An Organizational Kit

for Establishing Local Chapters of the
Presbyterian Association on Science, Technology and the Christian Faith

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PASTCF General Missioner

I. Rationale

Why establish a Local Chapter of the Presbyterian Association on Science, Technology and the Christian Faith? It is probably not obvious, but this is actually two questions. The first is why have ***any*** local organization concerned with "science, technology and the Christian faith." The second is why should such a local organization be related to a national level or denomination-wide organization. The answer to the first question is grounded in a matter of principle. The answer to the second is a matter of practicality.

In principle, we as Presbyterian Christians are called to be witnesses in the world, through word and deed, of the Gospel of Jesus the Christ. But what world is that? It is the world we have discovered most reliably by means of the sciences that knowledge of which in turn empowers our actions through science-based technologies. If our witness is going to be faithful, it needs to be both credible, compelling and effective. So, such witness cannot responsibly ignore either science or technology.

But who is this we? Certainly we are individual Presbyterian Christians. We are also the Presbyterian Church (USA). But, we are most effectively Presbyterians in community. If we as Presbyterians are going to attend to science and technology in any genuinely effective way, it will need to occur at the base, in congregations and Presbyteries.

Because we as members of the Reformed tradition view leadership as a shared responsibility, we have organized our church life in such a way that tasks that benefit the whole community are delegated to smaller groups, to committees and commissions and task forces. A local Presbyterian Association on Science, Technology and the Christian Faith (PASTCF) chapter is a group of Presbyterians committed to helping their congregation(s) or Presbytery attend to the world as it is described scientifically and being shaped technologically in order that the church can be more faithful in its life and mission.

But why should this local group be affiliated as a "local chapter" of the national PASTCF? This is for practical reasons. Let me identify two primary ones:

As a local chapter of PASTCF

- it is a part of a national network of similar organizations from which it can gain insights toward accomplishing a shared purpose.
- it has access to material, educational, personnel and other resources that national PASTCF will be developing specifically to aid a local chapter to carry out its tasks.

These, then, are principled and practical reasons that can be taken into account when considering the establishment of a local chapter of the PASTCF. If a decision is make to do so, that action will not only serve to equip the local Presbyterian community for faithful mission but also, in combination with others, the whole Presbyterian Church (USA).

II. General Description of a Local Chapter

a) Minimum size: Five (5) PASTCF members including one minister.

b) Mission: to be the PASTCF locally (the same mission as the national organization but with local focus).

i) To challenge and assist one or more Presbyterian Church (USA) congregations to study, understand, discuss, and act on the implications of science and technology as they affect the theology, worship, practice, and moral actions of the local church.

ii) To challenge and assist Presbyterian scientists, engineers, and other technical professionals to study, understand, discuss, and act on the implications of the Reformed theological tradition for their scientific and technical vocations.

c) Organization:

i) Members will be PASTCF regular members plus affiliates. (Affiliates are PASTCF members who are not Presbyterians but who have all the benefits of membership except office holding and vote.)

ii) Officers will be Presbyterian (USA) members.

iii) Minimum officers: Although the local chapter can organize itself in any way that seems fitting to accomplish its mission, at minimum it should have a person who accepts the responsibility as "convener" of the group.

d) Annual Report: the "local chapter" will provide the secretary of national PASTCF with an annual report (in electronic form) at least one month before the national PASTCF annual meeting.

i) The PASTCF Executive Board will provide a written response to the local chapter's annual report.

ii) The annual reports of the local chapters will be published (summaries in *SciTech†*; full texts on the PASTCF website).

III. Steps for Creating A Local PASTCF Chapter

This Guide makes at least two assumptions. The first is that there is a PASTCF member who is willing to work to establish a Chapter of the PASTCF in his or her community. It is also assumed that this person knows one or more other persons whom he or she believes would also be interested in helping to establish and develop a Chapter.

If these assumptions are correct, then one other thing can be noted. A Chapter can be established in a single congregation, among a cluster of congregations or within a Presbytery.

STEP ONE:
The person or persons who are going to initiate the creation of a Local PASTCF Chapter may request the PASTCF General Missioner send them a copy of the Local Chapter Organization Kit. This will include a current copy of the Association Bylaws, a copy of *The Unavoidable Challenge* by Ron Cole-Turner, a copy of "An Invisible Crisis of Faith" by Jim Miller, and five PASTCF membership application forms (persons can also become PASTCF members online at http://www.pastcf.org/joining-pastcf).

STEP TWO:
The convener(s) will call together a meeting of at least five persons who will serve as the core of the local Chapter. A copy of Jim Miller's "An Invisible Crisis of Faith" will be distributed to the participants prior to the meeting. The five should include at least one Minister of Word and Sacrament.

STEP THREE:
At this initial meeting the convener(s) should review the "General Description of a Local Chapter" with the others present. The group may also discuss "An Invisible Crisis of Faith." At the end of the meeting the convener(s) should determine if there is a consensus that the group should move forward toward the creation of a Local PASTCF Chapter.

STEP FOUR:
If there is consensus and any of these five persons are not PASTCF members, then they need to become members by completing an application form. The convener(s) can collect these applications and the

appropriate annual dues and forward them to the PASTCF Secretary/Treasurer or new members may join online at <http://www.pastcf.org/joining-pastcf>.

STEP FIVE:
The group should schedule a second meeting at which time to do two things: first, to discuss *The Unavoidable Challenge* and, second, to identify what initial activities the Chapter will undertake in order "to study, understand, discuss and act on the implications of science and technology as they affect the theology, worship, practice and mission of the congregation(s)," and to assist Presbyterian scientists, engineers and other technical professionals in local congregations "to study, understand, discuss and act on the implications of the Reformed theological tradition for their scientific and technical vocations." These activities will constitute the initial "program" of the Local Chapter. The discussion at this second meeting should also include the practical consideration of how the Local Chapter will be organized and its form of leadership. If the convener(s) wish to do so they may contact the President of the Association or General Missioner for consultation prior to this second meeting.

STEP SIX:
With the determination of an initial program, the convener(s) should contact the Secretary of the Association requesting that the group be chartered as a Local PASTCF Chapter.

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Throughout all of these steps, the convener(s) are encouraged to contact the PASTCF President [Robert Keefer, rkeefer@iowatelecom.net] or General Missioner [Jim Miller, jmiller1776@gmail.com] with respect to any questions concerning the process of creating a Local Chapter, expectations that the national Association may have for local initiatives, or resources that the national Association may be able to provide the Local Chapter.

Membership Application

Presbyterian Association on Science, Technology and the Christian Faith

Application and dues payment are also available online at http://www.pastcf.org/joining-pastcf/.

Please enroll me as a member of the Association at the following rate:

- ⑨ Regular or Affiliate* ($50)
- ⑨ Student ($10)
- ⑨ Continuing ($100)
- ⑨ Sustaining ($250)
- ⑨ Institutional ($100) – 10 copies of *SciTech* sent to a single address

* Affiliates are persons who, not being Presbyterian Church (USA) members, enjoy all the benefits of PASTCF membership except vote and office holding.

Please Print

Name _____
First Middle Last

Address _____
Street City State Zip

Phone _____ **Email** _____

Denomination _____ **Local Church** _____

Professional Field _____

Dues payment should be made out to "PASTCF" and sent to:

James B. Miller
PASTCF AssociateTreasurer
222 Cameron Street
Summerville, SC 29483

OR

You may join online at www.pastcf.org

The Church's "Invisible" Crisis of Faith

by the Reverend Dr. James B. Miller, PhD
Reprinted from *SciTech*

The Reformed Christian tradition values all human faculties as gifts of God and seeks to bring their exercise to the service of God in the world. This tradition was a formative stimulus in the emergence of modern science and the development of science-based technologies. Yet ironically, the very existence of Reformed Christianity is threatened today by its inability to speak credibly in a scientific and technological world it helped create.

Since all the church's ongoing activities of proclamation, mission, pastoral care, and social action depend upon its continued existence and the credibility of its message, the church in its theology and ministry **must** take account of developments in contemporary science and technology. More and more it is these developments that shape the way church members and humans around the globe live. Without such attention the church is becoming increasingly unable to conceive and express adequately the relation of God to the universe, of God to the earth and of God to humanity.

