

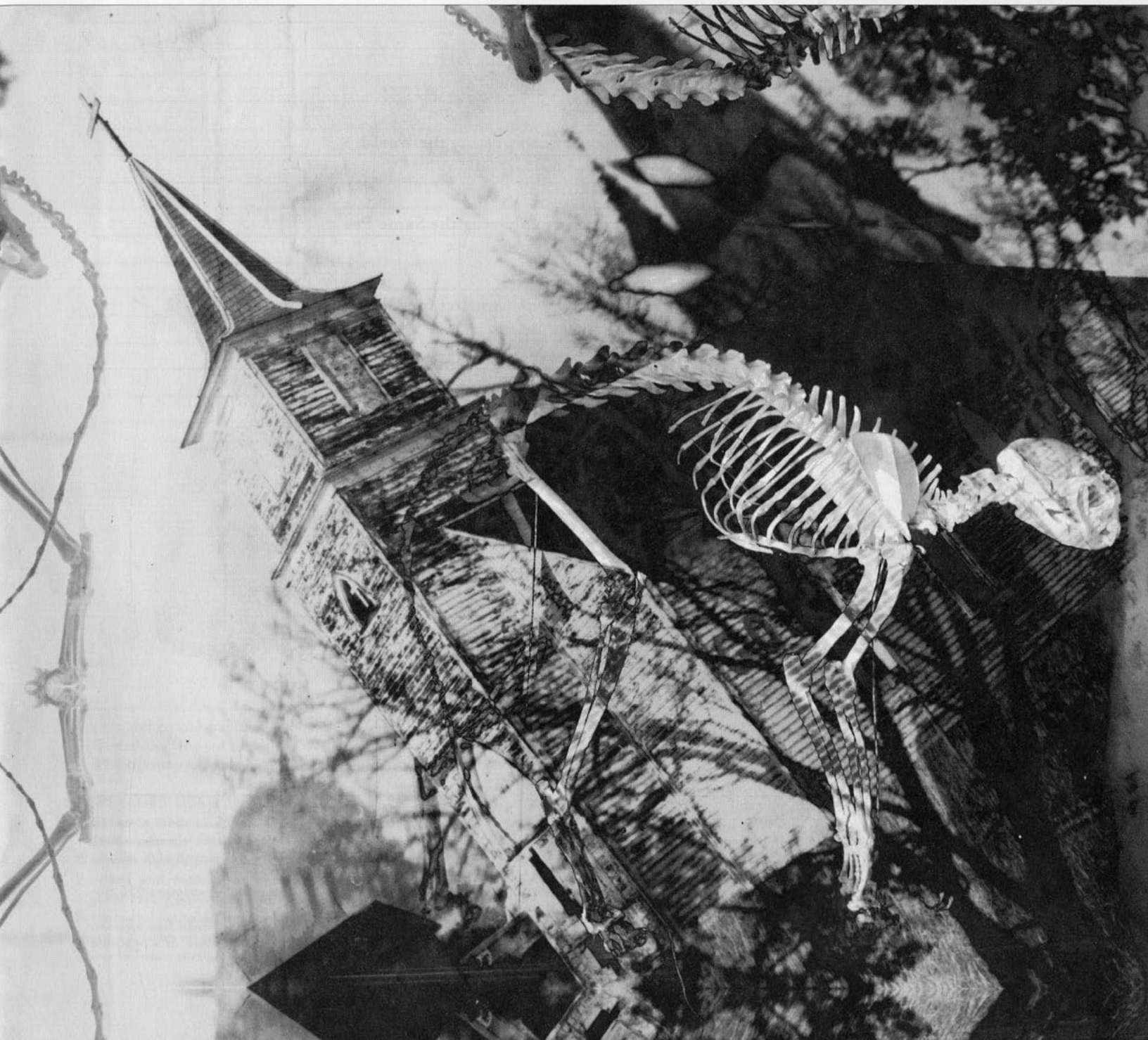
ISSUES

IN CHRISTIAN EDUCATION

Spring 2001

Vol. 35, No. 1

Theology and Science: Is a Conversation Possible?



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A PUBLICATION OF CONCORDIA UNIVERSITY, SEWARD, NEBRASKA

Theology and Science: Is a Conversation Possible?

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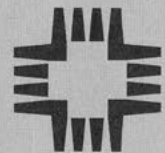
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CIRCULATION POLICY—*ISSUES in Christian Education* (ISSN0278-0216) is published three times a year by the faculty of Concordia University, Seward, Nebraska 68434. *ISSUES* is sent free to each church, school, district and synodical office in The Lutheran Church—Missouri Synod. Copies are also sent to high schools, colleges and universities affiliated with the Synod. Individuals wishing personal copies may obtain them as follows: Single copy @\$2.00 each; Subscription @\$6.00; 10 or more copies mailed to the same address @\$1.20 per copy. Readers are invited to reprint portions of *ISSUES* materials provided that the following credit line appears: "Reprinted from *ISSUES in Christian Education*, Volume 35, No. 1, Spring, 2001, a publication of Concordia University, Seward, Nebraska."



reflections

HOLY SCRIPTURE TELLS US, "In the beginning God created the heaven and the earth" (Genesis 1:1). In the New Testament the author of Hebrews, writing by inspiration of the Holy Spirit, writes, "Through faith we understand that the worlds were framed by the Word of God, so that things which are seen were not made of things which do appear" (Hebrews 11:3). In considering biblical and scientific views of the world, editorial writer Wilbert Rusch asks, "How can one help students address questions of origin without undermining the teachings of our church or doing violence to science?" In one of the book reviews for this *Issues in Christian Education*, Charles Hoyer points out that religion and science long have had differing world views, but they need not be mutually exclusive.

Continuing discussions and controversies point to the need for new perspectives on planet earth. Both religion and science want to understand the world and how we humans fit into it. Faith communities which take the Bible seriously, while also being involved in the sciences, have a major contribution to make in this discussion.

This edition of *Issues* examines three questions:

1. What is the uniqueness of the Bible's perspective on the world?
2. How do the natural sciences interpret the world?
3. What are significant issues involving biblical and scientific views of life on this planet?

Writer Gil Daenzer points out that "the words 'true' and 'false' as in 'absolute truth' are not proper scientific words. Theories are never true or false. They are strong or weak." Author Charles Kunert believes that when apparent conflict exists between Scripture and science, the conflict is of human origin. For me, faculty colleague Jeffrey Schwehm, in an editorial, adds an important insight: "As a scientist and a Christian who accepts God's Word that He created the heavens and the earth, my scientific studies have confirmed for me the existence of a Creator.... Could it be that God's vague presence in nature is intended, ironically, by design, to give us true freedom to worship Him out of love and not logical compulsion?"

God's question to Job seems most appropriate: "Where wast thou when I laid the foundations of the earth?" (Job 38:4a) As often happens during our brief sojourn on this earth, when with our finite human minds we cannot comprehend some of God's marvelous creation, we must realize with the Apostle Paul, "For now we see through a glass darkly; but then face to face: now I know in part; but then shall I know even as also I am known" (1 Corinthians 13:12).

Orville C. Walz, President



Layout, design and graphics by CONCORDesign of Concordia University, Seward, Nebraska.
Photography and Artwork: Adrian Hanft

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Titles set in 22 point Mrs. Eaves Roman (Imigree of Sacramento). Tracking normal.
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Thinking God's Thoughts After Him: How the Bible and Science View the World

The Biblical Worldview

AT THE VERY FOUNDATION of the biblical worldview is the assumption that essence precedes existence. This means that the nature and purpose of things existed in the mind of God before those things were created. We see this at a human level with the call of Jeremiah: "Before I formed you in the womb, I knew you/before you were born I set you apart" (Jeremiah 1:5, NIV). More generally, we learn that all creation reflects a divine principle of order, the *logos*: "In the beginning was the Word..." (John 1:1). Although one meaning of "Word" is the Son of God, Greeks "used this term not only of the spoken word but also of the ... word still in the mind—the reason."¹

As a result, we should not assume the Bible is using metaphor when it tells us that creation communicates. The Psalmist says, "The heavens declare the glory of God/the skies proclaim the work of his hands. Day after day they pour forth speech" (Psalm 19:1-2). It is this fact, that creation is not mute, but speaks of God's plans and purposes, that authorizes the natural knowledge of God: "... since the creation of the world God's invisible qualities—his eternal power and divine nature—have been clearly seen, being understood from what has been made" (Romans 1:20).

How the Biblical Worldview Made Modern Science Possible

AS NANCY PEARCEY and Charles Thaxton have argued in detail, this understanding of creation was indispensable to the rise of modern science.² Given the biblical model, scientists could accept the following set of 10 principles which made it rational and moral to explore the natural world. 1. Nature is real (and not *maya*, or illusion, as Eastern mysticism teaches). 2. The world was created good, so it is not to be despised, as the Gnostics believed, but is worthy of study. 3. Though good, creation is not divine, so it is not sacrilege to dissect nature. 4. God is rational, so the universe is coherent. 5. This coherence is expressed in laws which can be discovered (an atheist has a hard time justifying this expectation—why should there

be laws without a lawgiver?). 6. These laws are not rough approximations, but have mathematical precision. 7. Most important of all for science, the universe is intelligible to humans, because "the same *Logos* that is responsible for its ordering is also reflected in human reason."³ Since we are made in the image of God, human reason is *like* divine reason, although since the Fall, it is prone to errors and misuse. 8. Not only is human reason fallible, but God's thoughts are above our thoughts, so we must learn humility. We cannot deduce how God must have thought, but like Johannes Kepler, we should be content to "think God's thoughts after Him." 9. This humility is increased once we realize that God's will is free, so we cannot anticipate what God has to do (*a priori*), but must make observations (*a posteriori*). As Francis Bacon said, "Nature is only conquered by obedience"⁴—obedience to God's will for creation. 10. Finally, there is a two-fold moral obligation to study the "book of nature." For one thing, those gifted with a powerful reason are called to use it in the discovery of truth. "How dare you not know what can be known," Luther is reputed to have said. For another, the study of nature enhances our ability to serve our neighbor through the provision of goods, technological aids and cures for disease.

The Scientific Worldview

THE BIBLICAL FOUNDATION of modern science might lead us to hope for consensus concerning the scientific view of the world. However, scientific discoveries and advances in scientific methodology have themselves redefined science many times. In Newton's day true science was supposed to conform to a mechanistic paradigm. This asserted that all causation has a material mechanism, making action at a distance impossible. Thus, when Newton proposed his theory of gravitation, it was at first denounced as unscientific, since it seemed to invoke an "arcane" force which would have to act across empty space. Once Newton's theory became entrenched, it suggested that real science could deal only in deterministic laws, where a given cause necessarily resulted in its effect. Yet that paradigm was in turn overthrown by Quantum Mechanics: it is often the case that we can predict the behavior of electrons and protons only with a certain probability.

