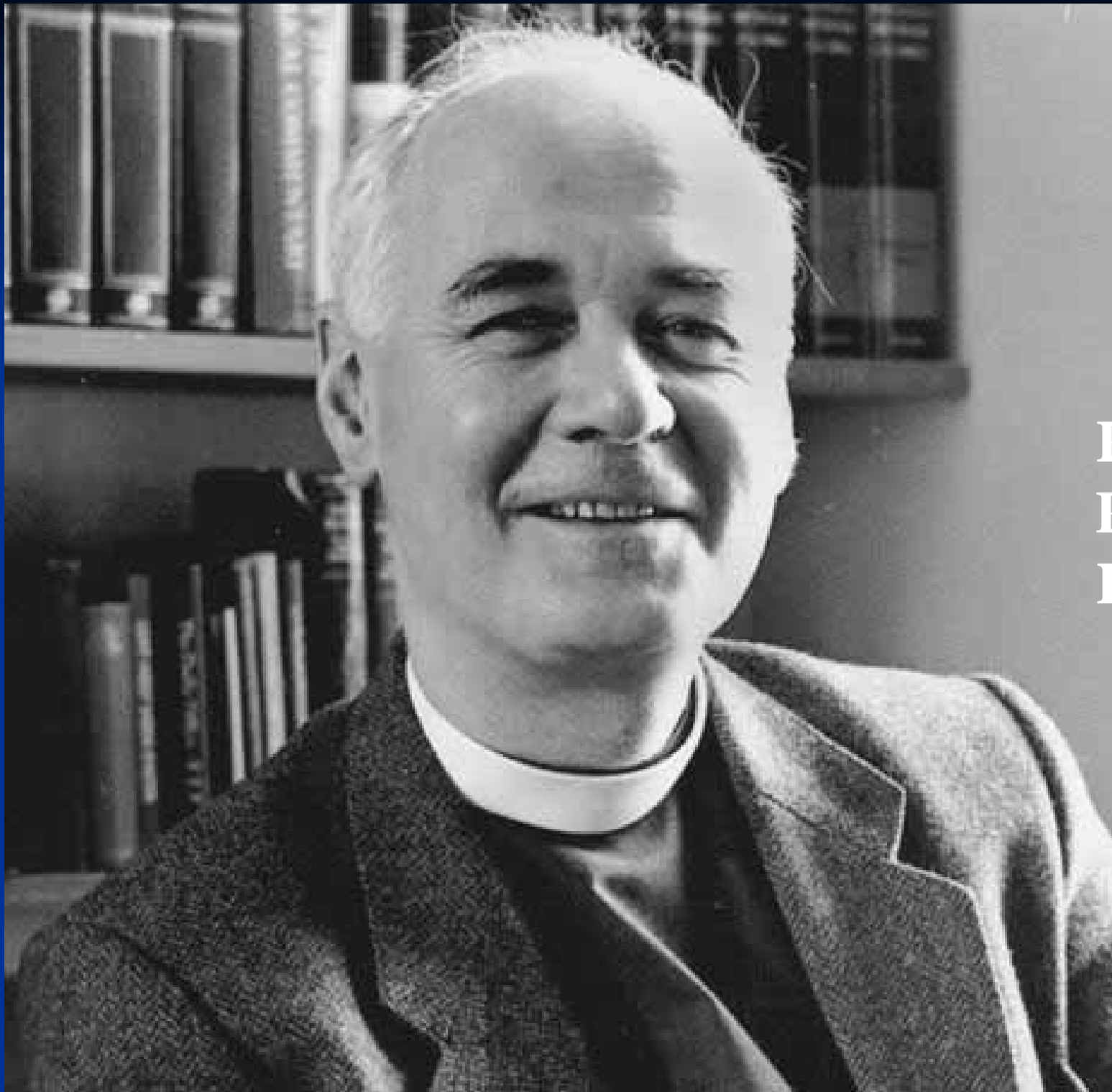
A CROSSROAD BOOK

Primary Reference

- **Quarks, Chaos, & Christianity. Questions to Science and Religion, Revised Edition**, John Polkinghorne, Crossroad, 2005

■ **The Rev. Dr. John Polkinghorne KBE, FRS:**

- **1955:** PhD physics from Cambridge University
- **1968:** full Professor of Mathematical Physics at Cambridge University
- published numerous papers on theoretical elementary particle physics
- **1974:** Fellow of the Royal Society
- **1979:** resigned his professorship in order to train for the Anglican priesthood
- **1981 to 1986:** served as a deacon, curate and vicar
- began writing numerous papers and books on interface between science and religion
- **1986:** Dean & Chaplain of Trinity College, Cambridge
- **1989-1996:** President of Queens College, Cambridge
- **1994-2005:** Canon Theologian of Liverpool Cathedral



**Rev. Dr John
Polkinghorne
KBE FRS**



M51 “Whirlpool Galaxy” in the M51 Group of Galaxies, Constellation Canes Venatici, 23 million light years distant



McDonald Observatory, West Texas

Introduction

**What Does Science Have to
Do with Religion?**

Introduction

What Does Science Have to Do with Religion?