In the 20th century we witnessed unprecedented changes in human understanding of the universe, changes that have been brought about by the scientific exploration. These developments have enormous implications for what Christians mean when they declare their faith in a creating, redeeming and sustaining God. They have no less significance for what Christians understand to be their call to ministry. Yet the church has failed to adequately take account of these developments and this failure constitutes a crisis of faith. It is a crisis, which though both profound and subtle in its depth and extent is nevertheless virtually invisible to most church members. Yet, if it remains unaddressed, this crisis can only continue to deepen as the church moves further into the 21st century. The issue now facing the church is no less than whether it can have theological integrity, whether its thought and practice can be integral to the actual world in and to which it is called to minister.

How has this crisis come about and why are people in the church not more immediately conscious of it? In principle there is no way to separate the content of the Christian faith (***what*** we say we believe) from its form ***(how*** we conceive and express what we believe). Further, the Christian faith cannot be conceived or expressed apart from some worldview. Our faith may influence our worldview but it is also dependent upon a worldview. Today, the church conceives its faith predominately in terms of an ancient worldview, one that bears virtually no similarity to a contemporary understanding of the history, structure and processes of nature. The cognitive dissonance this creates is masked by the acceptance of a dualistic vision in our culture and in the intellectual life of the church, a vision that separates religion from science, faith from knowledge, value from fact, subject from object, passion from reason.

This dichotomy began to appear following the 16th century as a product of two intertwined movements. One was the emergence of a culturally autonomous "modern" science understood as the practice of critical rational empiricism. The second was a retreat of the church from the contemporary intellectual lists, a retreat into a form of intellectual cloister by means of which Christian theology was insulated from the conceptually disturbing potential of scientific development. Since that time the worldview produced by the sciences and technologies has undergone many foundational changes in the 20th century alone, yet the worldview presupposed by the church in its conception its faith, a worldview that persists in the language of church teaching and worship, remains largely that of Christian western culture prior to the 16th century.

Because this separation has been so successful in permitting both freedom of scientific inquiry and the perpetuation of traditional forms of theological understanding and expression, few church members, even among those who are practicing scientists and engineers, experience any intellectual or spiritual discomfort due to the cognitive dissonance inherent in this separation. So, this "invisible" crisis of faith remains hidden except for those who by inclination or circumstance cannot escape confronting this dichotomy in the name of personal religious integrity. To use a medical metaphor, the church is like a community with a pathology that is so prevalent among its members that the community identifies the condition as "health" or "normalcy."

Yet, this schism of the mind and spirit is having profound consequences for the church. Current developments in biology, especially in genetics and biotechnology, require moral judgments grounded in insights from a faith that comprehends the universe as an evolutionary system. However, the Christian conception of humanity is virtually oblivious to evolutionary biology and so provides almost no insight. Or again, issues of environmental policy present the church with an opportunity to participate in public moral deliberation. Yet, the church's conception of nature is so anthropocentric, static, and romantic even among those in the church who espouse an environmentalist ideology that it bears little connection with the view of the earth and the universe presented by the biological and astrophysical sciences.

These are examples of how a clear line cannot be drawn separating science and technology nor separating theology

and ethics. Sometimes scientific needs can be revealed by technological developments as sometimes theological inadequacies come to light in relation to ethical quandaries. So, innovations in technology can spur ethical reflection that reveals theological inadequacies. Today, by this route, biotechnical innovation leads to questions of the adequacy o f the traditional doctrine of humanity.

It should not be thought that the locus of this crisis of faith is merely in the academic realm. This dualism, which undercuts the ability of the church to engage credibly in matters of contemporary moral and ethical deliberation, would be serious enough by itself, but this dualism also seriously compromises the ability of the church to perpetuate itself in its children. The decline in mainline Protestant church membership, which has been occurring for more than three decades, has been shown to be due less to issues of great theological controversy and more to the steady drifting away of persons for whom the church in its teaching, worship and mission offers no compelling reason for membership. These are the "postchurched" rather than the "unchurched." Their children may be "unchurched" but for different reasons than in previous eras. They are not "unchurched" because they have not heard of the Christian faith. They remain unaffiliated because they sense that the churches are spiritual backwaters, perpetuating archaic modes of thought that too often encourage dubious forms of social action.

Lest it seem that the impact of this dichotomy is only one having to do merely with the "language" of the faith or with differences about the social implications of the faith, let it be said that overcoming this dichotomy will require reexamining the most basic faith claims of the church: for example, the co-divinity of the Father and Son as declared in the Nicene Creed is dependent upon a classical metaphysical concept of substance that is made problematic by contemporary physics; the dualism inherent in the two natures doctrine of Christ as declared at the Council of Chalcedon depends upon a philosophical theory of essences that is undermined by evolutionary cosmology; the doctrine of divine revelation, which is modeled after inter-human communication, inadequately accounts for the scale of the cosmos and the place of humanity in this cosmos; the doctrine of humanity, which refers to a "Fall" in language which appears to be historical, is inconsonant with contemporary natural history and evolutionary biology; the doctrine of creation which is couched in the past tense, as though the universe were finished, inadequately reflects the apparent dynamic contingency of and ongoing creativity in the cosmos; a doctrine of redemption which centers the whole of cosmic history around a series of events over a few millennia in Palestine fails to reflect either the spatial, temporal or historical scope of the cosmos as currently understood.

This is only a suggestive list of foundational theological questions. These are not merely questions for the idle curiosity of scholars. They are questions about the meaning of the Christian faith that must be addressed if that faith is to have integrity today. They are questions that cannot be addressed responsibly without attention to contemporary scientific descriptions of the universe, the earth, the biosphere and humanity.

But is this effort really the concern of the church? Emphatically, yes. The need for such effort was recognized in the reorganization of the Presbyterian Church (U.S.A.) following reunion. The Structural Design for Mission identified the following function: "to encourage theological reflection on new developments in science and technology." A structural commitment for these issues was reinforced by the actions of the 200th General Assembly when it approved overtures from three presbyteries calling for commitment of resources and staff to this effort.

These mandates recognize that these issues can only be addressed successfully by sustained and committed effort. In general, institutionalized practices are difficult to change and traditional modes of thought are even less am enable to transformation, especially in the church. So the effort required to address the issue of the intellectual and functional integrity of the church in its theology, liturgy and moral practice is the work of an era not a budget cycle. If the church is to fulfill responsibly these mandates, it will have to commit itself and its staff to a long-range effort. It has taken three centuries for the spiritual dissonance we experience today to reach its current state. There is n o reason to believe that overcoming it can b e accomplished in a few years.

Yet there is hope. Even if in a tenuous way Presbyterians have been in the forefront among communions who have recognized and begun to act upon this need, we can also rejoice that we are not alone either in recognizing this critical issue or in beginning to take steps to address it institutionally. The Episcopal Church, the Evangelical Lutheran Church in America, the United Church of Christ and the Roma n Catholic Church are among the communions that have moved to establish long-term efforts to address these issues. They are sisters and brothers in Christ who are seeking not only to remember faithfully the Word as it called to earlier generations in their times but mo re crucially they are seeking to regain the ability to hear faithfully the creative Word of God as it calls to us all anew in the present age from the future.

PASTCF members have the opportunity to be agents to help the Presbyterian Church (USA) address this "invisible crisis of faith." We ca n do so b y working loc ally in our congregations and presbyteries not only to reflect intellectually on contemporary developments in science and technology but also to engage in the daunting task of discerning what significance these developments have for the way we proclaim our Christian faith personally and corporately in our teaching, worship and mission in the world. For those committed to follow Christ in a Presbyterian sort of way this is an

opportunity we cannot afford to refuse.

An Unavoidable Challenge:

Our Church in an Age of Science and Technology©

by

Ronald S. Cole-Turner

Unavoidable Challenges

- Matt and Doris have been unable to conceive a child for several years. They are told at a local clinic that the only available way for them to achieve a pregnancy is through *in vitro* fertilization.[1] They wonder if this is the right thing for them to do and so they discuss it with their minister. Since their minister has never been asked to explore this question, he suggests that they gather a small group of Matt and Doris' friends from church. Soon they are discussing core questions: Is it right to interfere in so basic a natural process as conception? Why are. Matt's Roman Catholic relatives strongly opposed? Since the *in vitro* process involves fertilizing more embryos than they would use, is it right to discard the others? Is it right to spend thousands of dollars to try to conceive a child when other children are able for adoption? Why do they feel so deeply the desire to have their own biological child? One of their friends in the group at church, a physician, helps them understand the *in vitro* process more clearly, and together they learn about the development of the embryo and the fetus. Others tell of their experiences of parenting. They discuss stories from Genesis, like that of Abraham and Sara, in which God makes a pregnancy occur. They ask whether God can work through *in vitro* fertilization.