A second difficulty is that although modern science is a child of Christianity, Enlightenment philosophy attempted to sever the con-

nection. Reason came to be viewed not as a reflection of divine *logos* but as a means of human autonomy. Likewise, the natural world came to be viewed as an autonomous system, closed to divine activity. These modernist attitudes led to a conflation of two approaches to science. The legacy of the Christian worldview was *empirical science*, that we discover nature's secrets by observation and experiment. By conceiving nature as autonomous, this approach was identified with *materialistic science*, the view that only natural, material causes could be invoked to explain natural phenomena. Since matter is blind and mute, it has no direction and cannot point to its creator's purposes. The culmination of this progressive gagging and blindfolding of God's creation is the atheistic evolutionism of Richard Dawkins. According to Dawkins, nature is a blind watch-maker, following no plan and producing animals and even people by processes which did not have them in mind.

Intelligent Design

RECENTLY A CONCERTED EFFORT has been made by scientists and philosophers in the Intelligent Design (ID) movement to reverse this trend. Phillip Johnson has argued that empirical science is not necessarily materialistic science. Recent work in cosmology concerning the fine-tuning of the cosmos for life and in biochemistry concerning the irreducible complexity of some biological structures⁵ has given empirical evidence for design in nature. Furthermore, Lutheran Stephen Meyer⁶ has argued that one can explain the structure and function of DNA, essentially a set of biological programs, only by recourse to the notion of *language*. And mathematician William Dembski has provided a statistically rigorous "filter" for distinguishing entities which are designed from those which result from chance or law alone.⁷ Using these discoveries, Johnson aims to drive a wedge⁸ between empirical science and materialistic science. All of this work provides hope that science will once again honor its parentage.

Notes

¹Note for John 1:1 in the *Concordia Self-Study Bible*.

²Nancy Pearcey and Charles Thaxton, *The Soul of Science* (Wheaton, IL: Crossway Books, 1994), especially pp. 21-37.

³Christopher Kaiser, quoted in Pearcey and Thaxton, *The Soul of Science*, 29.

⁴Francis Bacon, *The New Organon*, edited by Lisa Jardine and Michael Silverthorne (New York, NY: Cambridge University Press, 2000), Aphorism III, p. 33.

⁵Michael Behe, *Darwin's Black Box: The Biochemical Challenge to Evolution* (New York: Free Press, 1996).

⁶See Stephen Meyer, "The Explanatory Power of Design: DNA and the Origin of Information" in William Dembski (ed.), *Mere Creation: Science, Faith and Intelligent Design* (Downers Grove, IL: InterVarsity Press, 1998).

⁷William Dembski, *The Design Inference* (Cambridge: Cambridge University Press, 1998) and *Intelligent Design: The Bridge Between Science and Theology* (Downers Grove, IL: InterVarsity Press, 1999).

⁸Phillip Johnson, *The Wedge of Truth* (Downers Grove, IL: InterVarsity Press, 2000).

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Dealing with the "E" Word

I AM A TEACHER of high school-level biology courses. Recently, my "Introduction to Biology" students and I began the final phase of our course with a unit called "Change." It is not at all difficult to generate student interest in this topic. For years, their science texts, the media (and yes, their St. Louis Zoo and St. Louis Science Center), have proposed that a "soup" of chemicals spontaneously self-assembled the first living cell, that life forms evolved from other life forms over long periods of time, and that humans are an end-product from the selection of myriad lucky genetic accidents. No mention of man's soul is ever made.

Yet what does their church tell them? Pastors tell students that God created Adam and Eve, the first human beings. There were no pre-human ancestors to Adam and Eve. Rather than through a "big bang," the features and life forms on our planet Earth were formed in six creation days, hardly eons of time. And man was made a living soul.

So there you have it! Students respect both science and church. Whose pronouncements are correct? Both cannot be true. Is it any wonder students come to me with many questions about origins? I certainly have their attention. What do I do? What would you do?

At this point, dear reader, it may be prudent to mention the nature of design theory and

its relationship to creationism. Simply put, design theory is a paradigm that living organisms are the product of an intelligent creator rather than of blind material forces. Whereas biblical creationists are at once designists, designists need not be biblical creationists. Designists need not, and some indeed do not, cite the Bible and biblical creation at all. For example, Michael Behe, associate professor of biochemistry at Lehigh University, a designist, and author of *Darwin's Black Box...*, is not a biblical creationist. Behe, in his study of biochemical cellular "machines" like those that power flagella, suggests that such cellular devices are so intricate, so complicated, that it is impossible for them to have come into existence through the workings of natural selection. Behe argues that such structures must have been designed by God or by some other higher intelligence. There is no Genesis here. (If you are curious, the black box, in the sense used by Behe, is a device which does wonderful things, but whose workings are mysterious. Darwin proposed his controversial view of life's origin with no idea how enormously complicated even the simplest of cells could be. Cells were Darwin's black boxes.)

Behe's book, however, is not merely a book about certain "black boxes," for the book's complete title is *Darwin's Black Box—The Biochemical Challenge to Evolution*. The book is what its title suggests: a challenge to the scientific community, asking scientists to answer how natural selection at work can ever account for the irreducibly complex systems which are discussed in his book. As mentioned previously, Behe concludes that a superior intelligence of some sort must be at work, and he invites the scientific community to show him if he is wrong, and, if so, in what way. I have watched the literature for refutation. In the four years since Behe's book was published, I have yet to see a compelling response to his challenge.

Back to the problem: how can one help students address questions of origin without undermining the teachings of our church or doing violence to science. In class, we begin the topic with history. We consider the thinking about origin as it existed prior to Darwin's time, and then we investigate why Darwin wrote what he did. We proceed to the 20th century, where we consider the Scopes trial and also the Louisiana, Arkansas, and most recently the Kansas decisions, all of which have a bearing upon what can and cannot be taught in public school systems. We then compare Darwinism with modern

evolutionary theory so that students become aware of what the evolutionists are telling us today.

But, in my opinion, that is not enough. If students are to "go by the data," as good scientists should when drawing scientific conclusions, there are serious problems with the "e" paradigm. When one looks at the data, one needs to look at all of the data. Besides, my school is a Lutheran one. The school and the churches that support it teach the Bible as God's Word, a Word that can be trusted.

Therefore, after a thorough study of modern evolutionary theory, we consider conflicting evidence. It is here that we introduce design theory as a scientific alternative to other theories of origin that have been studied. Design theory is not a study of Genesis. While I regard the Genesis origin accounts as factual, such views are religious views and not scientific ones. They are articles of faith. For example, there are no experiments that can prove or refute whether or not God formed man out of the dust of the ground.

In looking at design theory, we consider the nature of irreducibly complex systems and why natural selection cannot account for them. We then consider the origin-of-life question and deficiencies inherent to explanations that attempt to account for the information (DNA) in a living being. Add to this the problem of using mutations as a mechanism for positive change to produce superior, more complicated structures, and, quite simply, the "e" paradigm does not pass close scrutiny.

I believe and teach that God's "fingerprints" are visible in all of nature, even in the lowly cockroach and the simple duckweed, if we but have the eyes to see. In my opinion, these "fingerprints" are evident not only in the presence of the organisms' marvelously complicated structures, but also in the organisms' capacity to use their own DNA information molecules. There is no evidence that information arises spontaneously. Original information always arises from an intelligent source.

For what it's worth, that is how the "e" word is handled in my biology classes. Science points to the handiwork of the Creator. Why not let science speak? I am aware that this works easily for me because I teach in a place where we can speak of such things freely, and this is a great blessing. But is it not still proper for those Christians who are in more limited educational settings to point to design theory in general, and to Behe's thesis in particular, to reveal an alternative to

the typical evolutionary model? And, to the extent that they are comfortable, what would be wrong with such individuals witnessing their belief in a creating Word, rather than relying on Behe's less personal intelligent designer? These are some things worth thinking about.

Wilbert Rusch, Jr.

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Taxonomizing the Debate

ONE MIGHT SUPPOSE that we Lutheran science teachers find ourselves in a difficult position. As Christians who believe that the Bible is the inspired Word of God, is it not difficult to reconcile these beliefs with our scientific training, in which supernatural entities are excluded as non-empirical? Each of us reaches some sort of accommodation for this conflict, and when addressing the topic with our students, it is tempting to just tell them the right way (our way) to understand the situation. I would argue that it is more productive to approach the subject by first presenting a set of alternative approaches that individuals use to frame the issue, and then explaining your own personal way of understanding the problem.

When approaching the science and religion (S&R) debate, it is useful to step outside the argument and categorize the various ideological approaches that have been used to relate the two systems. An ideological system is built on a set of beliefs that are not open to debate, but are assumed to be true. This is why ideological clashes are not resolvable; faith is not subject to argument. But by identifying some available options, it is possible to gain perspective on one's own ideological positions.

In relating S&R, is it possible to list a comprehensive set of these ideological approaches? Several authors have tried. For example, in 1993 Richard Bube wrote a book titled *Putting It All Together*, in which he identified seven patterns for relating science and the Christian faith. In an article in the June 1996 issue of *Zygon* (available online at <http://www.aaas.org/spp/dspp/dbsr/resource/peters.htm>), Ted Peters identified eight approaches: scientism, scientific imperialism, ecclesiastical authoritarianism, scientific creationist, the two-language theory, hypo-

thetical consonance, ethical overlap, and New Age spirituality.

Raising the ante to nine, atheist Massimo Pigliucci has devised a particularly clever conceptual framework in which three degrees of conflict between S&R are crossed with three ways God can be defined. This creates a 3x3 matrix, in which each of the nine cells is a unique approach to relating S&R. The three levels of conflict in Pigliucci's matrix were suggested by Michael Shermer in a 1999 book, and they already appear quite frequently in discussions of S&R. Shermer's three models for the S&R interface are: *the same worlds model*, *the separate worlds model*, and *the conflicting worlds model*. Pigliucci introduced this model in the most recent issue of *Skeptic* (available online at http://fp.bio.utk.edu/skeptic/Essays/science_&_religion.html), which also provides examples of individuals who advocate positions that fit in each cell of the matrix.

Are any of these systems comprehensive? Might there be approaches to the S&R question that "fall between the cracks" of the classification schemes? Given the uniqueness of any individual's beliefs, it seems inevitable that any classification system will necessarily have fuzzy borders. But this seems a reasonable limitation, given the benefit of perspective one attains by participating in the taxonomical exercise.

