

Quarks, Chaos, and Christianity

Prayer and Miracles

Sunday, February 3, 2008
10 to 10:50 am, in the Parlor
Presenter: David Monyak

St. John in the Wilderness

O God our heavenly Father, you have blessed us and given us dominion over all the earth: Increase our reverence before the mystery of life; and give us new insight into your purposes for the human race, and new wisdom and determination in making provision for its future in accord with your will; through Jesus Christ our Lord.

- Book of Common Prayer, p. 828

REVISED AND UPDATED EDITION

JOHN POLKINGHORNE

Templeton Prize Winner and author of Science and Providence

**QUARKS, CHAOS
& CHRISTIANITY**

Questions to
Science and Religion



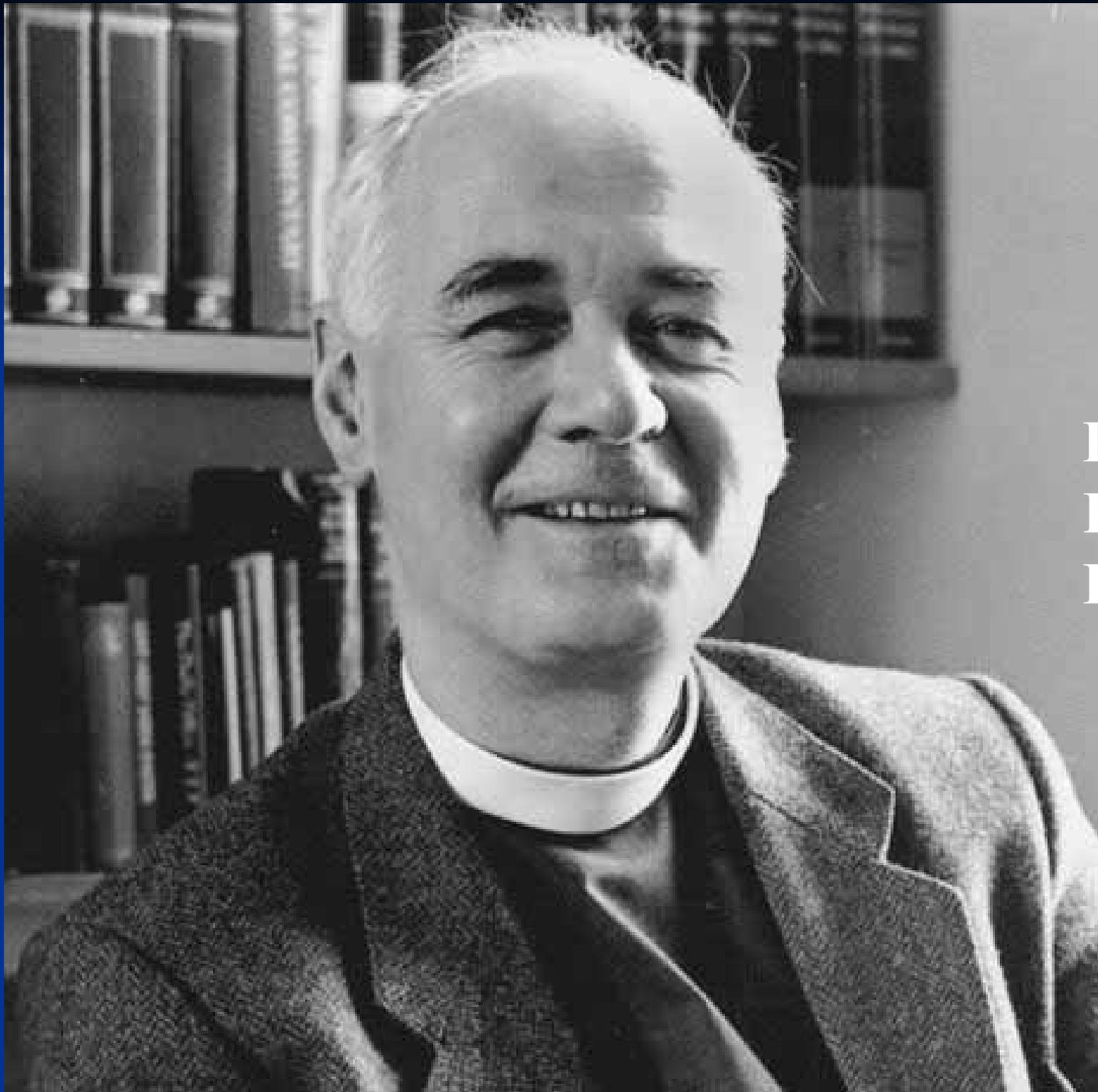
A CROSSROAD BOOK

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**

Introduction

Our Journey So Far

Introduction

1. Is Anyone There?

- In our first session we discussed whether there were any hints in science for the existence of God.
- We concluded that a belief in God the creator very satisfactorily answers two questions which science itself cannot answer:
 - **1. Why can we do science at all?** Why are we capable of comprehending and appreciating the rationale beauty of the laws that govern the universe, when such knowledge goes far beyond what we need to survive?
 - **2. Why do we live in a universe whose laws are incredibly fine-tuned to produce life?** (the Anthropic Principle)