- Rosa is an engineer in the field of nuclear energy. Years ago she became so angry at her denomination's stand against nuclear energy that she left the church. She felt that her point of view was never taken seriously. She has just received an invitation from the council of churches in her city to be on a panel exploring energy options. In the letter inviting her to participate, she reads: "In view of global climate change due to the greenhouse effect, should we now support nuclear energy as a temporary replacement for fossil fuels?" Could it be that the church will reverse itself? Adding to Rosa's frustration is the fact that recently she has developed new concerns about the possibility of any safe, permanent storage for radioactive waste. She accepts the invitation but uses the meeting to express her frustrations. "Twenty years ago you didn't want to hear me. Worse than that, I got the impression that you thought that as a nuclear engineer, I had sold out. You even convinced me that I had no place in the church."

- When Terry was in high school, he felt that he was being called into the ministry. He was active in his youth group and attended national conferences as a youth delegate. But during his senior year, while taking an advanced placement course in chemistry and receiving early acceptance at a leading research university, he found himself increasingly disenchanted with the church. He explained to his minister, "I want to be part of the future. The church seems stuck in the past. People in church say they are in favor of education but they don't let new ideas, especially in science, affect the church. It's as if the church has been asleep for hundreds of years." His minister challenged him: "Help us change it." Terry replied, "How can I help when the church doesn't seem to want **help?** Does anyone here even **think there's** a problem?"

- Several years after she was ordained, Patricia realized that ay after day she was confronted with questions about science or technology. One day a young person would wonder if the "big bang" theory of the origin of the universe was really saying the same thing as the first chapter of Genesis. The next day someone would ask whether it was right to sign an organ donor card. She found that she was not sure even how to begin to explore the answers. She thought back to her education. In high school,

[1] *in vitro* fertilization means fertilizing eggs, in this case human eggs, in a glass dish. The eggs would be surgically removed from Doris' ovaries, fertilized with Matt's sperm, and allowed to grow through several cell divisions, whereupon one or more would be implanted in Doris' uterus. Several thousand children have been conceived this way. Often they are called" test tube babies."

science courses were the least popular. In college, she took the minimum requirement. In seminary, science or technology was only mentioned a few times. But suddenly Patricia realized that to be an effective pastor and teacher, she needed to understand the world in which she was called to serve. So she committed herself to a program of reading about science and technology, watched television programs such as Nova, and wrote seminaries asking for continuing education opportunities on science and technology. When she found that little was offered, she convinced her Association to hold a continuing education event featuring a scientist and a theologian.

- Melanie teaches high school biology. The textbook she uses contains little information about the theory of evolution.[2] As a biologist and educator, she feels the textbook is inadequate, so she adds material on evolution to the course. She just has learned that a group of parents have protested to the school board, objecting to the emphasis on evolution on religious grounds. Some of the teenage children of these parents, however, have spent hours with Melanie after school, struggling to broaden their religious ideas in light of what they are learning in class. Melanie meets with her minister. She learns that members of her own congregation have complained to the minister about her teaching evolution. She suggests that she and the minister teach a short course at the church on creation and evolution. From the response Melanie receives, however, she realizes her minister is confused about what to think and wants to avoid controversy.

- Alan is on his way to his tenth high school class reunion in the small farm town where he grew up. It is his first visit back. He is now working for a large corporation trying to develop ways to make agriculture more productive and less dependent on chemical fertilizers. I-le chose this line of work, *in* part, because he believed it was an expression of his Christian faith to help make food less expensive and food production less damaging to the land. He is eager to see some of his former classmates who are now farming. Knowing that Alan is coming, the minister of the church Alan once attended has organized a time for conversation after Sunday morning worship. After Alan explains what he is working on, he is shocked by the response. "You're going to put more of us out of business," they tell him. "Each time you make agriculture more productive, you put another farm family off the land."

These are stories of people struggling with what it means to be faithful to the call of Christ in a world that is being profoundly reshaped by science and technology. Here are individual Christians looking for understanding and guidance from their community of faith. Here are ministers searching for responses to new questions raised by science and technology. Here are groups of people asking about the changing shape of justice and mercy and faith.

Matt and Doris are able to draw upon the knowledge and the concern of their church friends. Among these friends they **find** both support and a moral concern they do not find anywhere else.

Rosa is bitter and alienated. She is sure the church people cannot understand such things as the safe disposal of nuclear waste.

Terry is abandoning the church and the ministry because he sees them as irrelevant for the future.

Patricia recognizes that she needs to plan her own continuing education to prepare herself for effective ministry in a culture being shaped by science and technology.

Melanie is disappointed. To her, evolution is the most important theological question. She cannot understand why her minister seems not to know what to say.

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[2] According to the theory of evolution, all forms of life have come from simpler forms. There is no guide or goal to this branching out or unfolding of life forms; this unfolding is directed entirely by natural processes Such as random variation and natural selection. According to the theory, human beings originated through this process.

Alan is bewildered. How can something like increased agricultural productivity seem good in one setting and problematic in another?

Underlying these struggles is a common theme: *how can the church become more adequately prepared to help people deal with challenges posed by natural science and technology?*

In the pages that follow, we will examine the story of the church's interaction with natural science and technology. We will look at some of the reasons why the church, in recent generations, has often left people alone in their struggle to find the appropriate theological response to science and technology. We will look for signs of transformation, indicators that a new theology of nature is beginning to develop. We will affirm a new stance toward nature and toward science and technology, claiming that faithfulness to our calling requires a new consciousness of ourselves as creatures in community with all creation. We will seek a new and clearer theological worldview, informed by science, discerning of technology, and mindful of the active presence of God in our contemporary setting.

Retracing our Steps

Of Len we hear that science and technology are enemies of the church. People speak of religious faith *versus* scientific reasoning, or they refer to technology as "playing God" and therefore as a form of blasphemy. In the Bible, however, technology is affirmed. Agriculture, metallurgy, pottery, and irrigation projects are encouraged. In fact, God's creativity is often compared to the human artisan. God is portrayed as a gardener (Genesis 2:8), a potter (Isaiah 64:8 and Jeremiah 18:6), and a building engineer (Psalm 104:2-5 and Isaiah 28:16-17). On the other hand, Genesis 11 (the story of the tower of Babel) pictures God as threatened by human technological accomplishments.

In the early Christian centuries, theologians such as Basil of Caesarea, Ambrose, and Augustine saw science and technology as important to theology. Each wrote commentaries on the biblical creation accounts, interpreting them allegorically and drawing on the best insights of contemporary science. Basil of Caesarea suggested that various technologies are gifts of God given to counter some of the damage done to nature by the fall. Basil is sometimes credited with founding the first hospital.[3]

Augustine (354-430) virtually defined the Western Church's stance toward science and technology for a thousand years. He praised science and technology while noting that their products can be used in coercion and war:

> There are all the important arts discovered and developed by human genius, some for necessary uses**,** others simply for pleasure. Man shows remarkable powers of mind and reason in the satisfaction of his aims, even though they may be unnecessary, or even dangerous and harmful; and those powers are evidence of the blessings he enjoys in his natural powers which enable him to discover, to learn, and to practise those arts. Think of the wonderful inventions of clothing and building, the astounding achievements of human industry! Think of man's progress in agriculture and navigation ... then there are all the weapons against his fellow-man in the shape of prisons, arms and engines of war; all the medical resources of preserving and restoring health, all the seasonings or spices to gratify his palate or to tickle his appetite. Consider the multitudinous variety of the means of information and persuasion.[4]

During the Middle Ages, science was a branch of theology. Since theology was interested in learning everything about God, theology included science as the way to study God's activity in nature. Medieval theology encouraged technology as the application of human ingenuity to the accomplishment of God's will in

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[3] Cf. Christopher Kaiscr, "The Early Christian Belief in Creation: Background for the Origin and Assessment of Modern Western Science," *Horizons in* Biblical Theology 9 (1982): 1-30.

