

Biology and Belief: Conversations in Faith and Science

Introduction

Welcome to *Biology and Belief: Conversations in Faith and Science*, hosted by Dr. Alan G. Padgett. This video study series is an outgrowth of the Spring 2004 *Science and Theology Lecture Series* sponsored by the North Central Program in Science and Theology. The NCPST, a project of the Minnesota Consortium of Theological Schools, is committed to the promotion of teaching and learning that bring together religious wisdom and scientific knowledge for the challenges of our culture today.

Biology and Belief is designed to provide you with a solid introduction to some of the intersections of religion and science that are of particular concern for many Christians today. Its six segments span a wide range of topics:

- Two possible explanations for the origins of life on earth are explored in “God After Darwin: Evolution and Divine Providence” with Dr. John F. Haught and “Intelligent Design in Biology” with Dr. Jed C. Macosko.
- Dr. Gregory R. Peterson discusses the concept of the soul in light of recent discoveries in the cognitive sciences in “Brain, Consciousness and the Soul.”
- Differing viewpoints about human life and personhood are at the heart of many bioethical controversies. Dr. Dianne M. Bartels provides a framework for one such debate in “The Ethics of Stem Cell Research.”
- Other ethical issues surface when discussing our Biblical mandate to have dominion over the earth and all of its creatures. Dr. John Deen approaches this debate as an expert in modern animal agriculture in “Christian Faith, Farming and the Care of Animals.”
- In “Science vs. Belief? The Challenge of Naturalism,” Dr. Terence L. Nichols confronts those who think that science has made religious faith not only obsolete, but logically impossible.

Dr. Alan G. Padgett has been Professor of Systematic Theology at Luther Seminary since 2001. Previously, he was professor of theology and the philosophy of science at Azusa Pacific University where he was also the program chair for the D.Min. in spiritual formation. Padgett is an ordained United Methodist pastor and has served congregations in New Jersey and California. He is particularly interested in the areas of Christian spirituality, systematic theology, and the relationship between religion and science. His recent publications include *Science and the Study of God: A Mutuality Model for Theology and Science* (Eerdmans, 2003) and *God and Time: Four Views* (InterVarsity Press, 2001). Padgett received his B.A. from Vanguard University, an M.Div. from Drew University and a D.Phil. from the University of Oxford.



You may find that some of these segments raise more questions than they provide answers. For those who want to delve deeper into a subject in search of more clarity, additional resources are suggested in this workbook.

It is the hope of the NCPST that this study serves as one small step in preparing you to enter into conversations about science and theology in a faithful and informed manner.

In Christian service,
C.K. Clauser, M.A.
NCPST Steering Committee
Luther Seminary, St. Paul, Minnesota
Spring 2005

Notes for Participants

Each of the videos that you will watch is approximately 20-25 minutes in length. They contain excerpted highlights from much longer lectures and interviews. For this reason, some comments might not be fully explained and speakers may refer to items that were not included in the video. However, great care was taken in the editing process to retain the core concepts of the speakers' presentations

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in order that you would have a good overview of the various topics.

Debate or Dialogue?

Persons of faith can legitimately have viewpoints that differ. You will find that this is the case for some of the speakers in the video series, and quite possibly for those in your study group as well. This does not mean that people with contradictory beliefs cannot learn from each other and speak with respect. It is important to focus on growing and learning together, rather than on competing to prove your point.

Debate produces winners and losers, but dialogue offers the potential for deeper understanding and fellowship. Here are some key techniques to employ during your group discussions:

- Speak personally with phrases such as “in my opinion,” or “I believe,” instead of making sweeping generalizations like “everyone knows that ...”
- Be clear about **why** you believe something, not just **what** you believe.
- Listen carefully so you do not misunderstand or misquote others.

Notes for Leaders

Thank you for agreeing to facilitate this *Biology and Belief* video series. As the leader, you play an important role. You are responsible for making sure that the necessary resources are available for each session, for making the participants feel welcome, and for guiding the discussion.

Series Planning

Biology and Belief is designed to be flexible enough to fit a variety of learning environments such as adult Sunday school or Bible study groups. The class may be of any size while viewing the video, but it is recommended that the discussions take place in small groups to encourage greater participation.

The sessions are in an order that was thought to be helpful,

What you need:

- Television
- DVD or VHS player
- Copies of the workbook
- Bibles
- Pens and paper for taking notes
- Poster pad or chalkboard for recording important discussion points

but you may watch them in any order or skip one if you can't fit all six in your schedule.

Between viewing the video and the discussion time, each session will last a full hour. (If your setting permits it, you may want to allot 90 minutes just in case you have a talkative group.)

Each topic has a “Digging Deeper” assignment that can be used as needed to create an additional, or an extended class period. If you use these, get volunteers from the class for each assignment and be sure to give them enough time to complete it.

Session Preparation

You do not need to be a theologian, scientist, or professional educator to lead this study. However, careful preparation and extra study will help you to be a better facilitator.

Before each meeting, make sure that you watch the video and review the workbook for that session. You should also read through any scriptures that are referenced. Take time to review the questions and formulate your own opinions. Feel free to jot down other questions and discussion points that you think would be helpful for your group.

Suggestions for Doing a Session

It is important to begin each session with prayer to focus the group. Next, you may want to set the stage for the video by reviewing the first page of that segment's handout. (It can be helpful if the class gets this the week before.)

