

Chemist as Complementarian

An Interview with Robert C. Fay

Karl E. Johnson and Keith Yoder



Karl E. Johnson



Keith Yoder

Following the Morrill Act of 1862, Cornell University was founded in 1865 as New York State's land-grant institution. Four of Cornell's seven undergraduate colleges are public institutions, and the university is committed to extension work throughout the state.

Cornell continues to be informed by its founding vision not just organizationally but also philosophically. Andrew Dickson White, who once called the University of Berlin "my ideal of a university not only realized—but extended and glorified," founded Cornell as a "non-sectarian" institution and "an asylum for Science." The epistemological assumptions that informed the founding of Cornell—that autonomous human reason is inconsistent with and to be privileged over revealed religion—were made more explicit in White's two-volume *History of the Warfare of Science with Theology in Christendom* (1896). In part for these innovations, educational historian Frederick Rudolph once called Cornell the "first American university."

Cornell continues to be entrenched in debates about how faith and science ought to interact, if at all. Will Provine and the late Carl Sagan have been outspoken advocates for a naturalistic view of the world. As recently as 2005, President Hunter Rawlings III devoted his State of the University Address to decrying "religious-based opposition to evolution," specifically intelligent design.

Nevertheless, the Cornell faculty is diverse, and includes a number of "complementarians"—those who see science and religion as two different ways of knowing

that may inform each other, but which need not be in conflict. One such individual is Robert Fay, professor emeritus of chemistry and chemical biology at Cornell University. In addition to his professional work as a chemist, Bob is an active member of Bethel Grove Bible Church, an advisor for the Cornell chapter of InterVarsity Christian Fellowship, and a founding board member of Chesterton House, a Center for Christian Studies at Cornell. He graciously agreed to sit down and discuss how his faith informs his science, and how his work as a scientist informs his faith.

Q We understand you went to Oberlin College. What was your undergraduate experience like? What influenced you to be a chemist? What experiences in college influenced you to continue in the Christian faith?

A In the mid 1950s, when I was an undergraduate, Oberlin was a

Karl E. Johnson is the founding director of Chesterton House, a Center for Christian Studies at Cornell University. He received his bachelor's, master's, and doctoral degrees from Cornell University, after previously serving for ten years as program director for Cornell Outdoor Education. Johnson's article "The Curious Case of Galileo Galilei (in which he does not go to jail)" appeared in a recent issue of *Sightings*, a publication of the Martin Marty Center for the Advanced Study of Religion.

Keith Yoder graduated from Cornell University with a degree in human development; he is currently working at Cornell as a research assistant in a neuroscience laboratory. His recent work has focused on understanding the etiology of autism and evaluating therapies targeted at children with autism spectrum conditions. He plans to continue his education in a doctoral program relating to affective neuroscience. When not analyzing electroencephalograms, Keith builds websites for a technical consulting business he started and, along with the help of his wife, coordinates the youth program at his church.

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wonderful place—academically rigorous, racially and culturally diverse, with a rich legacy of social justice concerns. Oberlin was the first co-educational college in the U.S. and the first college to admit African-Americans (in 1834). Prior to the Civil War, it was a hotbed of the abolitionist movement and was a key stop along the underground railroad.

In addition, because of its outstanding conservatory of music, Oberlin was a place where one could go to a concert or a faculty or student recital four or five nights a week. It was a great place for people like me who enjoyed classical music.

My interest in chemistry was sparked by a very good high school chemistry teacher. My tentative plan was to become a liberally educated chemical engineer by pursuing a five-year joint Oberlin-MIT program that would result in an AB degree from Oberlin and an engineering degree from MIT. In my first two years at Oberlin, however, I became so interested in chemistry that I decided to bag the MIT part and do a standard chemistry major at Oberlin.

In my senior year, as a result of considerable growth in my Christian faith, I began to wonder if I should go into some form of Christian ministry, perhaps pastoral ministry. A wonderful opportunity opened up for me to spend a year pursuing biblical studies in Wheaton Graduate School and at the same time serve as a teaching fellow in the Wheaton Department of Chemistry. This allowed me to keep one foot on each side of the fence while seeking God's direction for the future. As a result of my experiences at Wheaton and in a summer chemistry research job at the National Bureau of Standards in Washington, I became convinced that my calling was in college or university teaching, rather than in pastoral ministry.