As a Lutheran science teacher, I have always felt it is important to provide my students with some sort of framework for understanding the S&R debate. In order to provide a more accessible scheme, I have presented a model similar to the systems above, but including only four ideological positions.

My simplified arrangement takes the form of a spectrum, with *naturalism* on the far left side in opposition to *theistic science* on the right. Two intermediate positions occupy the middle ground of the spectrum, *compartmentalism* and *complementarity*.

Naturalism is, of course, the prevailing worldview of the academic world. In my formulation, it is synonymous with atheism, the belief that there is no God. This single ideology replaces the upper six cells in Pigliucci's matrix, demonstrating the fact that many variational nuances are ignored. But the other three ideologies in my model all accommodate a belief in a personal God, which enhances their relevance in a Christian educational setting.

Those who advocate a *theistic science* approach believe that religious beliefs hold the upper hand in the S&R debate. After all, since Scripture is the revealed Word of God, it

provides a dependable starting point for any scientific model-building. What can be more reliable (and scientific) than truths revealed by our Creator? Creationists who quote Scripture during their presentations are almost certainly theistic scientists.

If one feels that it is necessary to exclude biblical truths from science because they are unobservable, one is forced into one of the middle-ground positions. A *compartmentalist* maintains a strict separation between religious and scientific reasoning, processes and truths. Named "two-language theory" by Peters, proponents of this ideology believe that separation is necessary because of the radical differences in the way S&R fulfill their functions in the world. In his 1999 book, *Rock of Ages*, Stephen Jay Gould explains his idea of Non-Overlapping Magisteria (NOMA), which is a godless form of compartmentalism.

The compartmentalist model is often criticized because it leaves the impression that there are actually two different worlds, a scientific world and a religious world. A *complementarist* (complementarity is also known as consonance in the S&R literature) postulates that there is only one world and seeks to discover the unique contributions each system makes in understanding this world. This relatively new ideology has received quite a bit of attention in recent years, and its proponents include the Templeton Foundation, an organization that has funded many scientific S&R research initiatives in recent years.

The creation/evolution debate wends its way across this ideological landscape. Neo-creationists, including defenders of "Intelligent Design" theories generally promote a *scientific creationism*, in which their arguments rise or fall on their scientific merit only and do not appeal to scriptural revelation. They could therefore espouse any of the three "personal God" ideologies. A *naturalistic creationist*, however, would be found only in a museum of oxymorons.

Students have reacted favorably to the presentation of this model. After describing the ideological positions in what is meant to be a fairly evenhanded way, I share my personal S&R belief system. This leads to a discussion that is designed to help my students relate these ideologies to their own understanding of science, religious beliefs, and possible points of intersection like origins and paranormal phenomena.

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Science As a Way of Interpreting the World

Introduction

WHAT IS OUR VIEW of the natural world at the start of the 21st century? How did we come to this view? How accurate is it? Is this the way the world really is? Is there a Grand Unified Theory that will explain everything?

What of smaller bits and pieces? Is the earth a sphere? Is heredity carried in DNA molecules? Have we reached the limit of knowledge in the world of electronics? Will medicine finally conquer disease? Will we uncover the cause of aging or the secret of longevity? What is the universe out there really like? Can weather be controlled?

One way to look at science is as a mountain of ignorance about nature. In doing science we learn something about the mountain and how to climb it. It implies that there may be alternate paths to the same point, and the understanding of the mountain may depend on the route taken, not too dissimilar from the various views the seven blind men had of the elephant. Where are we on this mountain? In the foothills? Near the top? Some would say, "We've come a long way, baby." What is lasting of what we know, and what will pass into history?

This article could become a philosophical treatise on knowledge or a study in the philosophy of science, but it won't. Nor will it be a research paper of this topic, nor what might be termed a "scholarly treatment," but rather a personal presentation of a few ideas developed over the years intended to provide a better understanding of the topic of this article and to more insightful and critical reading of the many books and articles on science and theology. Informing the ideas will be illustrations and examples.

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What is science?

SCIENCE, BASED on the assumption that the world makes sense, is the search for that sensibleness. That's it. Science tries to make sense out of the world in which we live. Thus, the question of science is, "Does that make sense?" Science usually takes a conservative view of the world of observations, reading nature literally unless there are good reasons not to. If it looks, walks and talks like a duck,...

How does science go about making sense of the world?

RATHER THAN DESCRIBING "the scientific method," I will focus on a fundamental set of activities that includes most of what scientists do when they are doing science, a set of processes. To understand (make sense of) the world:

- Observe nature (the facts and data)
- Find order (the laws of nature)
- Build models (the theories used to understand nature)
- Explain and predict (via the model, the observations of nature)


The goal of science is to find strong models, constructs that track very closely the way nature behaves. When this is accomplished, we say we understand those phenomena.

These four activities help us understand scientific "truth" and science as a way of interpreting the world. They serve both as a guide to understanding what we are about and how to categorize our knowledge. They are the tools used to understand and evaluate the strength or validity of scientific claims and scientific theories. They are the test of a good science lesson.

Humans have always sought to understand the natural world, what is to know and how to know it. Without conscious thought or formalism, they have done science doing these four activities. Old wives' tales have their source in these processes. Ancient science used them. They are used by all of us as we act the scientist in our everyday lives trying to make sense of the world around us.

For example, take the cause for the common cold. The germ theory of disease is certainly valid and born of observations and data that





make sense, and it is a good theory. But all of us know it is not the whole story. The theory informs us that we catch a cold from germs. But the germs are all around us every day, and one day we catch a cold—not every day that we encounter the germs. We hear people say, “When I sit in a draft, I catch a cold,” or “When my feet get cold,…”

Our own observation of cause and effect leads us to modify the simple germ theory. Similarly, the fact that flu and colds are “seasonal” is additional observational evidence of weakness in the model.

In this scenario we observe something in nature, find some order (some cause-effect relationship), build a model (germs) and use the model to explain the world of colds. Some part of the world makes sense.

Observations are everything. If a model isn't either grounded in observations or in predicting observations, it is just superstition scientifically. Parts of a model deduced indirectly may some day become observations.

For example, casually observing the world about us would lead us to a flat earth model. Yet about three centuries before Christ, Eratosthenes concluded the earth was a sphere based on observations of the sun and stars and calculated the circumference, which was only about 20 percent different from modern calculations. His data and arguments went unheeded and unaccepted until more than a thousand years later when sphericity was rediscovered, acknowledged and slowly became acceptable. When the sphericity of the earth was recorded as an observation on film by astronauts, it was not even newsworthy. The mass of other observations and the experiences of traveling the globe since the time of Columbus had already convinced us all of this fact without direct observation.

What about truth in science?

THERE ARE SEVERAL FACETS to this question. First, the source of truth. In science, it is nature; in Scripture, it is revelation. Second, in science, the two modes of accessing truth are reason and experience, logic and observation. In a religious perspective, reason, experience and faith access the truth of a revelation. There are “sight” things in contrast to “faith” things.

A third aspect is that truth in science is expressed in ideas, concepts, words and language that reflect its view of truth, such as “What is a scientific concept?” In science a concept is valid if it can be defined operationally. It is defined in terms of how it is measured, that is, what one does to identify it. “Time” is what is measured with a clock. Asking, “What is time really?” is a question for philosophy or possibly metaphysics. Similarly, length is what is measured with a ruler. Weight is what is measured with a scale, etc.

Some perfectly good concepts are simply not scientific concepts, such as love, God, faith and justice (although we show pictures of the scales of justice).

To make them scientific concepts would require a set of operations always leading to the same end. Suppose this scenario: from the Bible read the 23rd Psalm, say the Lord's Prayer, count to ten, turn around three times, bend over and spit between your feet and you will see a purple flash. That flash is God. If this were to happen every time, God would be a scientific concept. Notice that all the words are things to do, operations, such as read, say, count, turn around, bend over, spit. That is what science means by operational definitions.

A fourth component of scientific truth, and perhaps the most important, concerns what is meant by the words “true” and “believe” in the scientific sense. These words are used quite loosely, as in, “Is the atomic-molecular model true?” or “Do you believe the earth is in orbit around the sun?” The words true and false as in absolute truth are not proper scientific words. Theories are never true or false. They are strong or weak. Sometimes practitioners like to call scientific truth relative truth.

That is not a bad descriptor since we have all experienced the evolution of some ideas in science. Consider the studies in medicine about the causes of heart disease and their possible relation to diet. As we all know there is still a lot of noise in the data, but there is some truth to it. It is certainly not absolute truth. Science builds models and offers strong evidence, not truth.

Strong models (theories) handle the data well, explain phenomena cleanly, behave as nature does and make predictions that are then

observed. Weak models fail one or more of these tests. Models rarely encompass all relevant observations. Remember the model is never the way things “really” are. No one knows how things really are. The models are the best we have. Obsolete models may remain valid and of some value, but the new model is stronger, better. I prefer the word *model* to *theory* because theory carries the idea of guessing rather than organizing data.

Models are generally developed with an eye to the observations they are trying to include. If an observation cannot be understood logically, it may be entered as an assumption to the model. For example, nature requires the assumption that no more than two electrons can live in the same region of space. Without this inclusion, the model cannot handle the observations. In a more sophisticated model, it is said that no two electrons can have the same set of quantum numbers (a mathematical model rather than a structural model).

When there are two competing models interpreting some piece of the world, the determination of the stronger of the two is made (ideally) on the basis of which better handles the observations. Finding a weakness in one model does not strengthen its competitor. Every model must stand on its own feet, built on observed order, able to explain observations and make predictions. Making sense of the data is the business of scientific models.

To accept a scientific finding as true means that I am persuaded by observations and logic, within the bounds of the assumptions of the model and the limitations of the observations, that the finding is an accurate representation of nature and at least for the moment the way things are.

The word “believe” is at best a measure of the degree of reliability one gives to a model. It does not imply truth in the strict sense, but a model that is extremely compelling, serving as a good representation of nature itself. It could be perfect, but we have no way of knowing since we can never have all the observations needed to know that we won't hit a snag. All it may take to weaken or destroy a model is one observation that the model cannot handle, as in the caloric model for heat effects. (When I speak of an observation, I always mean reproducible

observation even if it is statistical reproducibility as in the link between smoking and lung cancer.)

From the time of Aristotle until the 1840s, matter was made of atoms and classified as earths, waters, airs and fire and then as solids, liquids, gases or heat (called caloric). With these ideas all heat effects in matter seemed explainable.