During the video, be mindful of the volume and position of the screen to ensure that it is good for everyone. Don't be shy about pausing or rewinding the video so that nobody misses out on important information. (Encourage the participants to request this as needed.)

During the discussion time you will want to invite everyone into the conversation, but keep in mind that people participate in groups in different ways. If questions related to the topic arise naturally, it is fine to go with the flow. Otherwise, you can use the prepared questions. Be sure to keep an eye on the time and help set the proper pace.

To end the session, provide a quick preview of the next topic before closing with prayer.

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God After Darwin: Evolution and Divine Providence

Charles Robert Darwin (1809 - 1882) began collecting shells, minerals and insects as a boy in England. Although he entered Cambridge with the intention of becoming an Anglican priest, his interest in nature won out and he focused his studies on geology. He then embarked on a five-year journey (1831-1836) as a naturalist aboard the *HMS Beagle*, a ship that was commissioned to chart the coast of South America.

Darwin would spend much of his life reflecting upon, and writing about, his observations from that voyage. In particular, he was struck by the distribution, both past and present, of plant and animal species in different locations in South America. This led him to search for the origin of species.

Although Darwin had his key explanations for this puzzle in place within a few years after his trip, he did not publicly provide the details of what we call his “theory of evolution” until his monograph *The Origin of Species by Means of Natural Selection* was published in 1859.

Although filled with countless details and descriptions, the essence of Darwin’s theory can be distilled into two main components. First, all forms of life descend from a common ancestor through gradual modification over time. Secondly, the “mechanism” that explains this modification, including the origins of distinct species, is natural selection. In this process, those life forms with characteristics that are the best adapted to their environment will be “selected” by nature to survive and reproduce, while those with traits that are not suited to their environment will die out.

Did You Know?

The phrase “*survival of the fittest*” was coined by Herbert Spencer, not Charles Darwin. Spencer (1820 - 1903) was an English philosopher, social reformer and economist. His application of the Darwinian model to economic and political values resulted in *social Darwinism*, an ethic that proposed that the government should not intervene on behalf of the poor and weak in society.

Dr. John F. Haught is Thomas Healey Distinguished Professor of Theology at Georgetown University and the Director of the Georgetown Centre for the Study of Science and Religion which he founded in 1996. His specialty is systematic theology, with a particular interest in issues pertaining to science, cosmology, ecology, and religion. Haught is internationally known for his recent writings which challenge the perception that Darwinian evolution poses a dangerous threat to Christian religious faith: *Deeper Than Darwin: Evolution and the Question of God* (Westview Press, 2003), *Responses to 101 Questions on God and Evolution* (Paulist Press, 2001), and *God After Darwin: A Theology of Evolution* (Westview Press, 2000). Haught earned a B.A. from St. Mary’s University and his M.A. and Ph.D. from The Catholic University of America.



Theological Concerns

In his book, *Responses to 101 Questions on God and Evolution*, Dr. Haught outlines six main ways in which Darwin’s version of evolution has troubled many Christians: (1) Darwin presents a **new story of creation** that appears to conflict with the biblical accounts of creation; (2) natural selection seems to diminish, or even eliminate, **God’s role in creating** the diverse forms of life on earth; (3) if humans are the descendants of “lower” life forms, the belief in **human uniqueness and ethical distinctiveness** seems to be called into question; (4) the predominant role that chance plays in evolution seems to eliminate **divine providence**; (5) evolution appears to rob the universe of **purpose** and leaves human life without permanent significance; (6) Darwin’s explanation of human origins contradicts the idea of the “Fall” and the notion of **original sin** and seems to remove the need for a savior.

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Viewing Guide

Some viewers may find it helpful to take notes on a separate sheet of paper. Others may prefer to simply listen. Regardless of your preference, pay attention for the following key points:

1. According to Dr. Haught, what are the three ingredients in the Darwinian “recipe” for evolution? _____

2. Dr. Haught views the world as seeded with _____, not _____.

Why? _____

3. During the interview segment, Dr. Haught, comments on kenosis, the self-emptying of Christ. (See Philippians 2:5-11) How does he tie this in with his evolutionary viewpoint? _____

Questions for Further Discussion

1. Do you believe that the three ingredients of Darwinian evolution are sufficient to explain all living things? Why or why not?

2. Dr. Haught has been deeply influenced by the work of Pierre Teilhard de Chardin. (*See the box below.*) Do you think that such directionality indicates a purpose for the universe? Is this a form of divine providence at work?

3. Read Colossians 1:15-20 and Ephesians 1:9-10, 22-23. Do these passages help to convince you that Christ is indeed Teilhard’s Omega?

4. Dr. Haught believes that the universe is unfinished and imperfect. In your view, is this sufficient to explain suffering, evil and sin? Or, is something else involved?

Digging Deeper

Read one of Dr. Haught’s books about evolution. While reading, pay close attention to new concepts that are introduced and how they might relate to the themes from the video. Prepare a summary of the book and share it with the class.