- Why bring up science in a Christian adult education and formation class?
 - Isn't religion and faith about spirituality, ethics and morality, ultimate meaning, and ultimate human destiny?
 - Isn't science about the physical world, the laws that govern natural processes, and the dynamics of the interactions of material things?
 - Aren't science and religion therefore (to use the words of Stephen Jay Gould) **Non-Overlapping Magisteria (NOMA)**?

Introduction

The View of the Ancients

- In ancient times, people of faith felt no need for the idea of Non-Overlapping Magisteria (NOMA):
 - Psalm 19:2: **The heavens speak of the Creator's glory and the sky proclaims God's handiwork**
 - St. Paul (Romans 1:20 NRSV): **Ever since the creation of the world his eternal power and divine nature, invisible though they are, have been understood and seen through the things he has made.**
 - Justin Martyr (100-160 AD): **All truth is Christian truth**

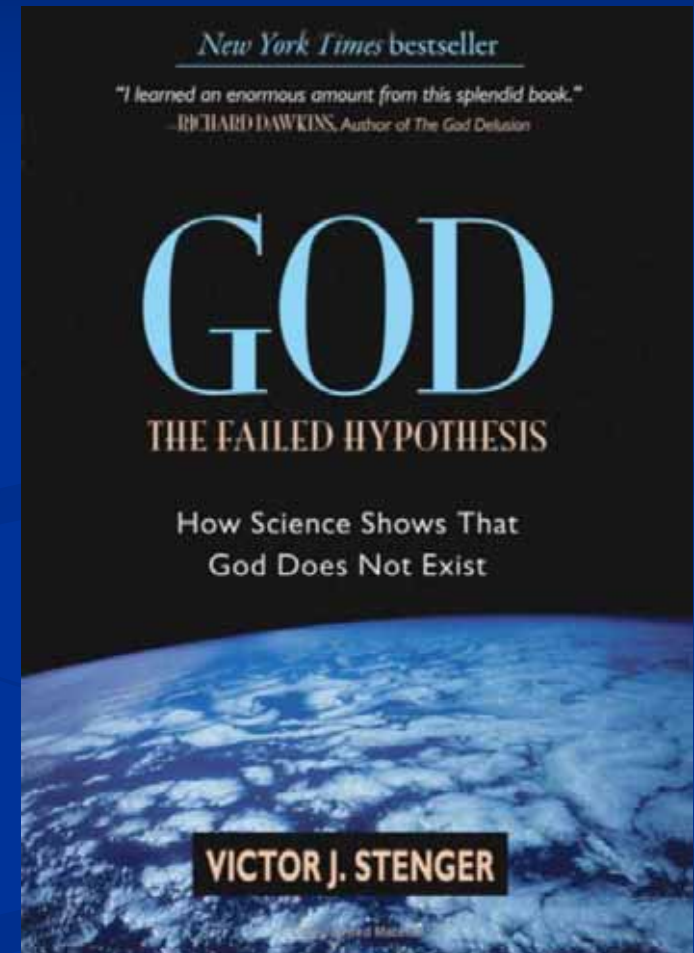
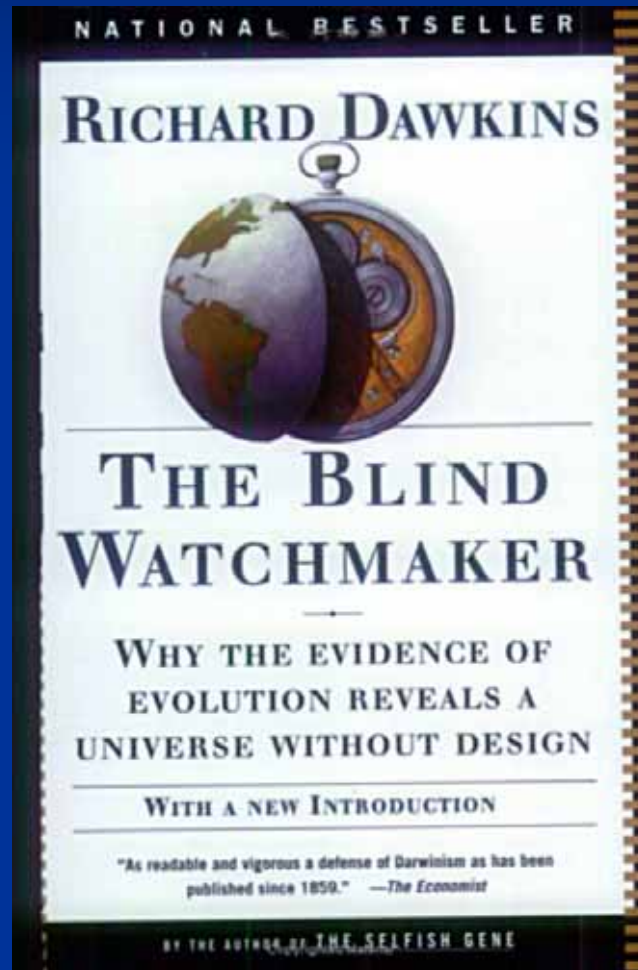
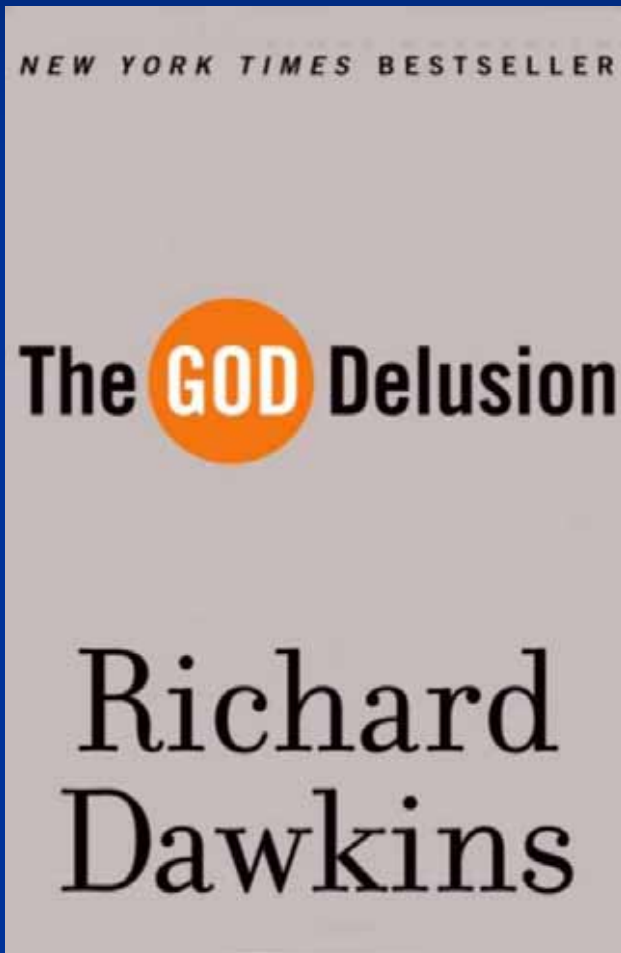
Introduction

Success of Modern Science and Materialism

- Modern science however has been extraordinarily successful in explaining the physical world without needing to invoke a creator.
- Impressed and emboldened by this success, many educated people today now proclaim that:
 - science *proves* the view that the *only* reality is the world of matter-energy around us (**materialism**)
 - the *only* path to finding truth is through the scientific study of the material world (**scientific materialism**)

Introduction

Success of Modern Science and Materialism



Introduction

Responding to Materialism

- How do we respond to **scientific materialism**?
 - 1. Agree with Stephen Jay Gould that science and religion are Non-Overlapping Magisteria, *OR*
 - 2. Agree with St. Paul that the heavens can reveal God's eternal power and divine nature and:
 - 2.1. oppose 21st century science when its results seem to support scientific materialism (the tactic of Creationism, Intelligent Design), *OR*
 - 2.2. engage 21st century science, exploring how its results impact our understanding of God and creation, while refuting that it forces us to accept a philosophy of materialism

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**Does Science Gives Us Any
Hints of a Creator?**

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Clues to God's Existence

- Two kinds of clues to the fact of God's existence:
 - 1. Particular moments in history, or particular people, by means of which the divine purpose was made especially clear
 - 2. The character of the world God's claimed to have made
- *Particular moments in history, particular peoples:*
Moses, Deliverance from Egypt, Jesus' life, death, and resurrection
 - Science is concerned with what happens *in general*, and has little to say about particular or personal happenings

Is Anyone There?