Everything had caloric in it. When wood burned, the caloric was released, hence the warmth. Hands rubbed together forced out caloric, hence the warmth. Fire was pure caloric as was sunlight. Caloric could go right through things from the fire to the water in the pot just like light shines through windows. Hot water has more caloric in it than cold water. Rub your hands together and then turn them open to the air and feel the caloric leaving as the hands cool. All heat observations were explained. The model seemed perfect.

Then in 1848 Count Rumford while boring cannons in Austria noticed that dull boring tools could release more caloric from the iron than sharp tools. A dull tool could release an infinite amount of caloric, boiling away barrels of water and still have the unbored cannon. An infinite source of caloric was unacceptable. A new model was needed. One definitive experiment can kill a model. A thousand successes cannot make it true, just stronger.

Joule suggested the kinetic theory and the concept of energy. Caloric was declared nonexistent. Kinetic theory asserted that temperature was nothing more than a measure of how fast the particles of solid, liquid or gas were moving. Hotter air is not air with more caloric, but air particles that are moving faster. Furnaces don't add caloric to air; they add motion. The new model explained the world better. It is not necessary to “believe” in it.

But there is another learning from this story. Even though kinetic theory is now the accepted model, the caloric model is consistent with so many of our everyday observations that it lives on both in our language (calories) and in our conceptual view of the world as in, “Let's get a little heat in here.” We don't say in the words of the kinetic theory, “Let's get more fast moving air particles into this room.” The word heat is often used synonymously with the earlier concept caloric.



Just because a model is not as good as the replacement model doesn't mean it will be discarded. The same is true of our language for sunset and sunrise, the language of an earth-centered view and not an earth-orbit view. Our own observational models often take precedence over what we "know" to be the stronger model, the "correct" understanding.

Nor does the word "believe" in science mean believe in the religious sense. However, one could believe in a model and make the tenets of science a religion rather than science, and no doubt some do become wise in their own conceits.

But there are more serious belief offenses. This happened with Ptolemy's earth-centered solar system model when it was incorporated into church dogma and became a matter of faith in the 13th century. Bruno was burned at the stake in 1600 for opposing it and for espousing other "heretical" scientific ideas, and Galileo spent 20 years under house arrest for similar "unbelief." It seems to me there is a great hazard for a religion to elevate a scientific finding or theory to the level of truth or a doctrine of belief. I doubt that things known by sight should ever become matters of faith. And perhaps the converse is true as well. But this ranges beyond the scope of this article.

While scientific models are themselves devoid of religious content, science sometimes seeks by observations answers to some of the same questions religion pursued by faith: for example, the issues of origins and fossils and for some the age of the earth. It would be quite a coincidence if the findings of science were to duplicate the searchings of faith since they start with such different assumptions and use such different processes.

We will probably never get away from using the words "scientific truth" and "believe" when talking science, but we can understand more clearly what is meant when these words are used. Accepting something as valid via experience and reason is not the same as believing something to be true by faith; for example, that Christ is God. Remember in science the word "believe" means to know or feel quite certain about something. I prefer to use the word "accept" rather than the word "believe," but they are often used interchangeably in the literature.

Finally, the extent to which the modern view of science as a way of interpreting the world gives first priority to observations should be revisited. This idea is a post-renaissance idea. Before then the model came first and was pre-eminent, as in Ptolemy's view of the solar system. The model came first. Man as the center of the universe was absolute truth. Everything had to revolve around man. Observations were subservient to the model. Observations at variance with the model were denied (as in moons going around Jupiter) or squeezed into the model (as in epicycles).

Modern theories sometimes have to squeeze in *ad hoc* components as well. To the extent that is necessary, the model is weakened. The transition from models as prime to observations taking center stage has taken 500 years and is not totally complete yet as evidenced by the tenacious nature of astrology as a science.

Also sometimes logic supersedes observations. Einstein's theory of special relativity (1906) was built on the slimmest of observations, an experiment that showed no effect when one was predicted, but on the strongest logic. It was so far ahead of its time it did not make a big splash. The first confirming predicted observation came in 1918. The rest is history. This was a model built foremost on logic as its source of truth rather than experience. Nonetheless, it still had to connect to observations to become one of the cornerstone models of modern science.

Conclusion

SO WHERE HAS THIS GOTTEN US? We have examined science as the search to make sense of the world, how this search is conducted and how to access the language and findings of science. We have dispelled the idea of absolute truth in science. We have not tried to guess how much more there is to know. We have not and cannot list all the scientific models available to us at the end of the century of greatest scientific and technological advances. In the search for what to know and how to know it, we have concentrated on the how. We have pointed to discoveries that have been and will be made through science as a way of interpreting the world.



PAUL L. SCHRIEBER

Theology and Science: Sharing the Same Pew

WHEN PEOPLE THINK about the relationship between science and theology, it is usually in antagonistic terms, each pointing a reproachful finger at the other from opposite ends of the playing field. Fault lies on both sides. Dialogue is elusive in the din of accusatory shouting. When attention is diverted away from nature and the God who created it, the result is a dismal confrontation, scarcely what the Bible intended. God wants all things to praise him, and he wants all things to proclaim his glory and to resound in praise and adoration. In this essay I hope to sketch out a way of harmonizing the voices of nature, science and theology. First, I will present this by a symbolic but true anecdote; and secondly, by identifying points of agreement and disagreement. I hope that my inner dialogue will help scientists and theologians listen to each other in faithfulness to the Lord in their respective disciplines.

A Search for Connections

MY FIRST ENCOUNTER with the issue of the relationships between science and theology involved my public high school chemistry teacher, Miss Long. This was not in terms of a clash between creation and evolutionism. It had an entirely different and surprising focus. The first assignment in beginning chemistry was to

read about the lives of great chemists such as Priestley, Lavoisier, Curie and Pasteur. When I queried her concerning the purpose of the assignment, she replied that one cannot learn science just by looking in a test tube. Rather, science is about people who try to understand the world about them. Her perspective had a profound impact on me. She disallowed for me the so-called objectivity of modern science. She helped me to posit the right questions and to respect the mysteries, especially the mystery of God's imprint in nature, which is clearly expressed in the Bible.

I had always been inquisitive about nature. In addition to the typical "Why is the sky blue?" question, I wondered why it was not always blue. The "laws of nature" seemed unyielding, yet the entire scientific enterprise was so easily subject to irregularities and unaccountable change. Did the professional chemists have as much trouble as I did in keeping out extraneous influences from myself? How much was I a part of the equation? All too often, the results of an experiment failed to match the unforgiving math of the formulas. Change was all about, but how could one distinguish between what was constant, random, or contingent? Sometimes the observations were so irregular that it appeared that Nature had little awareness of the Law it imposes on us.

Miss Long also taught me to be aware of the inadequacy of any model or paradigm. In one period early in the quarter, we had been studying several different models depicting atoms, one being the standard colored balls and con-

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necting rods. I had the temerity to comment to Miss Long that I could understand the math involved in the formulas but could not see any connection with the models. I suggested that the models give the wrong impression that this is the way the atoms really "look." Why orbit... why not loops and spheres? Miss Long's mouth fell open, and she lurched back as if shot. I feared I had uttered some great scientific heresy. When she composed herself, she said she wanted to talk to my parents.

After school Miss Long came over to the house to talk to my mother. Mom took her to the "piano room," where I played for Miss Long a Bach chorale prelude I had been working on to play the following Sunday in church. She informed us that she, too, played the organ for church. She related a meaningful experience when her pastor had been describing a statue of Christ bereft of hands and feet. It struck her as she sat at the console that her hands and feet were privileged to be Christ's hands and feet in this world. She became very emotional at this point. She then asked to speak about me to my mother in private.

The following day at school Miss Long explained that she had wanted to meet the parent who had shaped and formed someone with as much prescience as I. She said she would teach me science, and my mother would teach me theology. She said that she and my mother were sitting together on the same pew, while I was to take over at the organ bench.

Toward the end of the year, Miss Long gave an assignment to summarize all our notes for the entire year and write them on a huge circle divided in sections like a pie. This was an exceedingly tedious task, but I knew there had to be some good reason for it. I pondered this frequently as Miss Long painstakingly read those boring poster boards. One day she looked up and said, "Paul, do you get it?" I said I saw that what she wanted us to do was convert the Periodic Table from its vertical and horizontal orientation to add another dimension in order to relate things also sideways and crossways as parts of a whole. She asked, "Is it all there? What's missing?" I answered, "Time, mass, distance, gravity... and God." She said, "God is not part of the formula." I said, "I have never been able to

understand what time, mass and distance are." She said, "Everyone acts as though they know, but it is beyond science, because it is beyond man. As for God... remember your hands and feet, to praise him whether as scientist or as theologian. He made them, so they are his... but he is not part of the formula."

Miss Long was a great teacher who affirmed my right to ask many questions. She allowed for many holes, not only in the universe, but also in the scientific enterprise. And she did not fill the holes with God. She did not posit God as an alternative scientific explanation for the creation. God is not a mathematical formula, nor does he substitute for a gargantuan amount of time that is required by the anomalies and inconsistencies of the theories that perforce reject him.

Theological and Scientific Commonalities and Differences

IN STUDYING NATURE, I ask questions both from a scientific and theological perspective and note the points in common and the areas of contrast. The two are independent disciplines, and each has its own set of assumptions, methodologies and purposes. Nevertheless, the focus of each includes the phenomena of nature. It is difficult not to force one into conformity with the other. However, how can one account for the vast differences in conclusions? Can the biblical data be focused in such a way as to engage rather than repel scientists? After all, many scientists have been forced to posit a god as the last-ditch mathematical and statistical necessity created by the theory.

Can theologians who start with God in the beginning meet with scientists who end with God? Can a manufactured God be equivalent to a God who creates? Of course not. Nevertheless, the two disciplines have many things in common, such as:

1. Both examine data which they try to organize, using paradigms and models, interpreting parts in light of the whole.
2. Both deal with data that are visible and invisible.
3. Both involve people in examining and interpreting the data. To an extent greater than is often realized, people affect the data, so that whether in the Bible or in

science, there is no longer pure, raw, objective data.

4. Both operate with specific assumptions.

In examining and interpreting data, whether related in the Bible or in nature itself, (Lutheran) theology operates with the concepts of Law and Gospel and *sola scriptura*, *sola fide*, and *sola gratia*. These are abbreviations of the truth that salvation is by Scripture alone, by grace alone, and by faith alone.

Regarding sola scriptura: That Scripture is the authority in matters of faith and life does not mean that Scripture teaches one plus one is two. It has a special kind of math, as illustrated in marriage, whereby $(X+Y) > X+Y$. In other words, when God joins a man and a woman in marriage as one flesh, the result is greater than the sum of the parts. But the *sola* part does not refer to a claim of authority over everything about world history or natural history or physics.