[4] Augustine, City of God, trans. by Henry Bettenson (New York: Penguin Books, 1984), XXII 24, pp. 1072-73.

nature. Writers such as Hugh of St. Victor promoted technology as the active counterpart to prayer. The Benedictines of medieval Europe, through prayer and work, sought to transform the natural environment in order to make it a safer home for human beings. Their religious attitude toward science and technology stimulated the development of the windmill and various agricultural reforms, which made possible the cities and the civilization of modern Europe.

Of course there was an unfortunate side to this close relationship between science, technology, and the church. While the church might encourage and support scientific inquiry, it had to be wary of supporting any particular scientific theory. Today's theory may be tomorrow's flat earth. The trial of Galileo occurred because church doctrine was tied to a specific scientific theory, which Galileo challenged. The church censored Galileo and this action was taken as a signal by other scientists to be wary of church authority. It is regrettable that after Galileo's trial, some scientists saw the church as authoritarian and antiscientific. Church authority over science had to be removed, they thought, if science was to proceed.

Taken as a whole, however, the medieval and renaissance church stimulated scientific research. After all, the church taught that God had made the world, not in just any way, but as rationally designed by a reasonable Intellect. Furthermore, the church taught that God had created human beings in the divine image, and so God's rationality is embedded in the human mind. Since nature and mind are both structured by the same divine rationality, it was reasonable to think that the human mind could figure out the logic of nature.

But human beings could not discover nature's logic just by thinking about it. God was not only rational but free, these early scientists learned from the late medieval church. This meant that while the world was thoroughly rational or orderly, there are many ways in which God could have designed it and many laws God could have given it. Since God is free to choose the rational structure of the universe, the only way to learn about it is by observation and experiment. The mind alone could not discover nature's laws. One had to look.

Thus, early modern scientists began to look for patterns in natural events. In the Renaissance, they rediscovered mathematics as the best way to describe the logic God had put into nature. Newton's physics was the culmination of this effort of trying to uncover God's creative secrets. In a simple and elegant mathematical system, Newton explained the motion of the planets, the moon, and the tides.

Martin Luther and John Calvin both appreciated the contributions of science and technology.'[5]By challenging the authority of the church on spiritual matters, they broke the monolithic authority of the church over the intellectual life of Renaissance Europe, opening a space for unrestricted research. Unfortunately, both Luther and Calvin lived before modern science began to develop and so we do not know their full response to future discoveries. But their general attitudes toward science and technology were positive.

For example, we know that the University at Wittenberg, where Luther taught and where the Protestant reformation was born, was open to Copernicus' new ideas in astronomy. Defying the prevailing wisdom of the centuries, Copernicus suggested that the earth is not at the center of the universe but is one of the planets revolving around the sun. The first edition of Copernicus' work, *De Revolutionibus Orbium Caelestium*, came into print with the involvement of a Lutheran astronomer and the Lutheran theologian, Osiander.[6]

John Calvin, the central figure of Reformed theology, wrote that it is an affront to God to reject the insight of scientific discovery. "If we regard the Spirit of God as the sole fountain of truth, we shall neither reject the truth itself, nor despise it wherever it shall appear, unless we wish to dishonor the Spirit of God."[7] The Spirit of God - the same Spirit that helps us interpret the Bible, according to Calvin - is at work through the process of scientific research. To close ourselves to scientific inquiry is to close ourselves to God's Spirit.

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[5] For a helpful review, see John Dillenberger, *Protestant Thought and Natural Science* (Garden City, New York: Doubleday & Company, 1960).

[6] Ibid., pp. 41-49.

[7] John Calvin, *Institutes of the Christian Religion*, in The Library of Christian Classics, Vol. XX, ed. by John T. McNeill, trans. by Ford Lewis Battles (Philadelphia: Westminster Press, 1960), pp. 273-274.

Here lies the cornerstone of Protestant openness to science as a legitimate way for human beings to know about the world. Reading nature is like reading the Bible. In both cases, the human mind is illumined by the Holy Spirit, who reveals the secrets that God has hidden in creation and in the Word. The Spirit who indwells the Christian and the church also indwells and animates nature. "For it is the Spirit who, everywhere diffused, sustains all things, causes them to grow, and quickens them in heaven and in earth,"[8] Therefore, the Spirit who illumines Christians to understand the gospel also illumines scientists to understand nature. Just as a Christian thirsts for greater knowledge of the Word incarnate, so the Christian is passionately thirsty for knowledge of the secrets of creation. To be uninterested in scientific discovery is to turn one's back to knowledge of the Word who made all things.

The positive attitude toward science taken by Luther and Calvin encouraged widespread scientific research and technological application. "Newton and many of his contemporaries believed that in their work they were 'thinking God's thoughts after him.' Moreover, the Calvinist 'Protestant ethic' seems to have particularly supported science. In the Royal Society, the earliest institution for the advancement of science, seven out of ten members were Puritans, and many were clergy."[9] Rarely was Calvin's respect for science taken more seriously than by the New England Puritans and Congregationalists. Increase and Cotton Mather were both interested in medicine, particularly in the development of vaccines. Jonathan Edwards, whose first writing was about the wonders of spiders, followed the whole range of the natural sciences avidly and volunteered to test a new vaccine.

Philip Schaff, the historian and theologian of the Mercersburg theology of the German Reformed Church, praised the integrity of the medieval worldview in which both theology and science contributed to a comprehensive vision of creation. Schaff was reared and educated in Europe, and he was particularly critical of the growing fragmentation of American life, which separated church and state, faith and knowledge, piety and action.[10]

These early Protestant theologians - Calvin, Edwards, Schaff, and many others - viewed science with openness and appreciation. They saw science as a disciplined study of God's creation. How could science be impious or antagonistic to true theology when by its very definition it is open to the truth? Only a theology afraid of truth would be afraid of good science. Of course, these theologians criticized particular scientific theories and particular views of scientists. Sometimes their criticisms were misinformed or misguided by a perception of conflict with theology. But science itself, as a way to understand nature, was seen as theology's ally. If the goal is to understand nature as God's creation and to live rightly within it, then theology and science must each contribute its part.

In the 1800s, Horace Bushnell argued for Christian education by drawing on recent developments in evolutionary biology. While Bushnell is often remembered for his emphasis on Christian nurture, his interest in science is not often recalled. Sensing the great impact that science and technology would have in the twentieth century, Bushnell sought to reclaim the intellectual integrity of the Christian faith in an age of science:

> It has been my endeavor to put honor on faith - to restore, if possible, the genuine, apostolic faith. I have even wished, shall I dare to say, hoped, that I might do something to inaugurate that faith in the field of modern science, and claim for it there that respect to which, in the sublimity of its reasons, it is entitled. And great will be the day when faith, laying hold of science and rising into intellectual majesty with it, is acknowledged in the glorious sisterhood of a common purpose, and

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[8] Ibid., I.xiii.14, p. 138.

[9] Ian G. Barbour, *Religion in an age of Science*, The Gifford Lectures 1989-1991**,** Vol. I (San Francisco: Harper and Row, 1990), p. 17.

[10] James Hastings Nichols, *Romanticism is American Theology*: Nevin and Schaff at Mercersburg (Chicago: The University of Chicago Press, 1961), pp. 131-133.

> both lead in the realms they occupy, reconciled to God, cleared of the disorders and woes of sin, to set them in that final unity which represents the eternal Headship of Christ.[11]

Here is a vision of science w-id theology as partners in exploring the creation and in serving God. Such a theology does not need to control science or fear it, but welcomes honest scientific discovery.

Several generations later, H. Richard Niebuhr reiterated this theological openness to science. Writing in 1941, he commented: "Any failure of Christians to develop a scientific knowledge of the world is not an indication of their loyalty to the revealed God but of their unbelief. A genuinely disinterested science may be one of the greatest affirmations of faith and all the greater because it is so unconscious of what it is doing in this way."[12] Here Niebuhr continued a rich history of theological appreciation of science and technology.