Clues to God's Existence

- Science however should be able to help us find clues to the fact of God's existence in the character or nature of the world God's claimed to have made

Is Anyone There?

The Mistake of the God of the Gaps

- For centuries, evidence for a Divine Designer seemed obvious.
 - for example: consider the miracle of the intricate construction of the human eye
- Then Darwin came along with the revolutionary idea that the patient accumulation and sifting of small differences through generations of **natural selection** would automatically do the trick – no Divine Designer needed!

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The Mistake of the God of the Gaps

- The mistake we made before Darwin was to try to give a theological answer (a “Divine Designer”) to a scientific question (How did the anatomy and physiology of the human eyeball arise?) – that is, to make the mistake of the **God of the Gaps**.
- **“God of the Gaps”** = to invoke God as the explanation for anything that is currently scientifically unknown

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The Mistake of the God of the Gaps

- Polkinghorne:

The **God of the gaps** was actually a theological mistake. If God is the Creator, divine activity must somehow be connected with the whole show, not just with the difficult or murky bits of what's going on.

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Questions About the “Whole Show”

- There are two big questions about the “whole show” that science illuminates, but which are beyond science’s power to answer:
 - 1. **Why can we do science at all?**
 - 2. **Why is the universe so special?**

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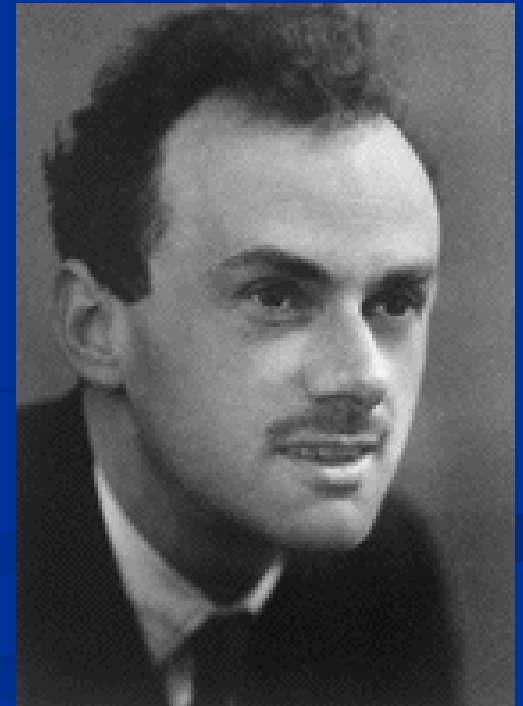
1. Why Can We Do Science At All?

- It is quite odd that it is possible for us to scientifically understand the world in a scope and breadth that is *far beyond* what we need for survival.
 - Einstein: “**The only incomprehensible thing about the universe is that it's comprehensible.**”
- Where do we get this marvelous power to understand the world scientifically?

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1. Why Can We Do Science At All?

- This strange and marvelous power has been largely due to mathematics.
- Physicist look for beautiful mathematical equations in formulating their theories.
 - **Paul Dirac** (1902-1984), founder of quantum mechanics, winner of the Nobel Prize in Physics 1933, and Lucasian Chair of Mathematics at Cambridge (same chair held by Isaac Newton) once said that it was more important to have beauty in your equations than to have them agree with experiment!



Is Anyone There?

1. Why Can We Do Science At All?

- Now mathematics is pure thought, the analyzing of patterns.
- Why do the most beautiful of these thought patterns manifest themselves in the structure of the physical world?
- What ties together the **reason within** (the mathematics in our heads) and the **reason without** (the structure of the physical world)?

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1. Why Can We Do Science At All?

- Another dimension can be added to this mystery: the majority of mathematicians are Platonists.
 - Most mathematicians will attest that they do not feel they are creating mathematics, but rather that they are discovering something that has an independent existence in a “Platonic” reality outside them.

Platonic
mathematical
world



3



Mental
world

2



Physical
world

1

from: *The Road to Reality. A Complete Guide to the Laws of the Universe*, Roger Penrose, p. 18

Fig. 1.3 Three 'worlds'—the Platonic mathematical, the physical, and the mental—and the three profound mysteries in the connections between them.