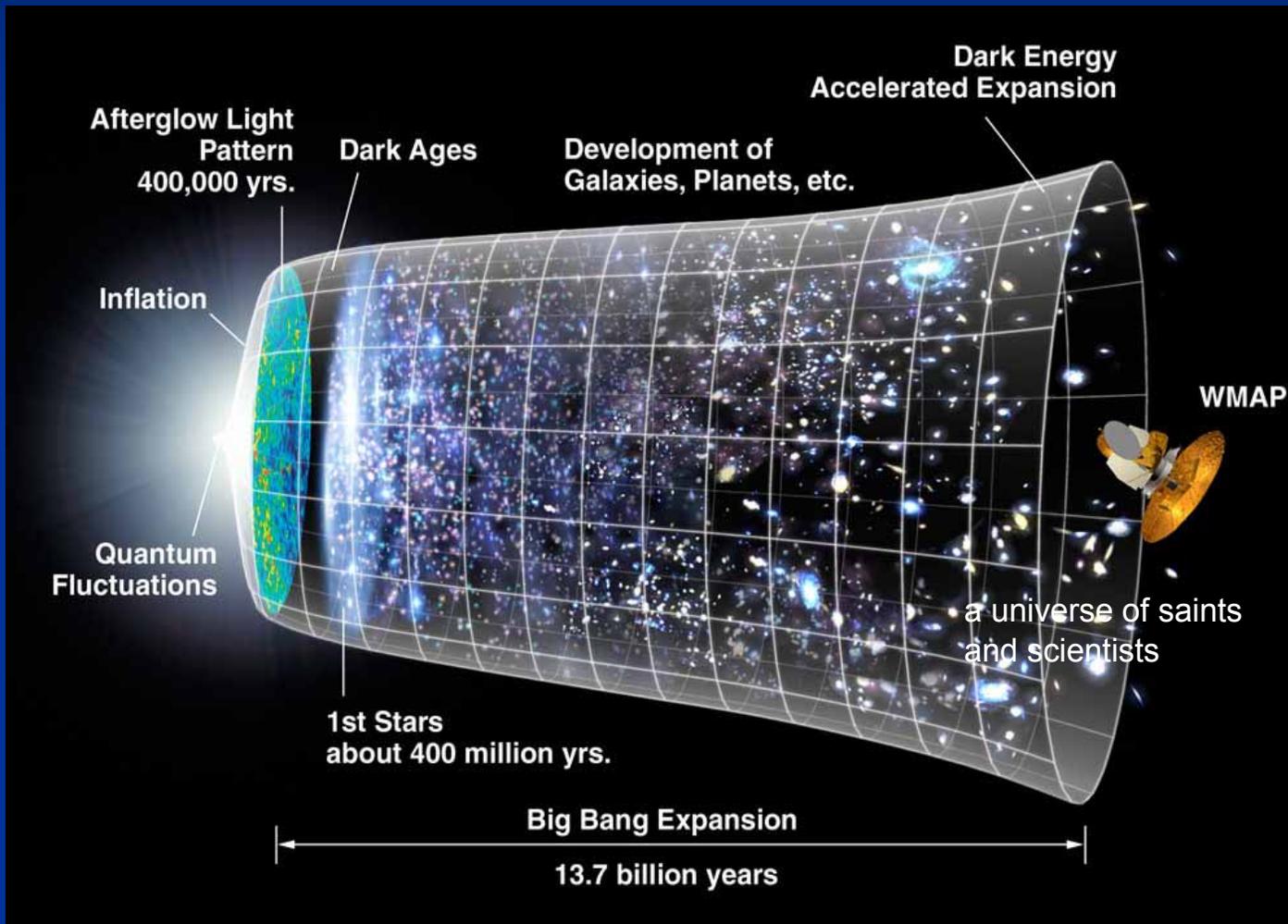
Introduction

2. What's Been Going On?

- In our second session, we asked what's been going on over the eons of