You asked about college experiences that influenced me to continue in Christian faith. I had grown up in a Christian home and in a small church, but like so many other Christian students, it was in college that I reexamined the foundations of the faith I had accepted as a child.

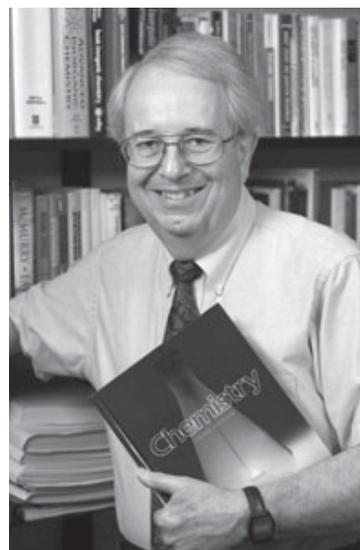
In my high school, Christians were known as people who didn't participate in certain social

behavior and as a result were somewhat socially isolated. At Oberlin, Christians were known as people who believed that Jesus Christ was Lord and God—and there weren't very many of us, only a half dozen or so in the InterVarsity group, the only evangelical Christian group on campus. So, the

issues were clearly theological; I had to find out what I thought of Jesus Christ. Through serious study of the gospels, discussions with others, and regular participation in the InterVarsity group, I became convinced that the claims of Christ were credible. Though not all of my questions were answered, I was satisfied that my faith was based on a firm foundation.

Q Whether out of necessity or a voluntary narrowing of interest, many academics invest their time and energy almost exclusively in their area of academic specialization. But you have devoted a lot of time not only to the study of chemistry, but also to the history of science in general. What motivated you to set such a high priority on studying the history of science?

A I suppose my interest in history goes back to my years in Oberlin. I took five history courses, including a superb two-semester course in the intellectual history of Europe. Although this course focused primarily on the history of philosophy, religion, literature, art, and music, it touched on science as well. During graduate school years and the first twenty-five years or so of my time at Cornell, my academic interests were pretty specialized, like those of most of my colleagues. When I became the coauthor of a general chemistry textbook in the



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late 1980s, I began to learn more about the history of chemistry.

Travel also played an important role. I spent a year on sabbatical leave in Oxford, where Robert Boyle, the father of modern chemistry, carried out his experiments on gases and formulated the law that bears his name. While a visiting professor at the University of Bologna in Italy, I visited the astronomical laboratory where Copernicus had been a student. About ten years ago, I went on a history tour of Britain and Ireland that was organized by the American Scientific Affiliation; this included a visit to the home of Sir Isaac Newton in Woolsthorpe, where he developed his theories of gravitation and optics, and where he developed the calculus during the two years that Cambridge University was closed as a precaution because of the plague.

Perhaps the most helpful influence on my interests was a summer course at Regent College, Vancouver, BC, taught by Mark Noll and David Livingstone, that focused on the historical interactions between science and Christianity. This course exposed me to the literature of this field and has kept me reading in subsequent years.

Q Here at Cornell, you're an advisor for Cornell Christian Fellowship (an undergraduate InterVarsity fellowship). Undergraduates often experience a "compartmentalization" between their academic and religious experiences. How important is it for undergrads to relate or "integrate" their faith and their studies? Why?

A I think it is important for students (and faculty) to relate their faith and their academic work because we are whole persons and the whole of reality is dependent on the Creator. In the study of science, we investigate God's handiwork in the natural creation, and in the study of the arts, we explore God's handiwork in the human creation. Of course, the ease of making connections between our faith and our studies depends on the subject. The connection to theorems in mathematics may appear remote whereas the connection to the paintings of Michelangelo, for example, is quite obvious.