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1. Why Can We Do Science At All?

- Why do we have access to this Platonic mathematical world and why are we able to find beauty in it?
- And why do the equations we find beautiful in this Platonic mathematical world so exactly encode the workings of physical universe?

Is Anyone There?

1. Why Can We Do Science At All?

- Science has no power to answer these mysteries.
- Polkinghorne:
 - the universe, in its rational beauty and transparency, looks like a world shot through with signs of mind, and, maybe, it's the “capital M” Mind of God we are seeing
 - the reason within and the reason without fit together because they have a common origin in the reason of the Creator, who is the ground of all that is.
 - humanity is made “in the image of God.” ... this is what makes science possible

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2. Why is the Universe So Special?

- The second big question science has no power to answer is: why is the universe so special?
 - Almost all universes we can think of would be sterile, incapable of evolving life however long you waited for them to do so.
 - Yet we are here, and here only because we live in a universe whose laws are incredibly fine-tuned to produce life: the **Anthropic Principle** (*anthropoi*, Greek for humankind)

Is Anyone There?

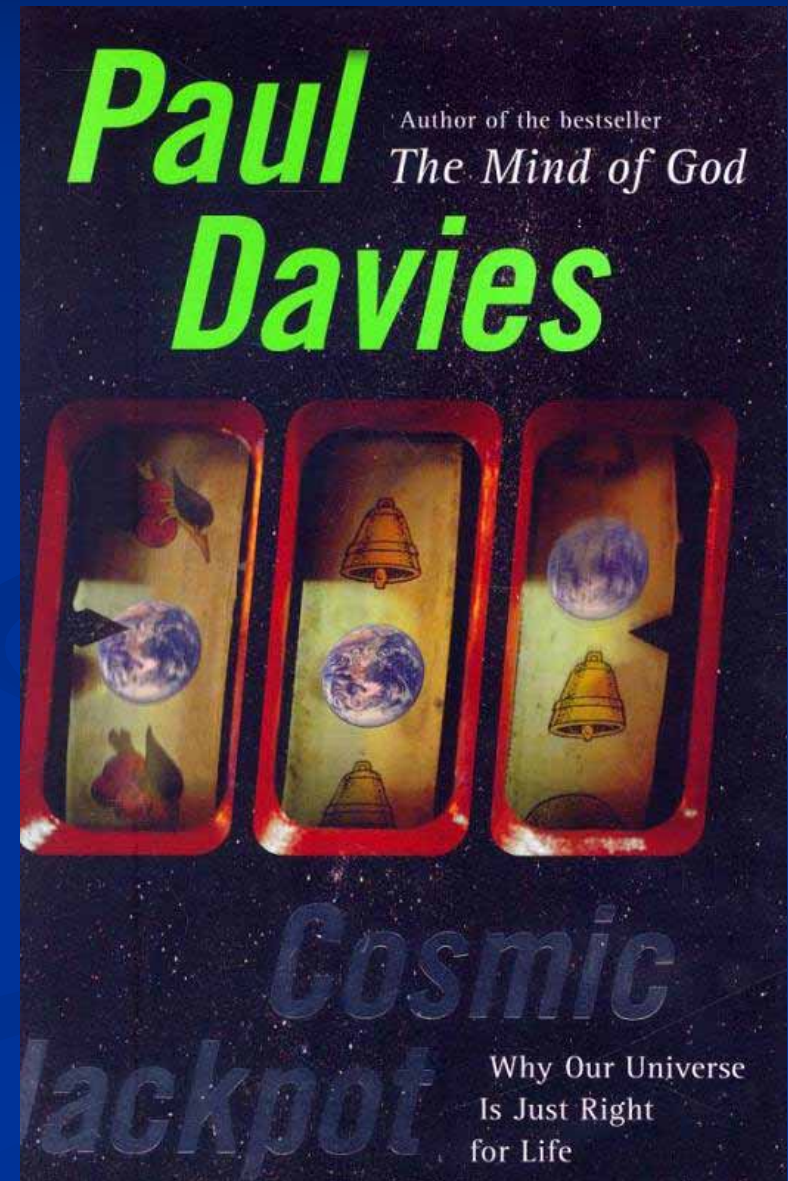
2. Why is the Universe So Special?