The Eclipse of Nature

By the mid-twentieth century, however, nature and creation had largely slipped out of theological view, eclipsed by existential, historical, and psychological concerns.[13] Even as H. Richard Niebuhr was writing about theology's need to be informed by science, many other mid-twentieth century theologians were turning away from nature as a tneologica.1 theme and from science as a component of theological method. For example, in one of the most widely read books on the doctrine of creation, Langdon Gilkey argued that scientific theories had nothing to do with the belief that the universe was created by God. Creation, Gilkey argued, is concerned about the relationship between all things and God, while science is interested in the relationships among finite things themselves. "If the doctrine [of creation] is merely stating the ultimate dependence of all finite existence on God, its Maker and Lord, why should theologians have quarreled with scientific theories about the events and developments through which our present age of the world came about? Are not the theories about finite process *quite irrelevant* to the very different question of the ultimate origin and destiny of the whole process?"[14] Where Niebuhr had claimed that disinterest in science is a form of unbelief, Gilkey, speaking then for many mid-twentieth century theologians, argues that scientific theories are "quite irrelevant" to theology.

Lamenting this irrelevance of science to theology, Jürgen Moltmann speaks of a "mutual demarcation," a kind of ceasefire line between theology and science. "Only the definition of the borderline between them seemed to offer the liberty that both required ... mutual demarcation did indeed confer peace. But it was peaceful co-existence on the basis of mutual irrelevance."[15]

Science as irrelevant to theology is the perspective that shaped much of the mid-twentieth century's theological scholarship and theological education. Many graduates serving the church today were taught in seminary that the most important thing about science was its theological irrelevance. In place of science and technology, many mid-twentieth century theologians turned instead to the realm of the historical and the personal in their effort to clarify the arena of divine activity. Why? There are at least three reasons. First, some scientific theories appear to conflict with traditional theological ideas. Second, the worldview presupposed by modern science seems at odds with the biblical worldview. Third, science and technology are sometimes linked with various injustices, which the church condemns. Let us look in greater detail at these three areas of recent antagonism between science and the church.

First, some scientific theories do conflict with earlier theology, largely because earlier theology sought to express itself in light of earlier scientific views. The most notable example is the challenge posed by the theory

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[11] Horace Bushnell, *Nature and Supernature as Together Constituting the One System of God*, (New York: Charles Scribner's Sons, 1903 (18581), p. 510.
[12] H. Richard Niebuhr, *The Meaning of Revelation* (New York: Macmillan, 1941), p. 126.
[13] Cf. Gordon Kauffman, "Problem for Theology: The Concept of Nature," *Harvard Theological Review* 65 (1972), pp. 337-366.
[14] Langdon Gilkey, *Maker of Heaven and Earth* (Garden City, New York: Doubleday, 1959), emphasis added, p. 25.
[15] Jürgen Moltmann, *God in Creation: A New Theology of Creation and the Spirit of God*, The Gifford Lectures 1984-1985, trans. M. Kohl (San Francisco: Harper and Row, 1985), p. 33.

of evolution, mainly to theologians in Great Britain and North America. Pre-evolutionary biology and theology had agreed: species did not change and the best explanation of their origin was the creative action of God. When evolutionary theories appeared in the 1800s and when Darwin's eventually won widespread support, theologians faced a choice. They could hold to their earlier doctrine, informed as it was by an earlier biology, or they could allow theology to restate its convictions in light of evolution.

Some early twentieth century theologians refused to modify their beliefs in light of evolutionary theory. They pointed out that traditional theology saw species as unchanging, God having created them in their present form. Theology had a nonnegotiable stake, these theologians believed, in the views of pre-evolutionary biology. They were the predecessors of today's creationists.

Other early twentieth century theologians tried to restate their theological beliefs in light of the theory of evolution. These theologians were vitally interested in debate among scientists over rival theories. They readily saw the impact of evolution on Christian views of creation, the fall, redemption, and the human future. Generally these theologians were open to new theories although they reflected the same divisions as their scientific colleagues.

Most often, these theologians sought to reconcile evolutionary theories with the idea *of* creation, suggesting that God creates through the very processes of evolution that biology describes. Christians in the historic Protestant churches, such as the United Church of Christ, have generally seen this as the best response to the great shift in biology brought about by the theory of evolution. It is seen as consistent with the theological openness to science that the Reformers encouraged.

Even so, important questions remain unanswered. For example, when we say that God creates through the evolutionary process, are we saying that God adds anything to this process, affecting its outcome? Can we think that God is the goal or the guide of the evolution when, according to biologists, evolution has no goal? Do we have an evolved sinful nature from which we need redemption? Have we evolved a capacity for kindness or altruism from the same evolutionary process? Is God awaiting something beyond our species? How does Jesus Christ fit into evolution?

These questions suggest that if we want our theology to be open to science, we must accept an ongoing task. Science continuously raises important and difficult theological questions. If we want a Reformed openness to theology and science, and if we are to reaffirm that the Holy Spirit illumines our theology and our science, then we need to engage in more work and pray for more illumination. A Christian theology genuinely informed by evolutionary theory has yet to be fully developed, in part because the theory continues to expand, as any good scientific theory should.[16] This should not discourage us but should challenge us to undertake anew the ongoing work of understanding nature as God's creation.

The second conflict between the church and science lies in the worldview of modern science itself.[17] With the rise of modern or Newtonian science in the seventeenth century, scientists began to picture the world as a vast machine. They built mechanical models of the solar system and eventually of atoms. Matter, devoid of consciousness and value, was often referred to as "brute matter." Its movements were determined by the laws of nature. In the realm of matter, there was no room for freedom and no need for God. This means that if there is a God and if human freedom is real, they exist in a spiritual realm alongside matter. How spirit and matter interact, of course, is a great philosophical and religious problem of the modern age.

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[16] Perhaps the best attempt so far to reinterpret Christianity in light of evolution is Arthur Peacocke, *Creation and the World of Science*, The Bampton Lectures, 1978 (Oxford: Clarendon Press, 1979).

[17] "Modern" science refers to western physics and cosmology from Newton to the beginning of this century. Modern science saw nature as mechanical and deterministic, composed of bits of matter called atoms. By contrast, twentieth century or contemporary physics sees the universe as evolving, indeterminant, and as composed of energy events. Cf. Barbour, op. cit., pp. 95-124 and 218-221.

After several centuries of early modern science, the mechanistic view of the universe became the dominant cosmology of the intellectuals of Europe and North America in the 1800s. In an important sense, Darwin challenged this mechanistic view; he showed how nature is capable of remarkable achievements, including the evolution of human consciousness and its discovery of the theory of evolution! But more often, Darwin is seen as reducing life itself to "brute matter." In this case, biological organisms are thought to be nothing more than sophisticated machines, assembled bit by bit through mechanical processes of random mutation and natural selection.

This mechanistic worldview permeated the intellectual context in which the church in Europe and North America attempted to comprehend and proclaim the beliefs of Christianity. Under the sway of this mechanistic worldview, some theologians thought they had to accept a split between machine and soul, matter and spirit, fact and value, science and faith. They set out to reconstruct theology for the human spirit and left nature to the scientists.

For these nineteenth and early twentieth century theologians, there were two worlds: nature or "brute matter," and the things of the soul or the spirit, including God. And there were two corresponding ways of knowing: nature is known through science, while spiritual and moral truths are discerned through faith or religious feeling. Gone was Calvin's understanding of creation as one world animated throughout by one Spirit, and gone was the belief that the Spirit was the one guide for all human knowledge. Theology retreated to the private, interior domain of the human psyche, leaving the external, public world to scientists, technical experts, physicians, politicians, and generals. At most, theology interacted with the social sciences, especially sociology and psychology.

Protestant Liberalism, which began in Germany in the early 1800s and spread to the United States, accepted this alienation between science and faith and between nature and spirit. According to Liberalism, science and technology were matters of experiment and analysis while religion and ethics were matters of faith or religious consciousness. Liberal theologians often separated religious ways of knowing from scientific. It is not that these theologians discouraged science or technology. Quite the contrary, they had great hopes for it. But they isolated religion from it, thereby separating the creation into the two realms of matter and spirit, fact and value, knowledge and faith. They turned more readily to the human sciences, concerned to influence the course of social development toward more humane social systems.

This tendency was continued in twentieth century biblical interpretation. The great existentialist biblical scholar, Rudolf Bultmann, looked for the activity of God in human consciousness but not in the world of nature, except as human beings are moved to act on nature.[18] Nature was left to the scientists. Theologians were interested in human consciousness, in existential authenticity, and in human history. Many influential twentieth century biblical scholars have followed this approach. As a motif of biblical theology, God's action in human history wholly eclipsed God's action in creation. "Salvation history" became the major theme of biblical theologians who pictured a God who acted in history but not in nature.