The task of hermeneutics helps sift through what is contingent and what is constant. *Sola scriptura* allows other disciplines, such as the social sciences and archaeology, to function independently of theology. Nevertheless, what the Scripture states is the truth, even regarding things of the other areas of study. Although the Scripture does not relinquish its authority in statements about nature, it, however, allows for expressions that are phenomenological rather than technical. This distinction opens some possibilities in rephrasing or theorizing in current scientific terms. For example, it is true that God made man out of the dust of the ground, but it is not clear what technique was used. Much of God's creative activity involved some intermediate means to produce other life forms. (In Hebrew this is the meaning of the Hiphil conjugation: "to cause something to produce something," as in Genesis 1:20, 24). We simply cannot reconstruct a picture of what that process might have been. This means that one must not automatically reject scientific explanations or proposals.

Regarding sola fide: Both science and Scripture accept a great quantity of things based on faith in data that cannot be empirically proven. In science, so much that amounts to a "theory" is really a system of "faith" that does not arise from the data but comes *a priori*. In the

case of the Christian, faith comes by the power of the Spirit. In the area of science, people are drawn to a conviction based on philosophical and rational principles that govern how empirical data are interpreted. With respect to both areas, certain systems or paradigms promote a consensus or are modified by forces that challenge the old paradigms.

Dialogue between the two disciplines has been very difficult because of an unrecognized crossover of assumptions on the part of both disciplines. This occurs, for example, when theologians attempt to provide scientific answers from the axis of their *a priori* and when scientists attempt to give metaphysical answers to theological issues. Both disciplines need to allow the other to do what it does best. Theologians should deal with the metaphysical issues raised by the study of nature (as is amply done in the Bible, such as in Job 38 and Proverbs), and scientists can help theologians appreciate nature as the order of creation. Both areas are united under the Lordship of Christ as Head of the church and Head of nature (Colossians 1:15-20):

He is the image of the invisible God, the firstborn over all creation. For by him all things were created: things in heaven and on earth, visible and invisible, whether thrones or powers or rulers or authorities; all things were created by him and for him. He is before all things and in him all things hold together. And he is the head of the body, the church; he is the beginning and the firstborn from among the dead, so that in everything he might have the supremacy. For God was pleased to have all his fullness dwell in him, and through him to reconcile to himself all things, whether things on earth or things in heaven, by making peace through his blood, shed on the cross. (NIV)

The Incarnation, therefore, is the reason for theologians not only to study church history in relation to world history but natural history as well. The cross of Christ not only has great significance for the spiritual realm but also for the physical universe as well. The universe benefits from the gracious work of Christ, as it groans in birth pangs to be released from the futile



hopelessness of man's sin (Romans 8:18-19). The work of Christ is the nexus of the teleology of nature, of world history and of the church as the body of Christ.

Scientists who project the beginning and end by mathematical formulas cannot offer any positive teleology of hope. Their eschatology is a *devolution* back to a dismal nothingness and futile cosmic universal meltdown. In contrast, the Bible speaks of a great Transformation and Change to a new heaven and earth beyond the confines of the present laws of nature. The Bible provides great, climactic Change that makes a difference. Theologians offer such eschatological hope to all people, for "all will be changed, in the twinkling of an eye..." (1 Corinthians 15:20-28, 51-53).

Regarding sola gratia: Both share a sense of universal loss and the intrusion of chaos or sin. All attempts to secure and protect end in cataclysmic failure. There is the pervasive sense that things are not as they always were. This fear is held even by the staunchest of environmental advocates. The biblical doctrine of salvation includes changes in the realm of nature, effected by God's *re-creative* Word. Genesis 1 and 2 then serve as descriptions of how things were in the pristine holiness, unsoiled by man's sin. Cosmic or universal Change occurred when mankind superseded the "order of creation" in taking for his own welfare what God had kept for himself, the right to be God. In the Bible, the greatest change or "devolution" was made by man in his greedy desire to jump rank and be god. Genesis 1-3 condemns man for not maintaining the creation as desired by God. Blessing becomes curse. Fruit becomes weed.

However, God introduced *change* that makes a difference. This is not automatic, built-in, natural *change*, but change that emanates from his *grace*. In the Bible, things in nature are the means of conveying God's wrath against sin as well as the gracious bestowal of his grace. Natural history is subsumed under salvation history. Although the focus in the Bible is on salvation history, creation and nature are fundamental and prior to God's restorative, re-creative, saving work. There is no fixed divide between the two realms. Both realms are ruled

by Christ whose purpose is to restore what mankind's sin had destroyed.

All life involves *change*. Many people believe that change is moving somewhere toward the good. Others observe that the universe is on the verge of collapse, and the hope is that science can bridge the gap. But scientific teleology can offer no hope regarding the future of the universe, because according to its view, all events are random, guided by the laws of *nature*. According to the Bible, the end of the universe will be worse than what scientists propose, because it is the expression of God's holy will against sin. The Bible offers hope in terms of *changes*, both on a microcosmic and macrocosmic scale. Such *change* does not flow automatically out of the elements but comes purely because of God's *gracious* involvement in the universe. Yes, there will be dramatic *change*, one through which God transforms and restores his world to a level even beyond the perfect and beautiful life in Paradise. Many foolishly hope that the scientific enterprise can develop technological means to overcome what is wrong in the universe.

Such a view is foolish because it does not recognize the source and extent of the disturbance, namely mankind's rebellion against the role of managing nature in the way God intended. The Bible shows us a snapshot of how things were in their pristine orderliness before the universe was shattered by sin. God will not permit anyone to return to Paradise by his own efforts, since no one can pass by the angel with the swirling sword of fire. Advances in human technology will not enable human beings to storm the gates of heaven, as the Tower of Babel shows. The biblical teaching of creation is fundamental to understanding how comprehensive is God's work of *grace* in creating a new world that is even superior to the original one.

It is *grace* rather than *nature* that is the principle behind the big picture of God's design of the universe. In other words, theology has to do with God, not just as another scientific explanation of how things began, but how things were, are and shall be, serving his good and gracious purposes. It is only the Christian, with heart illumined by the light of the Gospel, who can appreciate the creative work of God in

sending light to shine in the primordial darkness. God as Creator, apart from grace, is a threat to the entire scientific enterprise. All one can see is raw, overwhelming power that breathes out confusion and chaos. God can *change* such hearts, by his enlivening Spirit, to rejoice in God as Creator and Savior, to proclaim confidently, "I believe in God the Father Almighty, maker of heaven and earth." Theology helps science to see a rock as not just another rock, but an expression of his *love*, that sings out his praises (Luke 19:37-40).

Biblical Perspectives that Are Unique

BOTH SCIENCE AND THEOLOGY are interested in giving appropriate names to things and placing them in taxonomies. This was a task first performed by God when he created something, and then he gave the responsibility to Adam, an activity that consumes much attention by science. The difference is that according to the Bible this taxonomy is established by God as the order of creation in a taxonomy that is scarcely obvious or discernible. For example, the seven-day week is not based on any observable phenomena. Another example is that the Tree for Knowing Good and Evil had the same good appearance as all other good trees that God created. This also applies to the serpent! What made the difference is that God said it was different. God sanctified the seventh day, and he created even the serpent. Even before the sun and heavenly objects were designated for regulating seasons, God distinguished between the darkness and light to define the days.

The point is that the dissolution of the orderliness of the world is due to man's sin against God, which can be repaired only according to the order of grace and election. Genesis is in fact not only about *beginnings* but also about development and *change* according to the order of *salvation*. In the biblical world, survival and success are not by a process of *natural selection* and survival of the *fittest* but by *divine election* of the *weakest* and *lowest*.

The book of Genesis traces this development in a genetic manner. The title "Genesis," in fact, underscores the genetic progression according to God's gracious election. The word "Genesis" translates not the first word of the Bible as most suppose, but the word that first

appears in Genesis 2:4: "*Toledoth*" ("genesis," "genealogy," "account," "history"). This word in Hebrew refers to the significant outcome of previous events and the transition to a new stage in God's saving history. In this manner the history is traced along the lines of genealogies, outlining God's way of providing a Savior for the world through a certain genealogical/genetic link. There is evidence (Matthew 1) that there are "missing links" in the genealogy, but there is a conceivable, though rough, time line that can be constructed, unlike evolutionists' strong reliance on myriads of missing links and inconceivable eons of time.

The Bible teaches that there is uniformity in nature only to a certain extent. It must not be assumed that current conditions and processes are an adequate measure for all times. Such a constant view of change does not allow for God's use of nature in terms of curses or blessings. The Bible shows that man lives in a broken world, the original conditions of which are but a distant memory. The Bible proclaims that God has not lost the memory. In fact, he promises to restore it through the unique work of the Incarnate Word, through which all things were made (John 1:1ff.). In Christ, there is the new image of God restored. In Christ there is the new creation. In Christ there is Paradise. In Christ there is the holiness of the primordial Sabbath made full in heaven. Recreation is through God's selective process, not governed by nature's laws but according to his grace, setting apart *this* particular water, *this* mountain (Sinai, Zion), *this* land, *this* animal, and *this* particular, unique Son.

Genesis is about genetics, in the sense of gracious election. The curse against the serpent was defeat by the heal of the woman's seed. The uniqueness of this seed is accented by the Greek word that means both "unique" and "begotten," as in John 3:16. Taxonomically, Jesus was one-of-a-kind. He was conceived by the power of the Spirit over the Virgin Mary, and he was begotten of his Father before all worlds. God employed his creation blessing on mankind to be fruitful as the vehicle of his saving blessing. Against the backdrop of pagan naturalism and evolutionism in which procreation belongs to the gods of nature, the Bible places procreation



as a distinct blessing that God bestowed on human beings, a blessing not rescinded after the Fall. In fact, God selected this process as the means for bestowing his salvation blessings through his Son Jesus Christ.

What the Bible Does Not Say

THE EVANGELICAL THRUST of Genesis as personally involving all things is perhaps why the Genesis account of creation is not concerned about the duration or chronological positioning of the creation event. The Bible does not deal with time only as quantitative but especially as qualitative, indicated by the sanctity of the Seventh Day. That Seventh Day, having the ordinary sameness as the other days in time, is set apart for all successive weeks as a time blessed and sanctified by God's special benefaction on all. The Seventh Day teaches that the universe is not anthropocentric and devoid of God's presence. The apex of God's creative activity was his creating man and woman in his image, but he does not permit an anthropocentric universe. The climax of his activities was in ceasing his creative work and giving himself in blessing to meet the universe on the common ground of the Seventh Day. The regularity of that time is not reduced but changed and infused with a sense of importance that gives meaning and purpose to all the other days. God made time so that man might have time to live under his special blessing. This lies in stark contrast with the natural time cycles of ancient and current forms of pagan evolutionism.