Even in the case of mathematics, however, there may be a connection. It's interesting to ask why mathematics, an abstract activity of the human mind, should be related to the physical structure of the universe. The physics Nobel laureate Eugene Wigner has described this connection as "the unreasonable effectiveness of mathematics," and has said that it was a gift we neither deserved nor understood. John Polkinghorne has suggested that Christian belief provides a satisfying explanation: "The reason of our minds and the rational order of the universe are integrated because both have a common origin in the Creator, whose mind and will is the ground of all that is."

So because God is Creator of all things and Christ is Lord of all, studying the things he has made is a part of what it means to love God with our mind, as well as with our heart, our soul, and all our strength. The more we learn about this wonderful world, the more fully and intelligently we will be able to glorify its maker.

Q In your article "Science and Christian Faith: Conflict or Cooperation?" in *In Pursuit of Truth: A Journal of Christian Scholarship* (August 2007) you quote Galileo as saying that "Both the Holy Scriptures and Nature proceed from the divine Word" and you give his warning against "the carrying of Holy Scripture into dispute about scientific conclusions." Why should Christians be wary of bringing the Bible to "scientific" debates? Is the point that the Bible should not be regarded as a scientific text, or that religion and science deal with qualitatively different subject matter (or something else entirely)?

A Both of these points are important. At the time of Galileo, the dispute was whether the sun revolves around the earth, as believed by Aristotle and Ptolemy, or whether the earth and the other planets revolve around the sun, as believed by Copernicus and Galileo. In support of Aristotle, the Catholic Church cited Scriptures, such as Ps. 93:1: "The world is firmly established; it cannot be moved." Galileo famously countered: In the Bible,

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the Holy Spirit intends to teach “how one goes to heaven, not how the heavens go,” i.e., the Bible is not a scientific textbook. Basically, I think that’s right.

Scripture’s claim for itself is that it is intended “to make us wise for salvation through faith” and that “it is useful for teaching, rebuking, correcting and training in righteousness” (2 Tim. 3:15–17).

I agree with Galileo’s conviction that God has revealed himself in two books, the Book of Nature and the Book of Scripture, and that these two books cannot contradict one another. Our problem is that we tend to read Scripture through the lens of twenty-first century mechanistic science and forget that much of the Bible was written in highly figurative, anthropomorphic, and phenomenological language, and was addressed initially to people who lived thousands of years ago. To interpret it properly, we need to understand ancient cultures and the literary genres in which Scripture is expressed.

On the second point, I do believe that science and Christian faith answer largely different kinds of questions. Science is concerned with the properties and patterned behavior of material systems and with cosmic history. Science traces the history of the cosmos from the big bang to the condensation of galaxies, from the evolution of the chemical elements in the interior of stars to the evolution of carbon-based life.

Science answers mechanistic questions. It seeks to understand how the natural world works and explains its working in terms of natural causes. Its method is methodological naturalism. Science has nothing to say about the spiritual world. It neither affirms nor denies, at least when it’s speaking as science, the existence of a spiritual world. John Polkinghorne has said that the great success of science has been purchased at the cost of the modesty of its ambitions.

So the scope of science is clearly limited to the material world. Christian faith does not offer a mechanistic description of material behavior. It is concerned with a different set of questions—questions such as the following: What is the ultimate cause of the existence of the universe? Who governs

the material world, or is it self governing? What is the meaning and purpose of human life? These are metaphysical questions—questions that are not answered by science. For answers to these questions, Christians turn to God’s revelation in Scripture.

Are there areas where science and Scripture intersect? I think Stephen Jay Gould’s idea of non-overlapping *magisteria* goes too far. Surely, it is significant that most of the leaders of the scientific revolution of the sixteenth and seventeenth centuries were Christians and that their Christian worldview presuppositions about the orderliness, uniformity, contingency, and intelligibility of nature were influential in the development of modern science.

I suppose there are a few questions in which the subject matter of science and religion overlap, e.g., Did the universe have a beginning or is it eternal? The Bible teaches that only God is eternal and that everything else is created, and thus the universe did have a beginning. Modern cosmologists also believe that the universe had a beginning, the big bang, and date it 13.7 billion years ago.

Another area of overlap might be biblical archeology. Archeologists use scientific methods in investigating historical matters reported in the Bible.