The problem, of course, was that the Bible itself portrays a God *who acts in history by acting in nature*. The story of the exodus event, the prototype of all God's actions in history, claims that God rescued Israel from slavery by acting in nature, dividing the sea and providing food in the wilderness. In spite of the richness of biblical language about God the creator, biblical scholars of the mid-1900s tended to ignore creation. A case can be made that these biblical scholars have been widely influential in teaching a whole generation of church leaders to look for God's activity in human consciousness and in human history, but nowhere else.

Karl Barth, often seen as the great critic of Liberalism, also inherited Liberalism's split between theology and science and made it wider. In the 1930s, Barth was rightly critical of the theologians who supported the Nazis. These theologians, by appealing to science, supported Nazi claims to racial superiority as part of God's

[18] Rudolf Bultmann, *Jesus Christ and Mythology* (New York, Charles Scribner's Sons, 1958), p. 69.

intention for the creation. Barth denounced this use of theology and science and warned the church to return to God's revelation in Christ. In revelation, he argued, we find a message of grace and humility, not power and superiority.

Unfortunately, Barth's rejection of the Nazi use of science and theology became so sweeping that he rejected science entirely as a resource for theology. God's revelation in Christ became all sufficient; Christian thinking need not look to other sources. Even in his later theology, Barth took little interest in the natural sciences. Barth's influence, which continues to be enormous, has also encouraged many church leaders to ignore science and technology. In this way, Barth perpetuates the division between matter and spirit and between science and theology.

An advantage in isolating theology from science is that such a division protects theology from unsettling changes in scientific theories. If theology is sheltered from science, then no new scientific discovery can count against Christian beliefs. Darwinism did not matter one way or another since Christianity was interested in what it means to live (is if dependent upon God, not in what role God had in our evolution. In a world of intense scientific research and rapidly changing theories, it was comforting to have a faith unaffected by great intellectual changes and revolutions of contemporary science.

The disadvantage is that this strategy alienates theology not only from science but from the natural world itself. If the scientific interpretation of nature has no implications for Christianity, then Christian interpretation of creation has no consequences for science's understanding of nature. Skeptics quickly asked whether Christianity had any consequences at all. Was it nothing but a set of stories intended to motivate good behavior? Or was it an isolated language game, a way Christians talk in church but untranslatable into the common speech of the broader culture? Christianity was no longer taken seriously because it made no claim. It was simply God-talk, empty and irrelevant to life in the world.

Now, however, science and technology have permeated our whole conceptual universe, even redefining human consciousness. Our theology has been pushed off the conceptual map of contemporary thought, leaving science with its largely unchallenged reductionistic assumptions to define our existence.[19] Our strategy of isolation must end, and our Christian convictions must be brought into an honest engagement with science and technology. Thus transformed, our theology can seek to transform this culture of science and technology. Then our theology and ethics might join with our science and technology in a new alliance to search for the future of humanity God intends.

We turn now to a third reason for recent conflict between the church and science. Especially since the mid-twentieth century, science and technology have often been seen as connected to various forms of injustice. Science and technology have been under attack by the church and the whole culture, blamed for encouraging genocide, nuclear weapons, environmental crises, and a widening gulf between rich and poor. This attack is not unfounded.

Liberation theologies in particular have been sharply critical of science and technology and their uses.[20] In these theologies, technology is often seen as broadening the economic power in the hands of powerful nations and transnational corporations. Technology is seen as seducing the governments of developing nations into greater dependence on the richer nations, creating a kind of technological colonialism. And science is criticized as pretending to be objective and value free, while it is really a tool of economic oppression. Evolutionary theory, for example, can be seen as an ideology that justifies racism and exploitation.

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[19] "Reductionism" in science is the tendency to explain a complex whole by its parts. As an example, I have in mind the comment of James D. Watson, the director of the Human Genome Project at the National Institutes of Health, who said the goal of human genetics is "to find out what being human is," quoted in *Science* 243 (January 13, 1989), p. 167. Cf. Barbour, op. cit., pp. 165-172.

[20] Liberation theologies emerged in the 1960s throughout the world from women and racial minorities and from Christians in economically and politically oppressed nations. Liberation theologians seek to participate actively in the liberating power of God who frees oppressed persons from concrete circumstances of oppression.

These criticisms are perceptive and must be heard by the church in technologically advanced nations. They undercut naive confidence that our science is uncompromised by our ideology or that our technology is as good for others as we think it is for ourselves. They help us see that scientists are human, shaped like everyone else by the prejudices of human history; and, as much as they try to be objective, scientists can only aim at making their theories free of prejudice.

Liberation theologians also force us to recognize that the ownership of technology translates directly into wealth and power over the lives of others. When embedded in an imbalanced economic system, technology cannot help but increase the imbalance. Therefore, out of concern for economic and social justice, the church has often found itself speaking against technology.

Recently, church leaders on all continents are recognizing how science and technology expand our capacity to destroy nature. Science and technology not only contribute to unjust relationships among human beings, they mike it possible for the human species as a whole to treat the rest of the environment unjustly, taking far more from it than we return. As a result, we have used our technology to undermine the natural balances upon which our lives depend. Only recently has the extent of our damage been recognized. Whether it is politically and technologically possible to reverse some of this damage remains to be seen. But once again, in speaking on behalf of ecojustice,[21] the church has found itself speaking against technology.

Paradoxically, both culture and church have looked to science and technology to save us from these same problems. For example, if toxic waste is the problem, we look to technology to find a safe method of disposal. We need technology to dismantle nuclear weapons, dispose of nuclear waste, resolve environmental stresses, and bring a higher standard of living to the poor (especially in developing countries). After all, we would not even know about global warming or ozone depletion without the work of scientists.

In our more reflective moments, we see that science and technology are not demons that cause these problems, nor are they saviors who will rescue us from them. They are extensions of our minds and hands, no better and no worse than we are at the core of our beings. When we seek power or advantage, they aid us. When we seek to understand and care for nature or to feed the hungry and heal the sick, science and technology continue to aid us. But in doing our bidding, they give us the bad with the good. Like our moral nature itself, science and technology are inevitable mixes of justice and injustice, love and oppression, compassion and greed. In condemning the evil that is in us, the church will continue to speak against any science or technology that extends our evil into the social and ecological spheres.

A Crisis of Fragmentation

We have looked at three reasons why the concerns of the church have conflicted with science and technology. The church's theological articulation of its most basic convictions has largely ignored the conceptual impact of science. In our way of thinking about mission, we have largely overlooked or condemned the transformative power of technology on society and environment. Instead of conversing with scientists and engineers on our common concerns, too often the church has withdrawn, leaving science and technology to dominate the intellectual and economic landscape. Because we have rejected and ignored science and technology, often we find in the church today that:

- science and technology are ignored in seminary education;
- the social impact of science and technology is left out of pastoral care, ethics, liturgy, and mission;
- clergy are unprepared to lead congregations in thinking about the impact of scientific and technological change on beliefs or on mission;

[21] Ecojustice seeks to balance concern for justice an-tong human beings with concern for justice between humanity and the natural environment.

- our young people are perplexed by the gulf between the classroom or the laboratory and the pew;
- scientists and engineers sometimes feel misunderstood, unrepresented, ignored, and even maligned;
- science and technology are overlooked in our liturgy and hymns, while nature is treated sentimentally or in antiquated language;
- individual faith crises, which often arise because of science/faith conflict, are ignored;
- science is not affirmed as a means to understand God's creation more fully.

The church and its leaders are largely illiterate in science and technology. But this failing, as serious as it is, is not ours alone. Leaders of the institutions of science and engineering are often illiterate in the traditions that make up our culture. Science education often ignores the deep religious convictions of great scientists, such as Isaac Newton, failing to acknowledge that their faith motivated their science. Universities with strong programs in science and engineering have rarely expected their students to learn about the interplay of society and science, or even to inquire into the ethical significance of the knowledge they are acquiring.

As a result, we have produced a generation of scientists and engineers who know and care little about the richness of our cultural traditions. They have not read Aristotle, Shakespeare, the Upanishads, or the *Tao-te ching*, nor have they immersed themselves in the art of Africa, the paintings of Rembrandt or Monet, the B-Minor Mass or the Beethoven string quartets. There should be little wonder why they are vulnerable to the illusion that contemporary science stands alone as the great intellectual achievement of humanity, or why this science, bereft of cultural traditions, is rudderless, unable to chart a course or steer toward a future.