According to the Bible, the creation and the origin of time are coincidental, contemporaneous events. However, one cannot draw any picture of the event. (The so-called Three-Story Universe Model is incorrectly applied to Genesis 1.) To say that nothing was there one moment and then suddenly something appeared promotes a view in which time existed before it existed, and that space was there before the creation of matter and energy. "Nothing" becomes "something." Furthermore, the biblical text prohibits any mental picture of the world being created by describing it as an amorphous deep blob, or colloidal suspension with no discernible features as the same primordial soup from which all creatures were shaped. All things have a deep organic

commonality and compatibility because of this common source. To acknowledge the high degree of similarity of DNA that is shared by plants and people is no threat to the doctrine of creation, because it does not imply a developmental ladder between all things but accents, instead, the orderliness of God's creative work.

Theology helps to put all the pieces in the big, big picture: in relation to God. Theology helps science to avoid two extremes: that the universe is God, and on the other hand, that the universe can be understood apart from God. Theology helps scientists see that mankind is neither the measure of all things nor the center of the universe, and that the universe is not an independent impersonal sum of forces and matter. Theology identifies the purpose of it all, and the end, and the beginning, especially by identifying the personal will behind, in, with, and under it all.

Sharing the Same Pew

NOW IS IT LEGITIMATE to bring my inquisitive mind to question Genesis as a source of knowledge for understanding the universe? If God is not in the formula, how does he factor in? Is it only as Creator, to get the whole thing going, as Aristotle, the old and new Deists, and the Intelligent Design theorists maintain? When I turn to the Genesis account, I find out much more about God than that he mysteriously got everything started by the indescribable and unrepeatable act of creation. I suggest that scientists with their focus on issues of change raise important questions that theology needs to engage, but not on the same playing field as scientists. I enjoy discussing theology in addressing the questions regarding nature in terms that those studying nature will understand, to meet the pressing needs that are global and cosmic.

However, most importantly, studying nature and theology is about how God made people and provides for their continued well-being. Creation means God made me and sustains my life on this created earth, just as Luther stated in his explanation to the First Article of the Creed. God makes the creation a personal and existential matter rather than a phenomenon that is open only to empirical scrutiny. God is
(continued on back)

CHARLES J. KUNERT

Science and Theology: A Conflict for Christian Educators?

For the word of the Lord is right; and all his works are done in truth (Psalm 33:4).

Christian Educators Face Challenges

EVER SINCE THE RISE of modern science in the late 16th century, Christians have had to wrestle with how the findings of science affect their Christian faith. Today, as in the past, Christian educators are confronted by conflicting views of how the Bible and science are to be viewed and utilized in their attempts to understand the world around them and to be faithful to the God who made them. From the scientists like Richard Dawkins (*The Blind Watchmaker*) who claim that science has precluded God to the Christian writers such as Philip Johnson (*Darwin on Trial*) who attack some forms of science as leading us away from God, the rhetoric is fiery and vitriolic. Teachers and clergy are left to wrestle with a virtual flood of information from the media and the Internet. Every day they are bombarded by opinions concerning everything from abortion to physician-assisted suicide, from cloning to the human genome project, and from environmental ethics to evolutionary theory. And, frankly, many are ill prepared to deal with these issues.

The Lutheran Church—Missouri Synod (LCMS) has been recognized for over a century as a leader in providing strong theological training throughout the entire scope of its educational endeavors, from pre-school through post-seminary. As a graduate of LCMS elementary, secondary and post-secondary educational institutions, and as one who has taught in an LCMS college for the past three decades, I am intimately familiar with the breadth and depth of religious training occurring in our institutions. As a science educator, I am equally aware of the lack of emphasis on education in the sciences, particularly for those trained to be

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elementary school teachers, directors of Christian education, and the clergy. Despite the fact that we are an increasingly technological society and the fact that clergymen are faced continuously with issues generated by science, such as advances in medicine and paleontology, our seminaries require no science training whatsoever, and our teacher training programs are often bound by requirements for process-based education courses that make it difficult for students to gain adequate content training in the sciences.

There should be little wonder that I am frequently approached by clergy for advice concerning how they should interpret some new advance in the sciences or what position they should take in the debate over the origins of life on earth. Last year a local pastor called my office to make a plea. "Would you consider coming to my parish to speak to our Sunday morning Bible study about creation and evolution?" One of his brightest young parishioners had indicated that he was considering leaving the church because he could no longer reconcile his views of the formation of the world gained through his reading of scientific literature with the views of some church leaders who were stridently attacking those views. On an earlier occasion that same year I was asked to speak to local groups of clergy concerning the scientific issues involved in Oregon's physician-assisted suicide ballot measure, later adopted into law. Several times I have spoken to groups of lay people and clergy on genetic engineering and cloning. In all cases, the audiences seemed to genuinely appreciate understanding what science had to say in these matters. In many cases, members of the audience remarked that they "had never known that" about some issue or other. Certainly there is great room for growth.

The Perception of Conflict Between Science and Scripture

ONE OF MY TASKS as Dean is to interview prospective faculty members. I was particularly struck by an unsolicited comment made by a recent applicant for a position on our science





staff. Undoubtedly driven by his desire to support the revelation of God in Scriptures, the applicant indicated that whenever it came to a confrontation between Scripture and science, he would stick with Scripture. The comment was surprising to me because I had never indicated I believed there was an inherent conflict between Scripture and science. And I don't.

It is true, however, that upon reading articles in recent official publications of the LCMS as well as articles and statements from many other church bodies, one cannot but be struck by the theology vs. science mentality. A whole issue of *The Lutheran Witness* was titled "Is God an Evolutionist?" The feature article cast scientific findings as challenges to the Christian faith and set up a dichotomy between the evidence from nature and the evidence from Scripture.

This is, I believe, a very unfortunate direction that will, in the long run, prove to be very harmful to our church, our schools, and most importantly, to the opportunity to share the Gospel of Jesus Christ with those who do not know it. A recent poll of the top scientists in the United States arrived at the startling statistic that 95 percent of the biologists who are Fellows in the prestigious American Academy for the Advancement of Science no longer believe in a personal God. Sounds like a fertile mission field to me.

Reading the autobiographies of some of the great biologists of our day, such as E. O. Wilson from Harvard, one cannot help but be struck by the number of times they recount that the primary reason they left the church was because of attacks on what they could clearly see in the data of science. "If Christianity cannot tolerate the evidence of science and, indeed, rails against it, why should I be a part of it?" It is the same refrain heard from the teen in the local parish I mentioned earlier. Might it be that we are guilty of attacking scientific models unnecessarily? Might it be that some of our church leaders are more interested in preserving past theological formulations that fail to incorporate or understand the findings of science than in sharing the true Gospel of Christ that does not conflict with any scientific truth?

It will be the contention of this author that the revelation of God in Scriptures and the revelation of God in nature should be studied

by all who seek the truth. Both are expressions of God to humans intended to enlighten us and aid us as we wrestle with the problems we face while we still live on the earth. Psalm 33:4 puts it in a nutshell: *For the word of the Lord is right; and all his works are done in truth.* There can be no inherent conflict between the interpretation of Scripture through theology and our interpretation of nature through science if, indeed, both focus on understanding the truth rather than supporting our preconceived notions of what the truth is.

The Function of Christian Education

THE NOVEMBER 1999 issue of the Lutheran Education Association's *Shaping the Future* included a telling article titled "Are You in Touch With the Secular World?" The author stated the following: "Our schools must help children filter the secular world through the sieve of Christian perspective. God's Word is our greatest filter, but Christian schools and Christian teachers well grounded in the Word are filters as well."

At first glance this seems like a noble sentiment and one that is certainly based in the historical reality of most of our schools. I would contend, however, that care must be taken by well-intentioned teachers who see themselves as "filters" for their students. For all of us as human beings "see through a glass darkly" as Paul puts it.

As an example, it is apparent that many of our Lutheran schoolteachers think it appropriate to "filter out" any discussion of evolutionary theory under the pretext of protecting the student from evil. As a result, many of our students are ill prepared to deal with the issue when they are confronted by it later in their academic experience. Unfortunately, the new information they receive comes at a time when they are being challenged most significantly about all their belief systems. In my experience, those students view the filtering out process they experienced earlier as nothing less than either a lack of honesty or a lack of intellectual rigor on the part of the well-intentioned teacher.

The task of the Christian educator is to aid students of all ages to seek the rightness of the Lord in his Word and the truth of God in his works. Rather than telling our students what

that truth is, however, it is our job to encourage them to seek the Holy Spirit's guidance as they fully explore God's truth in the Word and in the world. We must constantly struggle to prepare ourselves to assist them in this task by continuing in our own learning process, constantly searching the Word and the world for God's revelation to us. It is not sufficient for us to rely on the teachings of others. It is our responsibility to seek the truth ourselves. Neither Scriptures nor science can be understood properly without a reasoned approach to their interpretation.

Two Approaches to the Truth

AS WE HAVE SEEN in the first two articles in this series, science and the Bible approach God's truth from two different perspectives. Each approach is important. Each approach is limited by either the scope of the enterprise or the inherent limitations of our ability to understand the revelation of God perfectly, be it in Scripture or in nature. By the same token, each form of revelation has strengths which must be recognized in order to avoid underestimating the power of the approach.

Properly utilized, theological approaches to the truth are extremely powerful, since they have as their authority none other than God's revealed Word. They are, of course, limited by the inherent failing of human beings to be able to fully appreciate the exact nature and scope of that revelation. Biblical texts must be used with a sober understanding of this limitation in order to avoid the mistake made by the Catholic Church in its condemnation of Galileo for supporting the Copernican notion that the sun, and not the earth, was the center of the universe. Galileo himself pointed this out in his famous *Letter to the Grand Duchess*:


Showing a greater fondness for their own opinions than for truth, they sought to deny and disprove the new things which, if they had cared to look for themselves, their own senses would have demonstrated to them. To this end they hurled various charges and published numerous writings filled with vain arguments, and they made the grave mistake of sprinkling these with passages taken from places in

the Bible which they had failed to understand properly, and which were ill suited to their purposes.

These men would perhaps not have fallen into such error had they but paid attention to a most useful doctrine of St. Augustine's, relative to our making positive statements about things which are obscure and hard to understand by means of reason alone. Speaking of a certain physical conclusion about the heavenly bodies, he wrote: 'Now keeping always our respect for moderation in grave piety, we ought not to believe anything inadvicably on a dubious point, lest in favor of our error we conceive a prejudice against something that truth hereafter may reveal to be not contrary in any way to the sacred books of either the Old or the New Testament.'