Pierre Teilhard de Chardin (1881-1955) was a French paleontologist and Jesuit priest. He believed that the entire cosmos was in a process of evolution in which the intensification of organized complexity was accompanied by a corresponding increase in consciousness. He saw meaning and purpose in the evolutionary progression from the realm of matter, or geosphere, to the biosphere of life here on earth. For Teilhard, the next

The diagram consists of two parallel black arrows pointing upwards and to the right. The top arrow is labeled 'organized complexity' and the bottom arrow is labeled 'consciousness'. Between the arrows, three stages are listed from left to right: 'GEOSPHERE' (preatomic matter - atoms - molecules - cells - organisms), 'BIOSPHERE' (organisms - vertebrates - primates - humans), and 'NOOSPHERE'. To the right of the Noosphere is a large Greek letter Omega symbol (Ω) with the word 'OMEGA' written below it.

stage was a sphere of mind and thought that he termed the noosphere after “nous,” the Greek word for mind. He refers to the final goal of this evolutionary process as “omega,” the last letter in the Greek alphabet. Teilhard equates omega with God and views evolution as a cosmic search for God. Evolution takes place because as God draws near to the world, the world is drawn into God through Christ Jesus.

For a complete explanation of this process, see Pierre Teilhard de Chardin’s book *The Phenomenon of Man* (Harper, 1959).

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Intelligent Design in Biology

The notion of an intelligent designer behind creation is not a new concept for Christian theology. In his great *Summa Theologica*, Thomas Aquinas (1226-1274) argued that we can infer the existence of God from observing that natural bodies achieve their end “not fortuitously, but designedly.”

Perhaps the most famous case for a designer was put forth by the Anglican priest William Paley (1743-1805) in his book *Natural Theology: Or, Evidences for the Existence and Attributes of the Deity, Collected from the Appearances of Nature* (Faulder, 1802). He wrote:

*In crossing a heath, suppose I pitched my foot against a **stone** and were asked how the stone came to be there, I might possibly answer that for anything I knew to the contrary it had lain there forever; nor would it, perhaps, be very easy to show the absurdity of this answer. But suppose I found a **watch** upon the ground, and it should be inquired how the watch happened to be in that place, I should hardly think of the answer which I had before given, that for anything I knew the watch might always have been there. Yet why should not this answer serve for the watch as well as for the stone? ... For this reason and no other, namely, that when we come to inspect the watch, we perceive - what we could not discover in the stone - that its several parts are framed and put together for a purpose ... the inference we think is inevitable, that the watch must have had a maker ... who comprehended its construction and*

Did You Know?

Despite frequently being lumped together in popular media, the supporters of Intelligent Design (ID) and of Creationism do not see themselves as being in the same camp. In *No Free Lunch*, ID proponent William Dembski writes, “Intelligent design is not a form of anti-evolutionism. Intelligent design does not claim that living things came together suddenly in their present form through the efforts of a supernatural creator. Intelligent design is not and never will be a doctrine of creation.”

Dr. Jed C. Macosko is Assistant Professor of Biophysics at Wake Forest University. He received his B.S. in chemistry from MIT and his Ph.D. from The University of California - Berkeley for his work on influenza and HIV. Macosko's teaching interests include mechanics, thermodynamics, protein structure and function, and biophysics. His research focuses on the mechanics of protein motors and machines, mapping their potential energy surfaces. He believes that surveying and mapping the potential energy surfaces of protein machines is essential for understanding their function and for developing drugs to halt their activity. Macosko's research has been published in *Journal of Biological Chemistry*, *Journal of Molecular Biology*, *Biophysical Journal*, *Biochemistry* and other scientific journals.



designed its use.

Employing the tool of analogy, Paley clearly identified God as the designer of the complexities found in nature such as the human eye or heart.

Although the contemporary Intelligent Design movement has developed significantly more sophisticated arguments since Paley's day, the essence of their claim remains the same: the universe cannot be explained by chance alone.

Theological Concerns

Theodicy, or the problem of evil and suffering, is one that has occupied Christians for centuries. For some, it can be a challenge to reconcile the idea of a divine designer with the impersonal suffering and chaos found in nature.

Another common criticism of Intelligent Design is that it invokes a *god-of-the-gaps* to fill in the blanks in their understanding. Like Isaac Newton's claim that his calculations of celestial mechanics required continual minor adjustments by “the divine arm,” many think that ID advocates give up too soon; science will eventually discover natural explanations for the complexity we find around us.

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Viewing Guide

Some viewers may find it helpful to take notes on a separate sheet of paper. Others may prefer to simply listen. Regardless of your preference, pay attention for the following key points:

1. What does Dr. Macosko consider to be the “hinge point” of intelligent design? _____

2. What is irreducible complexity? _____

3. What are the three components of William Dembski’s design filter? _____

Questions for Further Discussion

1. In the video segment, Dr. Macosko used a method very similar to Paley’s. Based on the complexity of a bacteria flagellar motor, he infers that a designer was behind it. Was this convincing for you?
2. The philosopher David Hume (1711-1776) had several criticisms of the “argument from design.” A key objection was that even if you could infer from observing design that there is

a designer, you couldn’t insist that the designer is God. As a *scientist*, Dr. Macosko won’t claim that God is the designer, but as a *Christian* that is what he believes. How do you feel about this distinction?