the universe's existence, and what does it tell us about the Creator?

Introduction

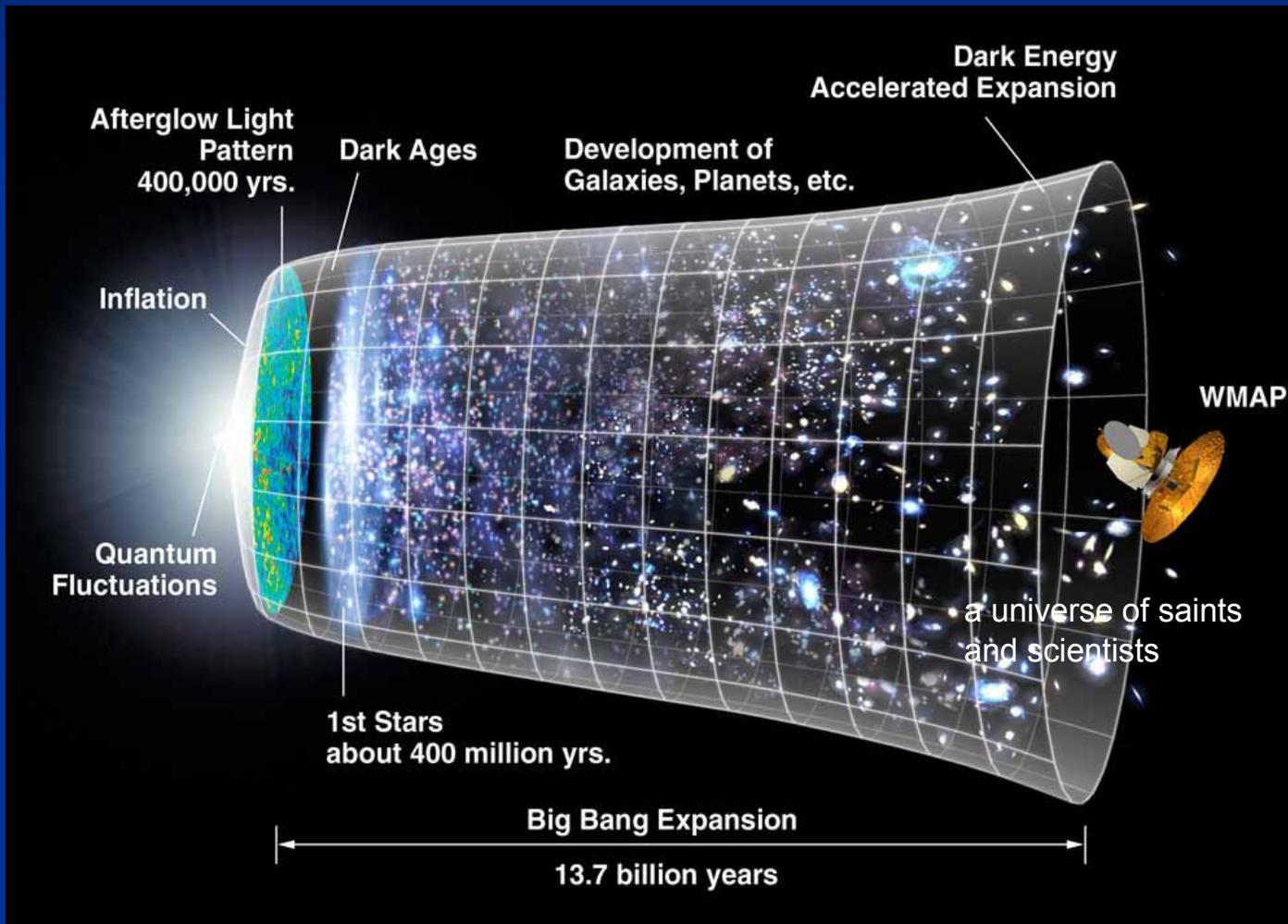
2. What's Been Going On?