Scientific approaches to the truth are limited in two separate ways. The first way is similar to that of theology: humans, because of our original sin, are prone to misrepresentation and exaggeration. The second is unique to science and results in science being far more limited in its scope than is theology. Science must deal only with natural events and data from the natural world. It cannot deal with supernatural events, including miracles. Many people make the illogical leap here to conclude that science *denies* that supernatural events occur. It does not! Rather science cannot deal with events such as the virgin birth or the resurrection of Christ. These are events that violate the models that science has generated of how the natural world operates. They are by definition beyond the scope of science.

But while science is limited in the arenas it can address, when utilized properly, science must be recognized as an incredibly powerful tool that has benefited humanity enormously. It is science that allows me to type this article on a laptop computer while sitting on the shore of a lake miles from electrical outlets. It is science that has, through advances in medicine, increased the average life span of a human 30 years in the United States in the past century. And it is science that has allowed us to fly to the moon and travel to Mars. We deny its power



at the peril of losing our credibility with most educated people in the world today.

Seeking Common Ground

PERHAPS WE, as Christian educators, should seek out common ground from which we can explore the interpretation of Scripture and the interpretation of nature. At the risk of oversimplification, I would like to suggest that such a common ground may be found and supported with well-understood biblical texts. I propose five theses that may, if adopted, help us minimize the dangerous tendency to assume a basic conflict between the two enterprises. More importantly, I hope we might be able to avoid assigning evil motives to those who might disagree with us. Perhaps it will even lead us to a more humble approach to the interpretation of both nature and Scripture.

Thesis 1: God reveals Himself to us in nature: *The heavens declare the glory of God; and the firmament sheweth his handiwork (Psalm 19:1). For the invisible things of him from the creation of the world are clearly seen, being understood by the things that are made, even his eternal power and Godhead; so that they are without excuse (Romans 1:20).* Since nature is a reflection of God, the study of nature will reveal to us a part of God's power. Science can be seen as a tool to uncover the truth of God revealed in nature.

Thesis 2: God reveals Himself to us in Scripture: *Search the scriptures; for in them ye think ye have eternal life; and they are they which testify of me (John 5:39).* We are saved by what God has done for us in Jesus. The purpose of the Bible is to bear witness to these acts of God in history. It is through the Scriptures that God has given explicit testimony concerning His act of redemption.

Thesis 3: God is truth; He cannot lie. Therefore His revelations to us are also truthful. *In hope of eternal life, which God, that cannot lie, promised before the world began (Titus 1:2).* We can have confidence that what we observe in nature using the gifts of observation that God has provided us will not reflect dishonesty or deceit on God's part. He would never intentionally mislead us.

Thesis 4: God is infinite; humans are finite: *For now we see through a glass darkly; but then face to face; now I know in part but then shall I know*

even as also I am known (1 Corinthians 13:12). For my thoughts are not your thoughts, neither are your ways my ways, said the Lord. For as the heavens are higher than the earth, so are my ways higher than your ways, and my thoughts than your thoughts (Isaiah 55:8-9). We cannot know everything there is to know about nature or God's Word. Interpretations by humans are, therefore, contentious. We must be very cautious about placing God's stamp of approval on our conclusions.

Thesis 5: God is love (1 John 4:8), and There is no fear in love; but perfect love casts out fear (1 John 4:18). The findings of science cannot and should not make us fearful. In the end, the truth they seek to enlighten is one and the same truth that God has revealed in His Word. Because of God's love for us, we can boldly explore the world He has provided us with all confidence. No scientific finding will ever be able to eliminate the love of God for us, nor can it. All fear is banished by God's overwhelming love for us.

If these theses are agreeable it should be clear that when there is apparent conflict between science and the Bible, the conflict is of human origin. The Bible is most certainly truthful, but our ability to interpret it is not perfect. Science may be a powerful tool, but it can never rule on the validity of supernatural events, and it most certainly cannot preclude the existence of God.

This means that we need to carefully measure our condemnation of others, particularly when it comes to matters of faith and salvation. Because Galileo believed the earth moved around the sun, he was deemed a heretic, and it was claimed that he had blasphemed God and was, therefore, unworthy of salvation. Similar arguments can be seen in articles condemning those who, after exploring currently available data, express their views related to evolutionary theory, stem cell research, and gene therapy.

What's a Teacher or Preacher to Do?

HOW, INDEED, SHOULD A TEACHER approach these areas within the classroom setting, and how should a pastor preach on these topics? Let me illustrate the practical application of the theses to a current area of controversy in the science-Scripture debate.

Issues of the sanctity of life: e.g., stem cell research. Stem cells are what biologists call undifferentiated and pluripotent cells. This means that they have not become specialized as yet and therefore can be prompted, given the proper signals, to develop into tissues of various sorts. For example, one form of stem cells is found in bone marrow. It gives rise to all the different types of blood cells, including platelets, the structures in the blood that allow proper clotting of the blood when injuries occur. Scientists have proposed the use of stem cells to produce all sorts of tissues that would be of benefit in cases of injury or diseases such as hemophilia, a disease in which affected individuals cannot properly clot their blood upon injury. Few people challenge the potential for good of this research.

The problem arises because of the source of stem cells. Stem cells are most easily obtained from human embryos or fetuses. This is simply because the earlier developmental stages have larger proportions of stem cells. Stem cells are very difficult to purify from adult sources. The controversy thus lies in the method of obtaining the stem cells. Can a Christian condone the use of stem cells from embryos and/or fetuses in order to assist in saving the life of a child who is dying from some disease? What if the stem cells are derived from an embryo or fetus that has been aborted either spontaneously or by induction? These are tough questions.

It should be obvious to everyone that the Bible makes no direct reference to stem cell research. But that having been said, there are several references in Scripture to the sacredness of life and the foreknowledge of each individual by God and to the taking of human life by others. The question is how the Bible and science should interact at this point.

The answer, I believe, is very carefully and patiently making sure that the persons involved in the debate are treated with respect, and that there is a clear recognition that it is the Holy Spirit that ultimately must convince each of us of the truth of a proposition. For a teacher or a preacher to address this issue properly, several things are required. First, he or she must explore what is known about the topic from science. And I do not mean superficially. There has been a tremendous amount of research car-

ried out on stem cells and their use in combating human suffering. Second, he or she must explore what the Scriptures say on this topic. Keeping in mind the potential for misinterpretation demonstrated by years of interdenominational debates, he or she must explore various interpretations of the passages in question in the light of one's confessional commitment to Scripture as source and norm of what we believe and teach. Both sets of information should be shared with students and parishioners, and judgment concerning the motivations of those who differ with us should be eliminated.

St. Paul gave Timothy this advice: *But foolish and unlearned questions avoid, knowing that they do gender strifes. And the servant of the Lord must not strive; but be gentle unto all men, apt to teach, patient, in meekness instructing those that oppose themselves; if God peradventure will give them repentance to the acknowledging of the truth (2 Timothy 2:23-25).*

Concluding Thoughts

EDUCATION MUST FOCUS on assisting students in a search for the truth beginning with a fear of the Lord. But that fear of the Lord cannot be confused with a command to turn off our brains. Humans are challenged to use all their gifts to the glory of God. This includes intellect. As Kenneth Miller points out in *Finding Darwin's God*, "If faith and reason are both gifts from God, then they should play complementary, not conflicting, roles in our struggle to understand the world around us." Our schools and our pulpits should be places where we mutually encourage each other to seek the truth of God in whatever form it takes, be it biblical or natural. They should not be places where we attempt to control what others think by attacking or humiliating them. They should, instead, be reflective of our own struggle to understand better the will of God for our lives.

Perhaps Francis Bacon said it best in *Advancement of Learning*: "To conclude, therefore, let no man out of a weak conceit of sobriety, or an ill-applied moderation, think or maintain, that a man can search too far or be too well-studied in the book of God's Word, or in the book of God's works; divinity or philosophy; but rather let men endeavor an endless progress or proficiency in both."

Intelligent Design—The Bridge Between Science and Theology

William Dembski

Downers Grove, IL: InterVarsity Press, 1999

IN *Intelligent Design—The Bridge Between Science and Theology* William Dembski proposes a model to be used in the biological sciences called *intelligent design*.

Dembski sees his model as a tool to be used to detect design in biological systems. He refers to biological systems that are *irreducibly complex* as proof that his model can detect biological systems that have been designed. An *irreducibly complex* biological system is a system that needs all of its components intact in order to work properly. If any one of the components of the system is missing, an *irreducibly complex* system will not work. Therefore, an *irreducibly complex* system cannot be produced by gradually improving on some less complicated precursor system as one might expect through natural selection. According to Dembski, these *irreducibly complex* biological systems give evidence of a designer.

This *intelligent design model* fits with Dembski's view that "Christ is indispensable to any scientific theory, even if its practitioners don't have a clue about him" (210). In other words, Dembski wants a scientific model that gives evidence of a designer to be used to bring others to faith in Jesus. Dembski's goal in proposing his model of *intelligent design* is to develop cross-disciplinary support between science and theology. Dembski needs this support because of the emphasis that he places on science as "the only universally valid form of knowledge within our culture" (118). Because Dembski believes that our culture accepts only scientific knowledge as universally valid, it makes sense that he would propose a scientific model that has the goal of leading others to Christ.

Lutherans believe that the Bible reveals universally valid knowledge about God and His creative works. Hebrews 11:3 states: "By faith we understand that the universe was formed at God's command, so that what is seen was not made out of what was visible."

It is by faith in the Bible as the inerrant Word of God that one believes, no matter what

model scientists use to explain the origins of the universe, that God created the heavens and the earth. Do Christians *really* want to use fallible and ever-changing scientific models as apologetic tools for evangelization? What happens when the *irreducibly complex* biological systems that Dembski gives as proof of his *intelligent design model* are suddenly shown to have descended from some less complicated precursor system? What happens to a person's faith that God created the heavens and the earth if that faith was based mainly on Dembski's *intelligent design model*?

As a scientist and a Christian who accepts God's Word that He created the heavens and the earth, my scientific studies have confirmed for me the existence of a Creator. Some of my atheistic scientific colleagues (not at Concordia University, Nebraska) have also looked at the natural world and confirmed in their minds that God does not exist. Could it be that God's vague presence in nature is intended, ironically, by design, to give us true freedom to worship Him out of love and not logical compulsion? Jesus said, "No one can come to me unless the Father who sent me draws him, and I will raise him up at the last day" (John 6:44). We really do not know why some believe and others do not. It is God who does the converting while we plant the seeds of God's love through the action of the Holy Spirit in our lives. A better way to reach out to those who deny the existence of God is to let them see God in our lives instead of trying to find a scientific model that may in some way force them to logically conclude that God exists.