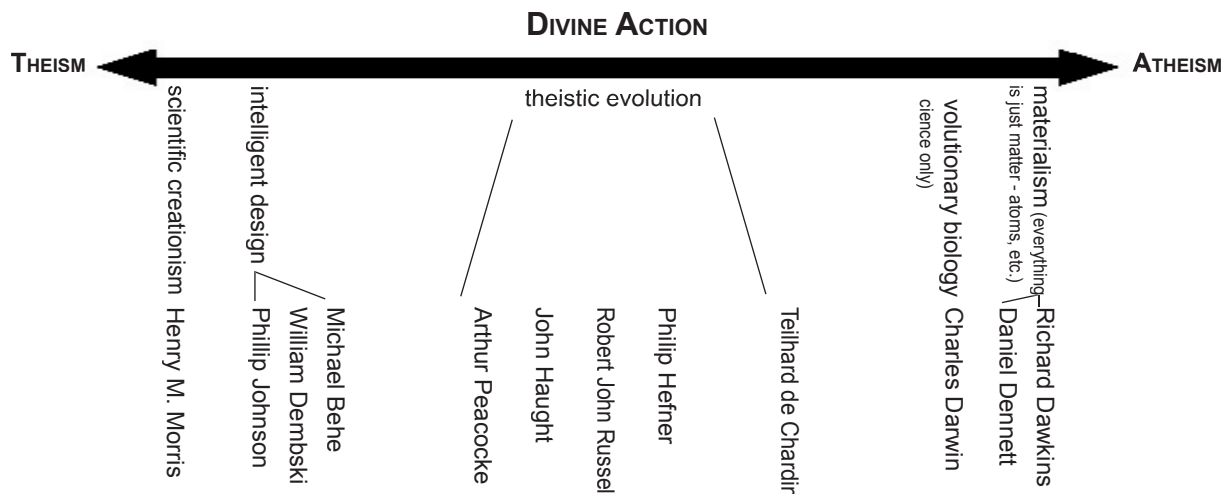
Digging Deeper

Intelligent Design - Select one of the intelligent design books below. While reading, pay close attention to new concepts that are introduced and how they might relate to the themes from the video. Prepare a summary of the book and share it with the class. • *Darwin on Trial* by Phillip Johnson (Regnery, 1991) • *Darwin’s Black Box: The Biochemical Challenge to Evolution* by Michael Behe (Touchstone, 1996) • *Intelligent Design* by William Dembski (InterVarsity, 1999)

Scientific Creationism - Visit a creationism web site: www.creationresearch.org or www.icr.org. Gather information about the fundamental beliefs and arguments of scientific creationism. Pay particular attention to similarities and differences with the positions put forth by Dr. Macosko and Dr. Haught in the video series. Prepare a summary of your findings and share it with the class.

Questions surrounding the origins of life can be approached in more ways than are represented in this video series. In their book *Evolution from Creation to New Creation: Conflict, Conversation, and Convergence*, Ted Peters and Martinez Hewlett situate a variety of viewpoints along a spectrum to help illustrate their relation to each other. One of the measures they plot various theories against is the degree of divine action in the natural world that each position allows.

Within categories there is often another sub-spectrum of positions with more subtle differences between them. Some popular authors and their placement on the spectrum are noted below.



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Brain, Consciousness and the Soul

Throughout time, people have speculated about the nature of human beings and have asked the question, “What makes me uniquely me?” Words such as soul, personality, and mind often surface in our answers.

The ideas of the ancient Greek philosopher Plato (427-347 BCE) about the soul have been extremely influential on Western thought and the beliefs of Christians. In short, Plato claimed that the soul was an immaterial, and immortal, component of a person. The rational part of the soul preexists the body in the realm of The Forms, ideal patterns that are perfect, unchanging and timeless. After the death of the material body, the soul that had animated the body would once again return to The Forms.

French mathematician and philosopher René Descartes (1596-1650) was another person who played a pivotal role in forming our thinking about this issue. He largely shifted the terminology of soul to that of mind. Despite being aware of some level of connection between the mind and brain, he believed that our minds are thinking, mental substances that are separate from, and independent of the physical substances of our bodies. This viewpoint also allowed for our continued existence after the death and decay of our bodies.

Theological Concerns

It seems that this dualistic perspective of an immortal soul housed in a mortal body is firmly entrenched in our contemporary belief systems. In January, 2003, a Harris Poll of 2,201 U.S. adults was conducted to learn about the religious beliefs of Americans. 84% of those who responded indicated that they believe in the survival of the soul after death.

For those who believe in an immortal soul, recent developments in the cognitive sciences, especially neuroscience, can be very troubling. Scanning technology allows researchers to pinpoint the locations of many functions in the brain. The careful study of persons with altera-

Dr. Gregory R. Peterson is Associate Professor of Philosophy and Religion at South Dakota State University and the Program Coordinator of the Philosophy and Religion Department. He teaches courses in the areas of ethics, philosophy of mind, and religion and science. Previously, Peterson served as Assistant Professor of Philosophy at the University of Minnesota - Duluth after earning a Ph.D. from the University of Denver. His primary area of research is in the religion and science dialogue, with special attention devoted to the biological and cognitive sciences. He is also a co-chair for the religion and science group for the American Academy of Religion. Peterson has authored numerous articles on religion and science in books, encyclopedias, and journals, and has recently published the book *Minding God: Theology and Cognitive Science* (Fortress 2002).



tions in the brain due to injury, disease, drugs, etc. have produced documentation of startling changes in not just cognitive functioning, but personality, impulse control, antisocial behavior, and the like. This evidence seems to suggest that “what makes me uniquely me” in fact emerges from the activity of my physical brain, not a mind or soul.