- Suppose God lends you the Universe-Creating Machine, with many knobs you can turn to adjust the strengths and mathematical form of the forces of nature, the size of the universe, its initial conditions, etc. You twiddle with the knobs and finally pull the handle to form your universe.
 - What is the likelihood something fruitful would come out, albeit different from our current universe?
 - Almost zero. Nearly every universe would be dull and sterile.
 - The universe we live in is extremely special, “one in a trillion,” extraordinarily fine-tuned to be fruitful

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2. Why is the Universe So Special?

- Books have been written on this fine tuning
- A recent one by Paul Davies is *Cosmic Jackpot. Why Our Universe is Just Right for Life*



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2. Why is the Universe So Special?

- One example: every atom of carbon inside our bodies was once inside a star. We are all made from the ashes of dead stars.
- Yet forming carbon in a star is very difficult.
- First two helium nuclei have to stick together, making beryllium, and then some of the beryllium has to stay around long enough for a third helium to attach itself and make carbon.
- But beryllium is too unstable to stay around long enough.
- Cambridge cosmologist (and atheist at the time) Sir Fred Hoyle, recognized that if there was a strong enhancement effect (“a resonance”), it could make the sticking on of that third helium go fast enough for some carbon to be formed before all the beryllium had vanished.

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2. Why is the Universe So Special?

- The resonance however had to occur at a pretty precise energy. If it was anywhere else, it would fail to do the trick.
- Experimental physicists looked for the resonance and found it precisely where it needed to be.
- Hoyle realized that if the laws of physics had been only a little bit different, that resonance would have been elsewhere, and there would have been no carbon, no carbon-based life (and no astrophysicists to worry about it all)

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2. Why is the Universe So Special?

A common sense interpretation of the facts suggests that a superintellect has monkeyed with the physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature. The numbers one calculates from the facts seem to me so overwhelming as to put this conclusion almost beyond question.

- Sir Fred Hoyle, British mathematician, astronomer and cosmologist

The universe is a put-up job.

- Sir Fred Hoyle, British mathematician, astronomer and cosmologist

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2. Why is the Universe So Special?

- So how do we explain the fine-tuning of the law of physics and the initial conditions of our universe to produce a fruitful world containing life?
- We have two choices, expressed in parable form by philosopher John Leslie in his classic book on the **Anthropic Principle**, *Universes*.

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2. Why is the Universe So Special?

- The Parable of the Firing Squad:
 - You are about to be executed.
 - You are tied to the stake and your eyes are bandaged.
 - Ten highly trained marksmen have their rifles leveled at your chest.
 - The officer gives the command to fire and the shots ring out ...
 - And you find you have survived!

Is Anyone There?

2. Why is the Universe So Special?

- The Parable of the Firing Squad:
 - How do you explain your survival?
 - Leslie suggests there are only two rational explanations:
 - 1. Many, many executions were taking place that day, and you were extraordinarily lucky enough to be in an execution in which, by sheer chance, all ten of the trained marksmen missed.
 - 2. More is going on than you know. The firing squad is on your side.

Is Anyone There?

2. Why is the Universe So Special?

- Explaining the parable:
 - 1. There is a vast number of other universes, each with its own natural laws and circumstances. They are nearly all sterile and lifeless, but we happen to be in one that by sheer chance had the laws and circumstances to produce life.
 - 2. There is only one universe, but more is going on than we know. It is fine tuned for life because it is the creation of a Creator who desires it to be fruitful of life.

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2. Why is the Universe So Special?

- *Both* explanations are *metaphysical* – they go beyond what science can tell us.
 - Many popular publications pretend that the multiple universes hypothesis is a scientific hypothesis – but because such universes are inaccessible to detection by the methods of science, they are in fact *beyond* physics, that is, they are *metaphysical* conjectures.
- Leslie suggests either *metaphysical* explanation is plausible.
- As Christians, we have other reasons for believing in God, and so, for us, a creation designed to be fruitful of life is the better understanding.

Summary

Is Anyone There?

Summary

Is Anyone There?

- Asking and answering the two questions:
 - 1. Why can we do science at all?
 - 2. Why is the universe so special?

gives us a nudge in the direction of religious belief.

- The answers we've found do suggest that there's Someone there, and we can agree with St. Paul (Romans 1:20 NRSV):

Ever since the creation of the world his eternal power and divine nature, invisible though they are, have been understood and seen through the things he has made.

Topics

Quarks, Chaos, and Christianity

- **Jan 6:** Is Anyone There?
- **Jan 13:** What's Been Going On?
- **Jan 20:** *Annual Parish Meeting*
- **Jan 27:** Who are We?
- **Feb 3:** Prayer and Miracles
- **Feb 10:** How Will It End?