The church has isolated itself from the institutions of science and technology. The institutions of science and technology have isolated themselves from the accumulated wisdom of our cultural traditions. Is there any wonder why we have stood for a generation on the brink of nuclear annihilation and environmental catastrophe? Knowledge and goodness are dangerously disengaged.

More than any other word, *fragmentation* describes our age. There are fragmentations of north and south, technologically advanced and underdeveloped nations, male and female, spirit and matter, value and fact, religion and science. And we are now discovering that these various fragmentations are all profoundly related to each other.[22] The alienation between theology and science (which quickly becomes an alienation between God and nature) is the linchpin of this system of fragmentations that threatens to undo our world. For in separating God from nature, we write off whole arenas (the poor, the underdeveloped, the female, the body, the environment) as devoid of the divine and empty of value.[23]

By separating theology from science and God from creation, we leave nature to exploitation and destruction. We are unable to bring spiritual and moral wisdom to urgent issues of energy policy, environmental preservation, population control, or to the more personal questions of birth technologies or therapeutic abortions when prenatal diagnosis indicates a serious genetic defect. These are questions raised by science and technology; we would not ask them but for our scientific knowledge. But science and technology alone cannot answer them![24] Only a moral and theological perspective can provide the resources for probing

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[22] Cf. Sallie McFague, *Models of God: Theology for an Ecological, Nuclear Age* (Philadelphia: Fortress Press, 1987).

[23] Cf. Carolyn Merchant, *The Death of Nature: Women, Ecology and the Scientific Revolution* (San Francisco: Harper and Row, 1980).

[24] In a helpful book on scientific issues in the abortion debate, embryologist Clifford Grobstein identifies important public issues and then comments: "It is to be emphasized again that scientific facts alone cannot answer such questions. . . . In a society that is increasingly technologically oriented, public policy cannot be shaped effectively without judicious fusion of the perspectives derived from science and technology with those of the general culture, particularly its value structure. In this sense, science and technology must be fully interactive with values, aspirations, and purposes." Clifford Grobstein, *Science and the Unborn: Choosing Human Futures* (New York: Basic Books, 1988), pp. x and xiii.

these urgent, unavoidable questions. But this moral and theological perspective will not be much help if it has alienated itself from science or if it has refused to be informed about technology's impact on nature and society.

In place of our dangerous fragmentations, we are seeking a new wholeness. We want to view nature as a whole, not as divided between brute matter and human agents. We want to recognize the wholeness of human knowing, resisting a division between science and faith. We want our personal lives to be whole, not divided between work and worship. We want to see our personhood as a whole, not divided between body and soul. We want our society to be whole, not divided between owners of knowledge and their dependents. We want to see the environment as a whole, not as a struggle that pits human beings against nature. We want to see the cosmos as a whole, not as a world that is passing away and a world that is to come.

A New World View

It is, perhaps, by the mercy of God that an opportunity for change is appearing. "In the last few years, a thaw has set in in these icy relationships and tracks are beginning to be made between the icefloes. Changes have occurred in the mood of both scientists and theologians."[25] Prominent scientists are appealing to religious institutions for help in exploring fundamental moral questions raised by contemporary science and technology. For example, in January, 1990**,** a group of scientists headed by Carl Sagan made an appeal to religious leaders for help in raising global consciousness about environmental issues. "We understand that what is regarded as sacred is more likely to be treated with care and respect. Our planetary home should be so regarded. Efforts to safeguard and cherish the environment need to be infused with a vision of the sacred." The appeal continues with the recognition that "there is a vital role for both religion and science."[26]

Currently, the United States government is funding research in human genetics through a program known as the Human Genome Project. Since human genetics raises legal and ethical questions, three percent of the research budget is devoted to ethics research. Here again, scientific researchers are offering a new environment for interplay among science, technology, theology, and ethics. The consciousness of the scientific community appears to be changing. "A remarkably free communication has developed between exponents of religious thought and genetic scientists (many of the latter, of course, being members of churches and synagogues). Theologians are now almost conventionally included in national conferences on genetics .... This unprecedented phenomenon represents a stark contrast to the separation of religion and science which many people have either taken for granted or have desired. It is a new era."[27]

Religious institutions are beginning to respond to the challenge. In December, 1989, the Vatican released a major statement by the Pope exhorting Christians to lead in the raising of environmental consciousness. Also since the 1980s, the World Council of Churches has been discussing the meaning of "Justice, Peace, and the Integrity of Creation," recognizing that our relationship to nature, mediated by science and technology, is a central religious concern. In 1989**,** the United Church of Christ identified "The Integrity of Creation, Justice and Peace" as one of its priorities; and in 1990**,** the General Assembly of the Presbyterian Church (U.S.A.) adopted a report entitled "Restoring Creation for Ecology and Justice," calling for a sustained focus on environmental concerns throughout the entire program of the church at every level.[28]

The United Church of Christ has been a leader in creating this opportunity for change. Theologians and scientists of the United Church of Christ, such as Roger Shinn, Ian Barbour, James Gustafson, Karen Lebacqz, Robert Russell, and others, have contributed in outstanding ways to the National Council of Churches, the World Council of Churches, and to the Vatican as each has struggled with the new role of the church in a tech-

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[25] Peacocke, op. cit., p. 14.

[26] Carl Sagan et al., "Preserving and Cherishing the Earth: An Appeal for Joint Commitment in Science and Religion" (Moscow: 1990).

[27] J. Robert Nelson, "The Role of Religions in the Analysis of the Ethical Issues of Human Gene Therapy," *Human Gene Therapy* 1 (1990): 47.

[28] The Office of the General Assembly, The Presbyterian Church (U.S.A.), Restoring Creation for Ecology Justice, (Louisville, KY: 1990).

nologically advanced age. These leaders are reclaiming a theological heritage that extends back to the reformers and to Edwards, Bushnell, and Niebuhr.

The United Church of Christ is actively reclaiming its historic commitment to theological openness to science and technology. In part, this openness is motivated by a concern for theological integrity. We want to see the world as God's creation and God as incarnate in this world. We want to bring every intellectual resource into the service of our vision of God's involvement in creation. We want to avoid a mental split between revelation and science. Instead, we want to reclaim Calvin's insight that the Spirit of God is the Spirit of all human awareness.

We realize that environmental responsibility begins with a reintegration of theology with science and technology. In a powerful sense, Christians are motivated by a desire for repentance to reintegrate science and theology. We are exploiting nature and recognize our theological complicity. We have ignored and devalued nature and misused its gifts. The church bears a special responsibility here: we are the ones who said that God is only concerned with human history and human persons, and that creation in its own right is unimportant. We realize that we cannot blame scientists or technologists for causing the environmental crisis since often we told them their science and technology did not concern the church. We are struggling to reorient our whole thinking: it is God and not we who gives value to the creation and who therefore defines the appropriate human relationship to all other creatures.

Fortunately, we are reclaiming our openness to science and technology at a time when science itself is experiencing a profound change in worldview. The mechanistic worldview of modern science, we saw earlier, contributed to the split between theology and science. As long as this mechanistic worldview permeated our culture, it was very difficult for theology to claim that nature was rich in theological value or that the creative persuasion of God is continuously active in the cosmos.

Contemporary physics, however, no longer supports a mechanistic view of the world. Science no longer portrays a mechanical world of atoms, devoid of consciousness, freedom, or worth. On the contrary, quantum physics has redefined the stuff of the creation itself. Matter is no longer seen as particles but as events of energy, apparently indeterminant, spontaneously capable of complex organization, capable even of life and thought. The cosmos is not a vast machine but an evolving, emerging process. It seems not to be rigidly determined by laws of motion but characterized everywhere by an openness that arises from a subtle interplay of chance and law. It is not composed of hard bits of matter but of interdependent relationships among events.

Life and thought are not some non-material forces that indwell matter. Instead they are inherent in the capabilities of matter itself.[29] In the human brain (and possibly elsewhere in the universe), matter is capable of consciousness. Consciousness is not found in a separate realm of spirit but emerges from the complexity of matter. Consciousness does not arise because God adds a new entity (a soul) to our clay. Rather, the basic matter of the universe is the same matter that is capable of the most complex system in all nature, the human brain. In the human brain, matter thinks, prays, and loves. Matter is capable of consciousness. It is valued and valuing.