Q You conclude your article with a quote from Francis Bacon:

Let no man ... think or maintain that a man can search too far or be too well studied in the book of God’s word or the book of God’s works, divinity or philosophy (i.e., science) ... Only let men beware ... that they do not unwisely mingle or confound these learnings together.

How do your science and faith influence each other without “unwisely mingling or confusing these learnings together?”

A I suppose the most common example of unwise mingling is the use of Scripture, or more accurately a particular interpretation of Scripture, to answer scientific questions. This was the mistake the Catholic Church made in the Galileo

affair. Incidentally, that conflict was not a clash between science and religion, as so often believed, but rather an intramural dispute about scriptural interpretation among people all of whom claimed to be Christians.

A contemporary example of unwise mingling would be attempts to use the biblical genealogies to determine the age of the earth. A large body of scientific evidence has established that the earth is ~4.5 billion years old. This is so well established that it should not be controversial. Yet a large number of Christians think that Scripture requires them to believe that the earth is no more than ~10,000 years old. This view is an impediment to the advance of the gospel and is damaging to the faith of Christian students.

More than 1,500 years ago, St. Augustine warned against interpreting Scripture in a manner that contradicts well-established facts known about the natural world. He wrote:

Usually, even a non-Christian knows something about the earth, the heavens, and other elements of this world, about the motion and orbit of the stars and even their size ... , and this knowledge he holds to as being certain from reason and experience. Now, it is a disgraceful and dangerous thing for an infidel to hear a Christian, presumably giving the meaning of Holy Scripture, talking nonsense on these topics; and we should take all means to prevent such an embarrassing situation, in which people show up vast ignorance in a Christian and laugh it to scorn ... If they find a Christian mistaken in a field which they themselves know well and hear him maintaining his foolish opinions about our books, how are they going to believe those books in matters concerning the resurrection of the dead, the hope of eternal life, and the kingdom of heaven ...?

How do science and faith influence each other without “unwisely mingling these learnings together”? Among the gifts of Christianity to science are moral values, values of honesty, integrity, generosity, and collegiality—honesty in the recording and interpreting of data, generosity in acknowledging the contributions of others, and kindness in the

way we treat our students and colleagues. Modern science was nurtured in the Christian civilization of Western Europe, and the legacy of Christian values continues to influence the way we do science.

One of the gifts of science to Christianity is that it assists us in interpreting Scripture, perhaps more so in avoiding misinterpretations of Scripture.

Q Changing subjects, you have spoken in the past about the distinction between “natural” and “supernatural” being foreign to Scripture. What do you mean by that, and why does it matter?

A The word “supernatural” does not occur in Scripture. The notion that God is responsible for supernatural events (i.e., miracles), whereas natural events occur on their own, is foreign to Scripture. According to the letter to the Hebrews, the entire creation is sustained by the powerful word of Christ through whom God made the universe. And Paul’s letter to the Colossians



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tells us that in Christ all things hold together—everything coheres in Him. So God holds the universe in being moment by moment, and if he ever stopped doing so, it wouldn’t run down gradually, as though it ran on its own. Instead, it would simply vanish.

Jesus spoke often of God’s actions in the natural world. God feeds the birds of the air and clothes the lilies of the field. He acts in the events we describe as natural, as well as in those rare and unusual events we describe as supernatural or miraculous. The fact that God has delegated most

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of his activity to secondary causes allows us to understand the physical and biological mechanisms of natural processes but in no way precludes God's providential activity in the world.

Why does this matter? If we see God's activity in the natural as well as in the supernatural, we will have a bigger view of who God is, and that will lead us to worship.

Q A century after Cornell Co-founder and President Andrew Dickson White wrote *A History of the Warfare Between Science and Religion*, the "war" seems to be as strong as ever. What should the church be doing to seek a constructive way forward in this matter?

A Actually, the second combatant in White's title was "Theology in Christendom," not religion in general. Sadly, the warfare between science and Christianity is waged by both militant atheists and fundamentalist Christians. Both believe that science, especially evolutionary biology, and Christian faith are incompatible.