13.7 billion years ago God *began* to create the universe of space-time. Because *time* is still unfolding, God's *on-going sustaining* of the universe is best viewed as an *on-going creation* of the universe

Introduction

2. What's Been Going On?



In 13.7 billion years, the universe has evolved from an unimaginably hot plasma of quarks and gluons to a world of galaxies, stars, planets, saints and scientists.

Introduction

2. What's Been Going On?

- It has evolved through processes involving the fruitful interplay of “**chance**” (happenstance) and **necessity** (laws, regularity)
 - **Chance**: the sign a **loving** God has given the universe the gift of **independence** to make itself, to be other than God.
 - **Necessity**: the sign a **faithful** God has given the universe the gift of **reliability**.

Introduction

3. Who Are We?

- In our third session we asked what does science tell us about who are we?
 - Does science really tell us (as some scientist claim) that we are merely “computers made of meat” or “genetic survival machines”?
- Science is only beginning to try to understand complex systems.

Introduction

3. Who Are We?

- The interconnectedness of physical reality found in:
 - **Quantum Nonlocality** and
 - **Chaos Theory**,
- the unexplained self-organization of complex systems just beginning to be studied in **Complexity Theory**
- suggest a “reductionist” view (= that we are fundamentally no more than a complicated heap of protons, neutrons and electrons) will not be science’s ultimate answer to our question.

Introduction

4. Can a Scientist Pray?

- Today we explore the questions:
 - Can a scientist pray and ask God for something?
 - Can a scientist believe in miracles?
- – and do so with intellectual integrity?
- – and do so without suspending their acceptance of everything science has taught us about the universe?

Introduction

4. Can a Scientist Pray?

- Science has revealed to us the regularity of the processes of nature, yet as Christians we proclaim a God who acts in history and answers the prayers of his children. How can we reconcile these views?
- How much “room” does science’s account of the universe allow for God to act in the universe?

Kenotic Creation and Divine Action

Kenotic Creation

God's Voluntary Self-Emptying

- Of course, the God who creates and sustains the universe can do whatever God wants in that creation.
- But we don't see a world that moves in arbitrary fits and jerks according to the whim of an all-powerful cosmic master.
- Our Christian belief in the God's incarnation as Jesus provides us with a profound insight into the character of God:
 - God chose to empty God's self of God's power and take on all the frailties and limitations of a human being.
 - God's voluntary self-emptying = *kenosis*

Kenotic Creation

God's Voluntary Self-Emptying

- It appears that in creating the universe, and endowing it with the twin gifts of **independence** and **reliability** so it could be fruitful and make itself, God has also chosen to empty God's self of some of God's power in relating to the creation.
- God has self-limited God's power in the act of creation to allow the created-other to be truly itself in its God-given freedom of being
- This self-emptying of God in creation ("kenotic creation") is consistent with a God whose character is love, whose nature is incompatible with being a cosmic tyrant.

Kenotic Creation

Providence

- How then does God relate to God's creation?
How might a loving God care for and act in this creation,
 - A creation in which God does not want to be a puppet master,
 - A creation which God wishes to make itself, to be other than God?

Kenotic Creation

Providence

- We can speak of three levels of specificity of divine action in creation:
 - 1. **General Providence**: the divine sustaining of the order of the world. The laws of nature are expressions of God's faithfulness.
 - 2. **Special Providence**: particular divine actions in within cosmic history
 - These actions take place within the "grain" of physical processes, and so are not easily discernable as acts of God.
 - 3. **Miracles**: radically unnatural events – turning water into wine, raising the dead to life.

Kenotic Creation

Providence

- There are some “minimalist” theologians who say that God relates to creation *only* through **General Providence** (God’s sustaining of the universe)
 - Anything more than that would violate the integrity of science.
- Such a view however is not biblical. God is not merely the God of the “whole show,” but also the God of Abraham, Isaac, and Jacob, the God of you and me. Such a God must be able to do specific things in the creation.
- Does science allow “room” for **Special Providence** = *particular* divine actions in cosmic history that are within the grain of the laws of nature?