This is a remarkable shift in worldview, from matter as mechanical and deterministic to matter as capable of complexity, consciousness, freedom, and praise. It offers a wholly new intellectual climate in which to seek a reintegration of our science and theology.

A New Stance toward Science and Technology

[29] For a summary of the worldview of contemporary physics, see Ian Barbour, op. cit., pp. 218-221.

Because of this transformation of consciousness, a theological revolution may be brewing. Biblical exegesis is rediscovering the motif of creation, not as a mere setting of the stage for salvation history, but as an integral part of salvation itself. Jürgen Moltmann, who continues the theological tradition of Karl Barth, is attempting to comprehend cosmic evolution within the community of the Trinity and as energized by the Holy Spirit. Wolfhart Pannenberg has attempted to expand the idea of history from a 3,000 year story of salvation to a universal history. Langdon Gilkey is now critical of his own earlier tendency to insulate theology from science: "Neo-orthodoxy shied away from these conclusions [that arose in relation to science] ... but only at the expense of ignoring God's relation to cosmology and nature on the one hand and confining its attention to history, existence and ethics on the other."[30] John Cobb and other process theologians seek to understand the influence of God in the world depicted by contemporary science. Some of today's evangelicals, distinguishing themselves from fundamentalism and from creation science, are open to scientific discovery of every sort, seeking to integrate it with a theological understanding of the creation.[31] Through these movements, the church is rethinking its stance toward science and technology.

It is in the life of the local congregation that this theological revolution will take concrete form, for in the congregation practical questions raised by science and technology cannot be avoided. Recall the stories with which we began. Ordinary people were confronting new questions posed for them by science and technology. But the questions were more than scientific; they were crises of faith. And so these individuals turned to the church for help, hoping to find a church sufficiently informed to know how to care.

Congregations should not abandon their traditional concerns for worship, pastoral care, social justice, evangelism, or education. On the contrary, in our congregations we are finding that we can no longer carry out any of these traditional concerns with vision and faithfulness unless we take the impact of science and technology into account.

We can be faithful educators only when we see that our outlook as learners is continually informed by the scientific culture in which we live and by the technological media with which we are bombarded.

We can be faithful caregivers only when we see that people are in pain over whether certain technologies are helpful or hurtful, healing or imprisoning.

We can be faithful witnesses to the gospel only when we recognize that the worldview of our age is in continuous flux because of scientific discovery.

We can be faithful advocates of social and economic justice only when we understand how technology extends our patterns of injustice and yet gives us tools for a creative now justice.

We can be faithful bearers of the call of God to Christian vocation only when we understand science or technical careers as vocations with distinctive responsibilities and concerns.

We can be faithful caretakers of creation only when we recognize that we are natural organisms participating in nature and that nature Lakes care of us.

We can offer faithful praise to God with the creation only when we acknowledge the vast complexity of God's universe expanding through time and space and that nature is already praising its Creator.

Awareness of science and technology is the new condition of faithfulness. Faithful congregations of the future will be open to the transformations of science and technology and will be capable of ministry with all those for whom science or technology presents basic religious and moral questions. Worship will stretch the

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[30] Langdon Gilkey, "The Influence of Science on Theology," in *Science, Technology the Christian Faith*, Brent Waters and Verlyn L. Barker, editors, (New York: United Ministries in Education, 1991), 109-116.

[31] Probably the largest organization of Christians interested in science is the American Scientific Affiliation, an association largely of evangelical scientists.

imagination with new visions of the universe and new images of the Creator. Youth will be affirmed in their doubts and their questions. Scientists and engineers will be supported in their vocation and invited to share their insights and their spiritual and moral struggles. Social action will be cognizant of the power of science and technology to redefine justice. Education in the church will invite the learner to integrate every insight from every source, seeking always to see our whole lives as a response of gratitude to our Creator and Redeemer.

Faithful pastors will look for opportunities to learn about the impact of science and technology on the lives of all those they serve. They will seek out conversations with people of science and look for continuing education opportunities devoted to these concerns. Instead of expecting today's increasingly educated congregations to sing praise to God in heaven above while we dwell on earth below, faithful ministers will look for (and help create) new hymns that reflect our now understanding of our place in the cosmos. They will proclaim an enlightened faith and an informed prophetic vision of justice, grounded in ancient wisdom but equally grounded in contemporary insight. They will admit that they do not have theological answers to what is going on in today's world, but they will accompany anyone in the pursuit of an answer to every doubt or any question. They will not reduce the power and presence of God to what they can comprehend but will seek to see all creatures in God's light. Consistent with the confession of the United Church of Christ, they will proclaim a God who continuously "calls the worlds into being."

In reclaiming this holistic ministry, ministers will need the partnership of other institutions of the church. Seminaries will need to provide continuing education events designed to help clergy recognize the impact of contemporary science and technology on Christian faith and life. Associations and Conferences will encourage and plan their own continuing education opportunities. They can also identify and support scientists and engineers who are members of congregations, drawing upon these persons to educate the church and heighten its effectiveness in speaking on public issues involving science and technology. Associations and Conferences can encourage seminarians-in-care to select courses that will help them minister more effectively in a world that will be increasingly transformed by science and technology. In their ministries of justice and evangelism, Associations and Conferences can focus on how science and technology, when misunderstood or misused, can stand in the way of social justice and Christian belief.

The United Church of Christ "urgently recommends that the United Church Board for Homeland Ministries, in conjunction with the United Church Board for World Ministries, the Office for Church in Society, the Council for Health and Human Service Ministries, and other bodies as appropriate, accept responsibility for continuing study of issues of science and technology in general and genetic engineering in particular, recommending appropriate initiatives and policy formation for the United Church of Christ."[32] In response, the national agencies of the United Church of Christ seek new partnerships with seminaries, Conferences, Associations, clergy, and laity who accept the challenge of faithfulness to the gospel in a scientific and technological age.

Together as a United Church, moving with openness and courage toward a new millenium, apprehensive about the future but confident in the God who constantly offers now visions and new possibilities, we affirm a new and faithful stance toward science and technology. We acknowledge our failures, our misuse of science to foster racist, sexist, or anthropocentric illusions, and our misuse of technology to manipulate people or dominate nature. We confess our wastefulness, our greed, and our theological disregard of nature.

We reclaim the best of our past: Calvin's view that the Spirit of God illumines our scientific quest, Edwards' limitless curiosity about the ways of the Creator, Bushnell's optimistic vision of the theological-scientific future, and Niebuhr's insistence that any Christian theology open to God is open to science.

We acknowledge that science has been and can be a form of human pride, an arrogant defiance of the Creator, and a threat to the openness of faith. We acknowledge that technology has been and can be a means of domination, destruction, thoughtless greed, and trivial self-gratification. But we also affirm that science can be

[32] United Church of Christ General Synod 17, "The Church and Genetic Engineering," July 1989.

and should be an exploration into the cosmos that God is creating, unfolding its secrets, marveling at its goodness, and exploring its unlimited potentialities. And technology can be and should be a venture of cooperation with God in extending the work of creation, reversing sickness and hunger, preserving and creating with a God who continues to create.

Through astronomy and scientific cosmology, we marvel at the age and vastness of the universe, the patience and wisdom of God, and our human smallness in the great scheme of things. Through physics we explore the fundamental nature of the stuff of the creation, and through chemistry and biology we see how this matter is organized into molecules capable of sufficient complexity to be alive. In ecology and global studies, we learn about the complexity of life on earth, and through evolution we learn of its history and the possibilities of the future. In all these things, we praise a God who patiently seeks our communion, having come to us in the presence of the Christ.

Through technology, we communicate instantly around the globe and into nearby space. We create works of art and culture, build homes and cities, and transport ourselves and our products. We search for new forms of energy, probe the ocean floor or distant planets, and alter the genetic inheritance of organisms. We find treatments for diseases and search for new, less destructive methods in agriculture. In all this, we do not seek to play God or replace God, but humbly offer the work of our hands and minds in cooperation with God.

We affirm science and technology, fearful of them only when they are unaccompanied by a humble faith, by a searching spirituality, and by a prayerful openness to cooperate with God. And so we pledge ourselves as people of faith to engage this scientific culture face to face, to reclaim a spirituality and a theology that can embrace our moment in human evolution, to proclaim our faith in urgent and compelling language, and so to open before us all a vision of wellbeing to which God beckons the whole creation.

For Further Reading

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