However, this does not leave us in the theological quandary one might at first suspect. A careful reexamination of scripture and Christian doctrine reveals an integrated and holistic view of persons, not a starkly dualistic split between soul/mind and body. This position assumes that we are embodied beings to our very core - we cannot exist without them.

For example, when we recite the Apostle’s Creed we do not mention a disembodied, immortal soul. Rather, we confess belief in “the resurrection of the body, and the life everlasting.” (See the following page for the text of the Apostle’s Creed.)

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The Apostles' Creed

I believe in God, the Father almighty,
creator of heaven and earth.

I believe in Jesus Christ, his only Son, our Lord.
He was conceived by the power of the Holy Spirit
and born of the virgin Mary.
He suffered under Pontius Pilate,
was crucified, died, and was buried.
He descended into hell.*
On the third day he rose again.
He ascended into heaven,
and is seated at the right hand of the Father.
He will come again to judge the living and the dead.

I believe in the Holy Spirit,
the holy catholic Church,
the communion of saints,
the forgiveness of sins,
the resurrection of the body,
and the life everlasting. Amen.

*or "He descended to the dead."

The New Testament also firmly grounds our hope for eternal life in the promise of a bodily resurrection. An especially vivid passage is found in 1 Corinthians 15:12-23 which states,

Now if Christ is proclaimed as raised from the dead, how can some of you say there is no resurrection of the dead? If there is no resurrection of the dead, then Christ has not been raised; and if Christ has not been raised, then our proclamation has been in vain and your faith has been in vain. We are even found to be misrepresenting God, because we testified of God that he raised Christ-- whom he did not raise if it is true that the dead are not raised. For if the dead are not raised, then Christ has not been raised. If Christ has not been raised, your faith is futile and you are still in your sins. Then those also who have died in Christ have perished. If for this life only we have hoped in Christ, we are of all people most to be pitied. But in fact Christ has been raised from the dead, the first fruits of those who have died. For since death came through a human being, the resurrection of the dead has also come through a human being; for as all die in Adam, so all will be made alive in Christ. But each in his own order: Christ the first fruits, then at his coming those who belong to Christ.

While we may not have complete understanding about the exact form our resurrected

bodies will take, we can trust that our faith has not been in vain and we can look forward to the fulfillment of God's promise to return us to embodied existence through resurrection.

Viewing Guide

Some viewers may find it helpful to take notes on a separate sheet of paper. Others may prefer to simply listen. Regardless of your preference, pay attention for the following key points:

1. Dr. Peterson refers to a quote by Francis Crick twice during his lecture. (See the shaded box below.) Why does he think this statement is so important? _____

2. What are the cognitive sciences? _____

3. What does Dr. Peterson say about Jesus as a healer? _____

Questions for Further Discussion

1. Are any of the concepts in this segment new to you? Which ones?

2. What portions of Dr. Peterson's perspective on resurrection do you agree/disagree with?

Digging Deeper

Prepare a summary about the meaning of resurrection the New Testament and share it with the class. Helpful resources such as biblical commentaries, a concordance, and theological dictionaries may be available in your church library or from your pastor.

"You, your joys and your sorrows, your memories and your ambitions, your sense of identity and free will are, in fact, no more than the behavior of a vast assembly of nerve cells and their associated molecules."

Francis Crick
The Astonishing Hypothesis

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The Ethics of Stem Cell Research

All of the various types of tissue in the human body originate from previously undifferentiated stem cells. The therapeutic use of stem cells holds the promise of treating Parkinson's, diabetes, arthritis, heart attacks, autoimmunity, osteoporosis, cancer, Alzheimer's disease, severe burns, spinal cord injuries, muscular dystrophy, multiple sclerosis, liver disease, and many other medical conditions.

Despite the potential for immense benefits to human health and well being, stem cell research is a controversial subject. While some people object to the entire enterprise for reasons such as humans should not "play god," most conflict arises when certain types of stem cells are used.

While stem cells are available from a variety of sources, embryonic stem cells are especially valued by researchers because they are known to be highly pluripotent. In other words, they have the ability to be stimulated in such a way that they will develop into many kinds of tissues. In the process of collecting stem cells, the embryos are destroyed.

The moral status or personhood an individual attributes to an embryo is the driving force behind most arguments relating to whether or not stem cell research should be conducted. If one believes that an embryo is a human being and has full personhood from conception, then there are no situations in which research would be acceptable since destroying embryos would be equivalent to murder.

Psalm 139:13-16

For it was you who formed my inward parts; you knit me together in my mother's womb. I praise you, for I am fearfully and wonderfully made. Wonderful are your works; that I know very well. My frame was not hidden from you, when I was being made in secret, intricately woven in the depths of the earth. Your eyes beheld my unformed substance. In your book were written all the days that were formed for me, when none of them as yet existed.

Dr. Dianne M. Bartels is Associate Director of the Center for Bioethics at the University of Minnesota. She earned an R.N. from St. Mary's School of Nursing and Marycrest College, an M.A. in psychosocial nursing from the University of Washington, and a Ph.D. in family social science from the University of Minnesota. Bartels was one of the founders of the Minnesota Network of Ethics Committees because of her conviction that understanding ethical theories and principles can contribute to the quality of daily life for patients, families, and employees in health care facilities. In her research, she has focused primarily on ethical questions that arise at the "edges of life" such as end of life care and the roles of genetic counselors. Her latest book is *Facilitating the Genetic Counseling Process: A Manual for Practice*. (National Society for Genetic Counselors, 2001).