After reading this book and the endless debates on the origin of the universe, I am reminded of God's words to Job:

Where were you when I laid the earth's foundations? Tell me, if you understand. Who marked off its dimensions? Surely you know! Who stretched a measuring line across it? On what were its footings set, or who laid its cornerstone while the morning stars sang together and all the angels shouted for joy? (Job 38:4-7)

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At the Waters Edge: Fish With Fingers, Whales With Legs

Carl Zimmer

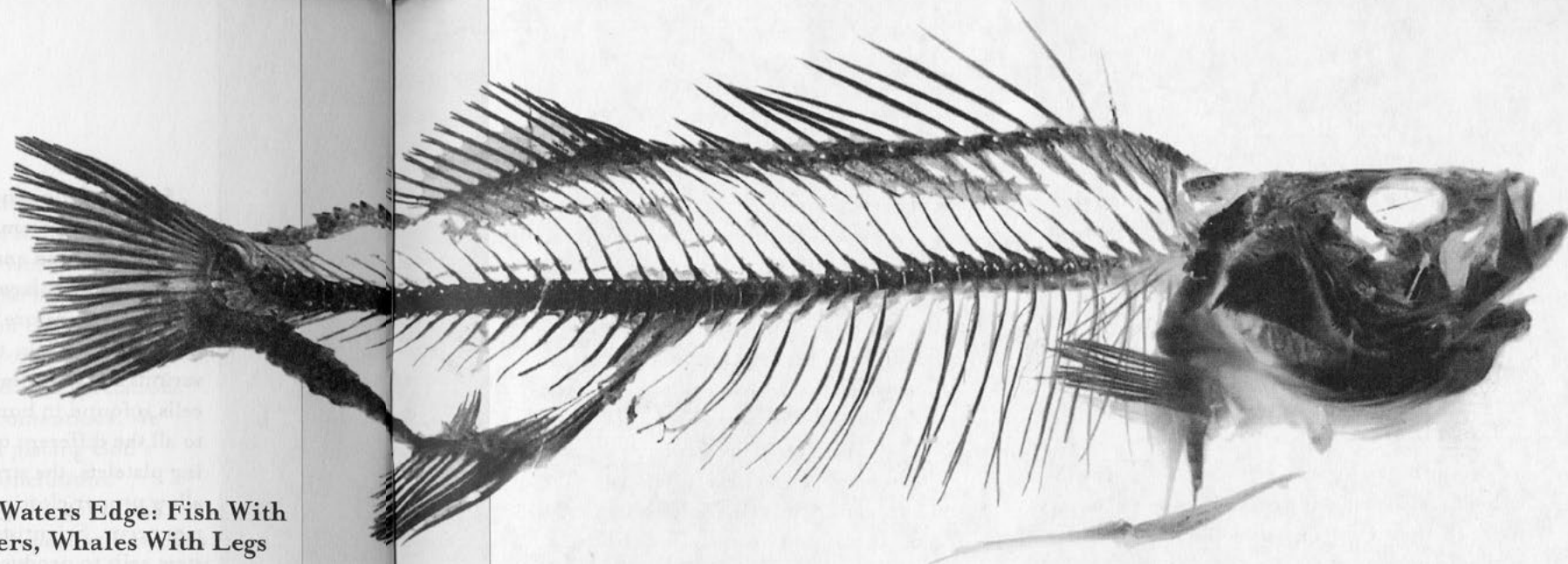
New York: Simon and Schuster, 1998

ONE OF THE TOUCHIEST and most enduring arguments involving evolutionary theory has been the concept of macroevolution. Not only in religious circles in which this topic often is considered to be anathema, but also in the inner sanctum of science, this topic is the subject of lively debate. New research techniques involving molecular evidence and numerous discoveries in the last two years, and especially in the 1990s, have shed considerable light on the opportunities and problems associated with macroevolution.

In *At the Waters Edge* the author, a noted science journalist with excellent credentials, has attempted to enumerate the lines of evidence that point to major theoretical developments that illuminate how the lines of thinking developed in the majority perspective of evolutionary trends from aquatic fish ancestors to terrestrial amphibian and reptilian animals. He also traces the putative rearrangements of form and function in which whales could be developed from terrestrial ancestral forms.

After an engaging introductory chapter the author traces the history of thought going back to early giants in the field of comparative anatomy, paleontology and embryology. Richard Owen, Georges Cuvier and Etienne Geoffroy Saint-Hilaire are noted for their contributions to early studies in which the anatomical relationships of living and extinct animals were worked out in considerable detail. The emergence of Darwin's theory of natural selection, though Alfred Russell Wallace's contributions are scarcely mentioned, offered a workable solution as to how animals (and plants) could undergo change over postulated long ages.

The balance of the book of more than 200 pages traces the proposed supporting data and theoretical bases for following the origin of land creatures from fish and the return of one group of terrestrial animals to the water to include the largest of all animal forms, the whales. Drawing upon recently



developed techniques in nucleic acid and protein research, Zimmer cites numerous studies that correlate with these conclusions.*

Developmental genetics is included in the search for mechanisms by which vertebrates can change not only the number of digits on their appendages but also the significant restructuring of body parts. The developmental studies are traced to changes seen in fossil forms from various crucial periods in the paleontological record. Much of the argument relies on data derived from the studies of homeotic genes, referred to as Hox genes in vertebrate animals. These studies have supplied substantial support for the occurrence of innovative changes in form and function in the groups of animals mentioned in this book.

One of the consistent arguments of folks more or less hostile to the concept of large scale changes in animals over time, that is, changes from aquatic to terrestrial modes of existence and vice versa, has been the absence of adequate numbers of transitional forms illustrating these changes. Evolutionary theoreticians are divided into several camps, two of which are *Gradualists*, who embrace many small changes over time that result in significant modifications; and the *Punctuated Equilibrium theorists*, who consider radical changes in short time periods followed by long periods of relative stability.

This argument deserves more discussion at another time and place. However, this book addresses the argument often posed against Darwinian change concerning the lack of transitional forms in the fossil record and secondarily a mechanism for producing significant changes. The last 20 years and especially the decade of the 1990s have produced an astounding number of intermediate fossil forms that fill in the gaps in the fossil record in a stunning array. Zimmer documents the recent research that has helped to fill in these gaps. Gaps still exist depending upon how detailed one would wish the record

to be. The lines of evidence from various disciplines of science as laid out by Zimmer in this intriguing little book can help most readers get a better grasp of how the data are being collected, correlated and synthesized to produce a more coherent picture of how these animals could have developed over time.

This book will be criticized by those who, for one reason or another, will have motives to either deny or reinterpret the data leading to the author's conclusions. However, the data are there and presented in a way that is accessible to the scientist and non-scientist alike. This is a recommended read even if one finds it difficult to agree with the conclusions of the author. It does enable one to get a relatively uncluttered view of where contemporary thought in this area of mainstream science is at today.

*Research reported in the last few months has brought to light new evidence as to what group of terrestrial animals are thought to be ancestral to whales; however, the basic premises still hold.

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Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution

Kenneth R. Miller

New York: Cliff Street Books, 1999

BIOLOGISTS WHO ARE ALSO CHRISTIANS have long struggled with the apparent conflicts between evolution and their faith. Usually they decide that these are based on two incompatible systems that can never be synthesized.

Kenneth Miller, a well-known cell biologist and author who is also a Christian, has

brought the two together with powerful logic. He covers many fields of science in great depth, yet he presents the material in a prose understandable by any layperson.

First he examines, one by one, the arguments of those who deny evolution. Fully half of the book covers topics such as age of the earth and intelligent design and shows that these arguments can all be explained through cause and effect. The world would therefore appear to be truly materialistic. Everything is predictable. The only things not known today are those which are yet undiscovered.

After allowing time to atheistic scientists like Edward O. Wilson, Miller points out a flaw in this materialistic view. This chink is provided by the concept of quantum uncertainty, which shows that nature is unpredictable. This is true even for evolution since mutations are also unpredictable.

This unpredictability does not prove the existence of God, but it does allow for His existence. This God is not part of the cause and effect. He is not a puppeteer, involved in the details of our lives; He has established the universe and watches over us as His special creation. In addition to our biological heritage, we have been endowed by God with a soul that gives us free will. We are more than robots, responding only to inherent drives.

Although biblical details, such as the Creation, are passed over as poetic, the God described so beautifully by Miller is one well known to Christians.

Religion and science have long had differing worldviews. Miller has shown here that they need not be mutually exclusive, but are truly compatible. For those who have long fought to fit God into science, this in-depth but highly readable book is for them.

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(continued from page 16)

the same Creator who will restore me in the new creation through the re-creative work of the Spirit. The Spirit mysteriously activated the raw stuff of creation by sweeping over the surface of the Deep, so he knows what can be done with water in his new act of creation through the waters of Holy Baptism. "If any one is in Christ, he is a new creation" (2 Corinthians 5:1).

Conclusions

THIS STUDY HAS TOUCHED on the following theological affirmations that might serve as points for further dialogue between scientists and theologians:

1. Creation is more than just about how things began. It includes God's activity in shaping, separating, making distinctions, and filling the universe which he created.
2. Nature is under God's control. He is never depicted as an intruder from beyond.
3. Nature reveals God's character.
4. Nature reveals moral values (Job 38, Proverbs, Parables).
5. The focus of Genesis is not anthropocentric—it is theocentric, a point to be analyzed in relation to various teleological

explanations, such as AP, PAP, TAP (See Mark Worthing, *God, Creation, and Modern Physics*. Minneapolis: Fortress Press, 1995).

6. There is a sphere of existence beyond the natural order: namely, the *sui generis* deity and the sacred time and space that God selects for his special work of salvation.
7. God loves his creation, nature, his animals. The cosmos is his backyard, and the terrible beasts are his pets.
8. The future of Nature: Nature's destiny and man's are bound together in Christ (Romans 8:18), through whom God will restore a "new heaven and earth."

Studying nature can lead to important truths, not only about the universe, but especially about God, because the heavens and the earth are proclaiming his glory (Psalm 19). Scripture does the same. May we do no less with our hands, feet, voice, eyes, ears and tongue? The scientist and the theologian can indeed sit together in the same pew:

"Glory be to the Father, and to the Son, and to the Holy Spirit; as it was in the beginning, is now, and shall be forevermore. Amen."



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