Special Providence

Special Providence

Mechanisms of Divine Action

- How might God be able to act within cosmic history without violating the integrity of natural laws God has given to creation?
- What might be the mechanisms of God's **special providence** in creation?

Special Providence

Mechanisms of Divine Action

- Last week we discuss several possible sources of “openness” in physical processes that could provide “room” for God to act without violating the laws of nature (which are of course also expressions of God’s will)
 - The fundamental unpredictability of all physical processes found in **Quantum Mechanics**
 - The extreme sensitivity of most physical processes to initial / starting conditions found in **Chaos Theory**
 - The unexplained “self-organizing” tendency of complex systems now being studied in “**Complexity Theory**”, suggesting that that “more is different,” and that complex systems operate by a yet to be discovered set of natural laws.

Special Providence

Quantum Mechanics

- Quantum physics tells us that fundamental physical reality is best imagined *not* as a vast number of subatomic particles swirling about, but as a seething bed of unembodied potentially, possibility.
- The boundaries, the range or scope of that potentiality / possibility is encapsulated in the quantum wavefunction or statefunction.

Special Providence

Quantum Mechanics

- When a scientist (or any observer) attempts to detect or measure some property of a particle (say its position or speed):
 - the act of measurement *causes* the wavefunction of the particle to **collapse**, and
 - the particle comes into existence, becomes embodied with *one* of the possible values of the property allowed by its wavefunction.
- The particular value taken on appears to be “chosen” at random by the ground of physical reality.

Special Providence

Quantum Mechanics

- Quantum mechanics therefore shows us there is a “built-in” unpredictability in the universe. We can predict only the probability of a elementary particle’s position or speed (for example), not the actual values.

Special Providence

Chaos Theory

- Many physical systems are “well-behaved” in that we can easily predict their future behavior. For example: clocks.
- More commonly however physical systems display “chaotic” behavior. For example: clouds.
- “Chaotic” = they are *exquisitely* sensitive to initial conditions.
 - Extremely tiny differences in the input values (initial conditions) leads to wildly different behaviors in the future.

Special Providence

Chaos Theory

- *Example:* the weather in North America can be effected by whether or not an African butterfly flapped its wings a week earlier.
 - Another name for Chaos Theory: “**The Butterfly Effect**”
- The sensitivity of most physical systems (“clouds”) is so great that it would require a precision forbidden by quantum mechanics to predict its behavior.
- Hence many of the physical systems we are most familiar with (“clouds”) are *fundamentally* unpredictable.

Special Providence

Quantum and Chaos Theory

- The fundamental unpredictability of the world found in **Quantum Mechanics** and **Chaos Theory** suggest there is room for God to act in the world and yet remain hidden to science.

Special Providence

Complexity Theory

- **Complexity theory** is a nascent science looking at the emergence of behavior and properties in complex systems that could not have been recognized from the properties of their constituent parts.
- “More is different.”

Special Providence

Complexity Theory

- Complex systems seem to have an unexplained tendency to “self-organize” into a very orderly set of behaviors.
- For example:
 - the spontaneous generation of order seen in **cellular automata**.
 - In chaotic systems in which friction is present, the chaotic system will converge after a period to time onto an intricate but limited portfolio of possible forms called a “**strange attractor**”

Special Providence

Complexity Theory

- At present, there is no general theory that covers the behavior of complex systems.
- Polkinghorne believes there is a deep theory underlying these phenomenon whose discovery will revolutionize scientific thinking.

Special Providence

Complexity Theory

- We may find that in addition to explaining the world with:
 - **“bottom-up” causality**, the way fundamental constituents effect the whole, we need to take into account a:
 - **“top-down” causality**, the way global properties of a complex system effect its constituent parts.