Theological Concerns

Scripture makes it clear that God cares about human beings in all circumstances and at any stage of life. Not knowing for certain the moment that personhood begins, the traditional Christian position has chosen to err on the side of caution and give life the benefit of the doubt from the moment of conception. This sense of mystery and reverence is expressed in Ecclesiastes 11:5, "Just as you do not know how the breath comes to the bones in the mother's womb, so you do not know the work of God, who makes everything."

Others have pointed out that science and technology have given us a very precise understanding of the stages of human development and groups of undifferentiated cells, while possessing the potential to be persons, are clearly not actual persons. Analogous to the use of human cadavers, embryos used in research should be treated with respect, and for the greater goal of providing aid to others whose suffering could be relieved.

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Some viewers may find it helpful to take notes on a separate sheet of paper. Others may prefer to simply listen. Regardless of your preference, pay attention for the following key points:

1. What are the five sources of stem cells?

- _____
- _____
- _____
- _____
- _____

2. What main beliefs about the status of human embryos does Dr. Bartels present?

- _____
- _____
- _____
- _____

3. What does Dr. Bartels think about the criticism that researchers are just trying to play god?

- _____
- _____

Questions for Further Discussion

1. Dr. Bartels claims that the point at which one becomes a person is a belief, not a scientific fact. When do you think we become human beings? At conception? At birth? At some other point?

2. Dr. Bartels discussed five sources of stem cells. Which of these do you consider acceptable to use and which are objectionable? Why?

3. Dr. Bartels also raises ethical questions about the allocation of resources in our health care system. Is it fair that funding goes to high-tech research instead of public health? How would you approach the problem if you were a policy maker?

Digging Deeper

Visit one or more of the web sites listed below and gather information about current trends in stem cell research. Note if there are ethical concerns that are raised in addition to the ones Dr. Bartels presented in the video series. In particular, be aware of any case studies or stories about how research impacts people's lives. Prepare a summary of your findings and share it with the class.

- www.nih.gov/news/stemcell
- www.stemcellresearchnews.com
- www.bioethics.umn.edu

Key Terms of Human Development

Blastocyst - The embryo during the 4th - 11th days, characterized by the development of an outer layer of cells surrounding an inner cavity.

Blastomeres - Cells produced by the division of the zygote within the first three days.

Embryo - The term used for the developing organism from the 2nd to 8th week after fertilization.

Fertilization - A sperm penetrates an egg and creates a zygote. This process takes approximately 24 hours. Also known as conception.

Fetus - The Latin word for "child" is used to refer to the gestating baby from the 9th week of pregnancy through birth.

Gametes - Mature reproductive cells. Can refer to both eggs and sperm. Is sometimes referred to as germ cells.

Oocyte - Another term for an egg.

Primitive Streak - The beginning stages of the spinal cord and nervous system that appears around the 14th day.

Zygote - The cells produced by the fertilization of an egg and the earliest stages of cell division during the 1st week.

To learn more about human development from conception to birth, visit *The Visible Embryo*, a wonderful website full of concise information and illustrations. www.visembryo.com/

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Christian Faith, Farming and the Care of Animals

Animal protein in the form of meat, eggs, milk and cheese has long been a key component of the human diet. However, some Christians today are starting to rethink this primary use for animals.

The pastoral image of a devoted shepherd lovingly tending flocks is giving way to the realities of agribusiness and factory farming in the 21st century. Is it right to turn animals into nothing more than a commodity?

Theological Concerns

Much of the Western understanding of how to interact with the natural world, including animals, is rooted in the creation story from the first chapter of Genesis. (See the box to the left.) The key word in this account is **dominion**, which is

Genesis 1:24-30

And God said, "Let the earth bring forth living creatures of every kind: cattle and creeping things and wild animals of the earth of every kind." And it was so. God made the wild animals of the earth of every kind, and the cattle of every kind, and everything that creeps upon the ground of every kind. And God saw that it was good. Then God said, "Let us make humankind in our image, according to our likeness; and let them have dominion over the fish of the sea, and over the birds of the air, and over the cattle, and over all the wild animals of the earth, and over every creeping thing that creeps upon the earth." So God created humankind in his image, in the image of God he created them; male and female he created them. God blessed them, and God said to them, "Be fruitful and multiply, and fill the earth and subdue it; and have dominion over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth." God said, "See, I have given you every plant yielding seed that is upon the face of all the earth, and every tree with seed in its fruit; you shall have them for food. And to every beast of the earth, and to every bird of the air, and to everything that creeps on the earth, everything that has the breath of life, I have given every green plant for food." And it was so.

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County before attending The University of Guelph where he earned his D.V.M., M.S., and Ph.D. His research interests include swine health management, epidemiology of swine diseases, and economics of swine production. Deen is a regent of the American Board of Veterinary Practitioners and a trustee of the American Association of Swine Practitioners Foundation. He is a regular contributor to *International Pigletter*, the monthly industry newsletter and scientific publications such as *The Journal of Swine Health and Production*.

commonly understood to mean supreme authority, absolute ownership and power over property of any sort. If we accept this interpretation, then we are within our rights to control the destiny of animals in whatever way serves our needs.