What can the church do about this? First, let me say I'm deeply concerned about the large number of Christian students who lose their faith when they get to college or university. No doubt there are many reasons for this, but I suspect that one of them is that they have been taught that science and the Bible are in conflict and that evolution is some kind of a conspiracy designed to destroy their faith.

I think that churches—in our Sunday schools, youth groups, and from the pulpit—need to teach that science and Christianity are not in conflict. Pastors and other church teachers need to learn more science and, following Augustine and Galileo, should not interpret Scripture in a way that conflicts with well-established scientific facts. God has given us two books, and those two books cannot contradict each other. This truth should also be taught in the seminaries, where pastors are trained. I think that's where some of the difficulties begin.

We also need to encourage more Christian young people to go into careers in science, especially academic careers. We need more Christian faculty in our colleges and universities who can help students recognize that the oft-cited conflict between religion and science is really a conflict between religion and materialism, i.e., philosophical naturalism, not a conflict between Christianity and science.

Q For young academics, who are starting their careers, they're looking at the prospect of being very busy, just to keep up with their obligations. I'm just curious what, if any, advice or suggestions you might have to maintain a priority on doing their work, while also maintaining and sustaining broader academic interests, that connect their academic specialty to Christian faith.

A That's a tough question, and I'm not sure that I was very good at this myself. I got involved in a number of things other than doing chemistry when I was a young assistant professor. I was a Sunday School teacher, I played the piano in my church, I was an advisor to the Cornell InterVarsity fellowship, and, at the same time, I worked very hard at chemistry. I worked very long hours and I think that I didn't always allocate my time with a great deal of thought and analysis. I did the things that came along that needed to be done, rather than setting out carefully designed priorities, so I don't feel like I'm an expert on this. I think that the tension between the busyness of academic work and our wanting to grow in our faith—not only in terms of worship and fellowship with other Christians, but also in having some time to keep reading and studying and growing intellectually and spiritually in areas that relate Christianity to broader issues—that's an ongoing tension. For me, a lot of growth in that area has resulted from things I've been asked to do—give a talk to this group or do this or that other thing. And that gets you working and gets you studying, rather than laying out a plan for the next five years as to how one is going to grow in these areas. I think ideally long-range planning is what one ought to be doing, but I'm afraid I haven't been very good at it.

Q I'm curious if you have favorite authors or perhaps favorite titles of books or periodicals that you have found to be especially helpful.

A One of the first books I read in the "Christianity and Science" area, in part as a result of Charlie Hummel's visit to campus years ago to give a talk to the Cornell Graduate Christian Forum, was his book called *The Galileo Connection*. It's a nice review of the contributions of various Christians to science and then a broader discussion of how science and Christianity relate.

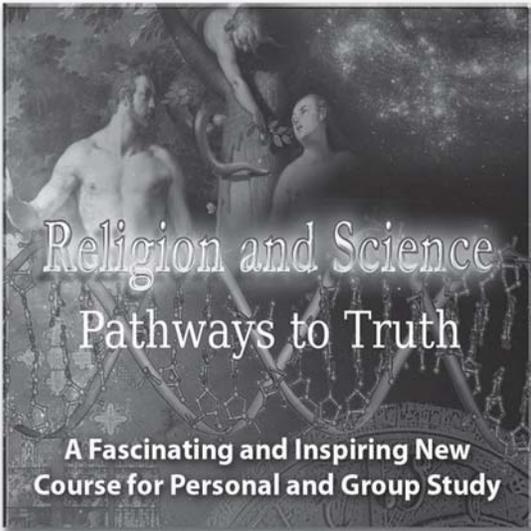
Other books that have been very helpful are the books of John Polkinghorne. Also, books by historians of science, people like David Lindberg and

Ronald Numbers, have been very helpful. There's a lovely book by Lindberg called *The Beginnings of the History of Western Science* which discusses the period prior to Copernicus. C. S. Lewis's books have been very helpful. One that I particularly like is *God in the Dock*, which is a series of essays that Lewis wrote on a variety of topics.

Q Well, thank you very much. We appreciate your time and all your hard-won wisdom of all your years of study.

A You're very welcome. It has been a pleasure to talk with both of you. *

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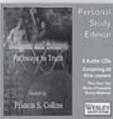
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