Special Providence

Complexity Theory

- Polkinghorne suggests that the self-organizing tendency of complex physical systems involves a “top-down” causality of “**active information**”
 - **Active Information**: a slogan phrase to represent the influence that brings about the formation of structured patterns of behavior.
- He suggests that God interacts with God’s creation through this **top-down causality**, by influencing the formation of structured patterns of behavior (that is, by providing “**active information**”)

Special Providence

An Open Creation

- The laws of nature do not define a “rigid universe” in which the future could be theoretically predicted by a “calculating demon” of sufficient might.
- Instead, the universe is truly open, a universe in which both we and God can act and change the future.
- God, has voluntarily emptied God’s self of divine power (kenosis) to allow the universe to make itself, to allow the universe and the creatures who evolved within it (ourselves) to have a part in bringing about the future.
- There is thus an intertwining of God’s providential and creaturely causality at work in the universe.
 - God interacts within creaturely history but does not overrule the acts of creatures

Special Providence

An Open Creation

- God's divine **kenosis** (self-emptying of God) to allow the universe to make itself involves, Polkinghorne believes:
 - Not only God's self-emptying / self-limitation of divine **power (omnipotence)**, but also:
 - God's self-emptying / self-limitation of **divine knowledge (omniscience)**: God does not know the future of universe.

Special Providence

An Open Creation

- God has allowed the universe to be a truly open, evolving world, a world allowed to make itself, and God has chosen to know and interact with the world in its temporality, as it actually is.
- To truly interact moment by moment with a creation that is an independent world of true becoming, God does not know the future *because the future is not yet there to be known*.
 - God has self-emptied / self-limited (*kenosis*) God's self of divine knowledge (omniscience) and accepted a divine experience of temporality, interacting with history as history unfolds.

Miracles

Miracles

Any Place for the Miraculous?

- So is there any place in this picture for miracles, for radically unnatural events – turning water into wine, raising the dead to life, events that violate the laws of nature?
- Wouldn't they violate God's twin gifts to the universe of reliability and independence?

Miracles

Any Place for the Miraculous?

- Miracles and science:
 - Miracles are unique events and not recurrent phenomena, and hence lie outside the normal scope of science.
- Miracles and theology:
 - God's self consistency is the self-consistency of a "person" – it need not imply a rigid uniformity.
 - It is perfectly feasible for God to act as a "person," and act in surprising and unprecedented ways.
 - However we don't want to believe God is a celestial magician, doing occasional tricks to astonish people but most of the time not bothering.

Miracles

Any Place for the Miraculous?

- [Miracles are] not to be understood as God's arbitrary irruption, in a quasi-magical way, into the otherwise smooth history of creation. That would involve the theological nonsense of the God of miracles acting against the same God whose faithful will is the ground of the reliable process of the universe. Rather, miracle is the revealing by the Creator of the profound potentialities that the divine will has for creation, beyond those so far discerned in the workings of the world.
 - Polkinghorne, p. 127, Science, Faith and Understanding

Miracles

The Resurrection

- Jesus' Resurrection was just such a miracle, showing the character of God's will for creation:
 - The Lord's risen body was not a replacement for the dead body, nor its resuscitation, but its glorification.
 - The new creation will not be an abolition of the "old" creation (= our universe, past, present, and future), but its glorification.

Miracles

The Resurrection

- Miracles, and in particular the miracle of the Resurrection should dispel any concern that in allowing creation the freedom to make itself, God's purposes may not eventually be fulfilled.
- The fulfillment of God's will may occur along paths our actions create, but God is at work ceaselessly to bring salvation to creation, and ultimately God will be this universe's Savior.

Can a Scientist Pray?

Can a Scientist Pray

Can We Ask God for Something?

- So can a scientist (or anyone who takes science seriously) pray and ask God for something?
- The answer is yes – there is “room” in the created order for God (and ourselves) to act.

Can a Scientist Pray

Why Should We Pray?

- But why should we have to pray?
 - Doesn't God know what we need (even better than ourselves)?
 - Do we have to attract God's attention to get God to notice us?
 - Do we have to badger God, make a nuisance of ourselves to get God to act on our behalf?
 - Do we pray to suggest to God a rather cunning plan for our future that God may not have thought of?

Can a Scientist Pray

Why Should We Pray?

- Polkinghorne suggests we are doing two important things when we pray:
 - 1. We offer our wills to be aligned with the divine will.
 - 2. We are challenged to figure out what we really want. We are called on to commit ourselves to what we really value in the world.

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?