However, some theologians have suggested a different approach to our responsibility toward creation; that of **stewardship**. A steward is one who manages the property of another. For a Christian, this would mean approaching land, plants, animals, and even ourselves as belonging to God. Just as God loves us, we should demonstrate care and concern for the things we supervise.

We can all agree that farming practices that cause animals to suffer needlessly should be eliminated. Still, people of faith differ in their understanding of what constitutes suffering or abuse of animals. Our presenter offers suggestions about how principles of Christian stewardship can be applied to animal agriculture.

Biology and Belief: Conversations in Faith and Science

Viewing Guide

Some viewers may find it helpful to take notes on a separate sheet of paper. Others may prefer to simply listen. Regardless of your preference, pay attention for the following key points:

1. What are Dr. Deen's five key responsibilities to farm animals?

- _____
- _____
- _____
- _____
- _____

2. How does Dr. Deen's Calvinist perspective inform his approach to animal agriculture?

Questions for Further Discussion

1. What do you think about Dr. Deen's claim that farming is part of our mandate for stewardship?

2. Dr. Deen remarks about the differences in

Did You Know?

One of the key responsibilities toward farm animals that Dr. Deen mentions is coming to agreement on, and following, societal norms. In the United States, the federal government plays a major role in setting and enforcing these standards.

The Animal and Plant Health inspection Service (APHIS) is responsible for protecting and promoting U.S. agricultural health, administering the Animal Welfare Act, and carrying out wildlife damage management activities. Visit them online at www.aphis.usda.gov.

The Animal Welfare Information Center of the U.S. Department of Agriculture also has a web site at www.nal.usda.gov/awic and the details of the Animal Welfare Act and Regulations may be viewed at www.nal.usda.gov/awic/legislat/usdaleg1.htm.

rural and urban residents' attitudes to animals agriculture and to issues of life and death in general. What differences, if any, have you observed?

3. Dr. Deen states that dominion over animals cannot be abusive, but should model God's dominion over us. Read Exodus 23:12 and Deuteronomy 22:4 and discuss how they recast your understanding of dominion.

4. Farmed animals are primarily produced to be eaten. Are they still part of nature, or have thousands of years of domestication and captive breeding separated them from the natural sphere as Dr. Deen suggests?

5. Do you agree that killing and eating animals is a way of enjoying creation? Why or why not?

Digging Deeper

Christian Vegetarians - Some Christians choose not to eat animal products. They might have a variety of reasons why they are vegetarians including practical health benefits, ethical concerns about animal welfare, and social justice for the world's poor and hungry. Visit the web site below and learn more about some of the arguments for vegetarianism. Prepare a summary of the information to share with the class.

- Christian Vegetarian Association
www.christianveg.com/index.htm

Christian Farmers - Some Christian farmers are connecting with each other to share insights about integrating their faith with their vocation and basing their work on principles of stewardship. Talk to Christian farmers in your community about these issues or gather information from one of the web sites below and share your findings with the class.

- Agriculture and Theology Project
www.agriculture-theology.org.uk/index.htm
- The Fellowship of Christian Farmers, Int'l
www.fcfi.org/index.html
- Christian Farmers Federation of Ontario
www.christianfarmers.org

Biology and Belief: Conversations in Faith and Science

Science vs. Belief? The Challenge of Naturalism

A common perception today is that science is explaining more and more, and religion is explaining less and less. Supernatural beings like God and angels really don't exist - all that matters is matter itself.

This insistence on the supremacy of natural phenomena that can be measured, tested or dissected is shifting our focus away from the wonder of creation. Instead of a window in which we see the glory of God, we see resources to harness and master through better technology. In a secular society, Christian faith is increasingly relegated to the realm of mere myth and superstition, as if you can choose to believe in science OR religion, not both.

Theological Concerns

An increasing number of Christians are convinced that the philosophy of naturalism is misguided and pushes science unnecessarily away from religion. The relationship between science and religious belief could be one of partnership, cooperation and mutuality, rather than one of competition.

In fact, some theologians such as Terence Nichols contend that a great deal of scientific evidence and many aspects of human life are better explained by a Christian worldview than by naturalism. He provides several concrete examples of this assertion in his book *The Sacred Cosmos: Christian Faith and the Chal-*

Ancient and medieval Christians lived in a sacred cosmos and saw nature as a window or sacrament that expressed the beauty, majesty and glory of God. [In the early modern period] science came to understand nature as a mechanical system that operated more or less independently from God... nature came to be seen as resources to be manipulated and exploited for gain.

Terence Nichols
The Sacred Cosmos

Dr. Terence L. Nichols is Professor of Theology at the University of St. Thomas where he also serves as Chair of the Theology Department. Nichols earned a B.A. from the University of Minnesota and spent eleven years as the owner/operator of a construction firm before pursuing doctoral work in theology at Marquette University. After receiving his Ph.D. in 1988, Nichols joined the faculty at UST where he teaches courses in world religions, science and theology, death and afterlife, and systematic theology. His recent publications include *The Sacred Cosmos: Christian Faith and the Challenge of Naturalism* (Brazos Press, 2003) and *That All May Be One: Hierarchy and Participation in the Church* (Liturgical Press, 1997).



lenge of Naturalism related to human nature and the theory of evolution among others. Of particular interest is the coherence of the Big Bang theory with the Christian doctrine of creation, specifically *creatio ex nihilo*, or creation from nothing.

In short, the Big Bang theory claims that the universe originated from a massive explosion, and that the universe is still expanding as a result of that initial event. Although this view was first put forth in 1930, the scientific evidence that tipped the scales in favor of this explanation was not discovered until 1965. Since then, physicists and astronomers have been conducting research in which the findings only serve to shore up this perspective.

As the universe expanded after the Big Bang, it did so according to precisely balanced constants that allowed the formation of stars, planets and the eventual development of plant and animal life.

For Dr. Nichols, this sounds very much like God bringing order out of chaos as his Word transforms a dark, formless void into a beautiful, bountiful world.

Biology and Belief: Conversations in Faith and Science

Viewing Guide

Some viewers may find it helpful to take notes on a separate sheet of paper. Others may prefer to simply listen. Regardless of your preference, pay attention for the following key points:

1. Instead of “atheism” or “scientific naturalism,” Dr. Nichols uses the term “philosophical naturalism.” Why? _____

2. How does he define philosophical naturalism? _____

3. What is required to get a whole picture of reality? _____

2. How does Dr. Nichols define miracles?

Questions for Further Discussion

1. Do you see divine providence at work in anthropic coincidences? Why or why not?

2. Dr. Nichols contends that naturalism cannot explain large parts of the human experience including things such as freedom, rationality, morality and human rights? Explain why you

agree or disagree with this perspective.

3. Dr. Nichols believes that the antidote to naturalism is a return to a sacramental view of nature. What do you think is the antidote to naturalism?

4. How does Dr. Nichols’ sacramental view of nature fit within your framework of faith and worship? Is it too much like worshipping nature?

5. Do you need to believe in miracles in order to be a Christian? Why or why not?

Digging Deeper

Creative Expression - Psalm 19:1 tells us, “The heavens are telling the glory of God; and the firmament proclaims his handiwork.” Create a poem, drawing, song, mosaic, or other form of artwork that expresses how you see the glory of God displayed in nature. Share your work with the class and explain why you selected the specific things that you portrayed.

Book Report - In his book, *The Sacred Cosmos*, Dr. Nichols explains how Christianity exceeds naturalism in accounting for the evidence in four key areas: the origins of the universe (Chapter 4); the evolution of the universe (Chapter 5); human nature (Chapters 6 & 7); and miracles (Chapter 8). Select one of these themes and read the corresponding chapter(s). While reading, pay close attention to new concepts that are introduced and how they might relate to Dr. Nichols’ comments in the video. Prepare a report about the chapter(s) and share it with the class.

Many universal constants in nature must be finely tuned in order to support intelligent life. Three of these **anthropic coincidences** are listed below:

- The gravitational force constant. If this was smaller, stars would be too cool for nuclear fusion to ignite, leaving the universe too cold to support life. If it was bigger, stars would burn out too quickly before life could evolve.
- The polarity of water molecules. If this was smaller, ice would not float, resulting in excessive freezing. If this was greater, water would vaporize and couldn’t support life.
- The decay rate of the proton. If this was smaller, there wouldn’t be enough matter in the universe for life. If this was larger, excess radiation would exterminate life.

Biology and Belief: Conversations in Faith and Science

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Selected Science & Theology Web Links

Denominational Sites

- Church of Scotland: Society, Religion and Technology Project • www.srtp.org.uk/srtpage3.shtml
- Episcopal Church Working Group on Science, Technology & Faith • www.dfms.org/science
- ELCA Alliance for Faith Science and Technology • www.elca.org/faithandscience/alliance.html
- Presbyterian Association for Science, Technology and the Christian Faith • www.pastcf.org
- United Methodist Church: Science and Theology • www.gbod.org/scienceandtheology

Organizations

- American Ass'n for the Advancement of Science: Dialogue on Science & Religion • www.aaas.org/spp/dser
- American Scientific Affiliation (ASA) • www.asa3.org
- Center for Theology and the Natural Sciences (CTNS) • www.ctns.org
- Counterbalance Foundation • www.counterbalance.org
- Creation Research Society (CRS) • www.creationresearch.org
- Discovery Institute Center for Science & Culture • www.discovery.org/csc/
- European Society for the Study of Science and Theology (ESSSAT) • www.esssat.org
- Institute for Creation Research • www.icr.org
- Institute for Theological Encounter with Science and Technology (ITEST) • <http://itest.slu.edu>
- Institute on Religion in an Age of Science (IRAS) • www.iras.org
- InterFASE (International Faith and Science Exchange) • www.interfase.info
- International Society for Science and Religion • www.issr.org.uk
- John Templeton Foundation • www.templeton.org
- Lumen Christi Institute • www.lumenchristi.org
- Metanexus Institute on Science and Religion • www.metanexus.org
- New England Center for Faith and Science Exchange • www.bostontheological.org/fase/fase.htm
- North Central Program in Science and Theology • www.luthersem.edu/NCPST
- Philadelphia Center for Religion and Science • www.pc4rs.org
- Science and Christian Faith • www.science-faith.org
- Zygon Center • www.zygoncenter.org

Publications

- Science and Spirit • www.science-spirit.org
- Science and Theology News • www.stnews.org
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