# PERSPECTIVES on Science and Christian Faith

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In this issue . . .



*"The fear of the Lord
is the beginning of Wisdom."*
Psalm 111:10

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***Perspectives on Science and Christian Faith***


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# THE EVANGELICAL MIND

Nowadays scientific societies and their publications are under increasing pressure. The economic climate and a freezing of salary schedules have caused second thoughts about memberships which had been hitherto considered automatic. It must be said that the ASA is feeling that economic pinch. Our membership base has eroded over the past decade to the point that we might soon need to consider cutting some of our services, something that we want to avoid.

As I talk with ASA people and read their comments on the Internet, I am impressed by the ways that our organization continues to help people grapple with science-Christianity issues and the role of their faith in their professional lives. Get a few of us together and it does not take long to hatch a project where ASA can reach out to serve others. All of this requires the funding to keep the organization running. The Executive Council and Executive Director have the responsibility to look for resources beyond the membership. However, we bear the responsibility for maintaining *our* memberships, recruiting new members as well as sending a check for an extra amount when the membership bill arrives. Some cultures value books and the things of the mind over the gadgets that compete so well for the American dollar. Mark Noll's recent work, *The Scandal of the Evangelical Mind* (1994) offers a sobering look at our scholarship. It is only through the ASA and CSCA that this generation can find an enduring forum for the religious issues that impinge on the lives of scientists and engineers and build a strong response to those who claim that "science is all."

If each of us would take the time to recruit new members, order *Perspectives* for our church library, and dig a bit deeper, we could fulfill some of the publication and service needs that cannot be met in our present circumstances. ASA Executive Director Don Munro and I would appreciate receiving your comments.

Jack Haas
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## In This Issue

In our first paper, physicist David Snoke takes dead aim on the need for "absolute certainty" in evidential apologetics. He suggests that advocates of "mathematical certainty" along the lines of Descartes and Kant have opened the door to relativism in this century in regard to both religion and science. He argues partly from modern language theory, "that inductive epistemology is self-consistent and that only inductive epistemology provides the basis for science and universal ethics in the Christian context."

Our second paper concludes Jay Hollman's series on the ethical and theological implications of modern medicine. He deals with the ways that psychiatry and neuroscience explain homosexuality, ethical issues related to health care in the U.S. and the seminal problem of AIDS.

Physicist John Cramer then examines Mortimer J. Adler's 1980 version of the traditional cosmological argument for the existence of God in the light of recent developments in science and the philosophical critique of J. L. Mackie and Adolph Grunbaum. He concludes that Adler's case has improved with age.

In our last paper, bioethicist D. Gareth Jones offers a Christian understanding to ethical issues related to the dead human body.

Geologist Jeffrey K. Greenberg comments in our communication on the subject of "debates." A strong collection of book reviews follows.

The Annual Report for 1994 provides fiscal information and reports from the officers, committees, and agencies of the ASA.

# The Problem of the Absolute in Evidential Epistemology

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*Great scientific advances have taken place based on the scientific method, while many have found faith and comfort via the evidential apologetic of scholars like Josh McDowell and Hugh Ross. Both the scientific method and evidentialism rest on inductive epistemology. Yet in modern philosophy departments both the scientific method and evidentialism are dead, because inductive epistemology is dead, and modern scholars who follow them are considered naive. Although induction has been defended in this century by scholars like Wittgenstein and Reichenbach, it is perceived to have failed because of the problem of the absolute; in other words, it seems to provide no basis for absolute certainty. I propose dropping the search for "absolute certainty" altogether, since it is meaningless, and argue, partly from modern language theory, that inductive epistemology is self-consistent and that only inductive epistemology provides the basis for science and universal ethics in the Christian context. Those who want a "mathematical" certainty in epistemology, following Descartes and Kant, have opened the door to the widespread relativism in this century regarding both religion and scientific matters.*

The debate about science and Christianity is one of the great arguments of our day. Some claim that science has proven Christianity false, or at least made it unnecessary and irrelevant.[1] New Age proselytizers claim not only that science has disproved Christianity, but has gone further to prove, or at least support, Buddhism or other Eastern religions.[2] Others have maintained that almost all of modern science suffers from such a degree of bias that Christians must take up arms, so to speak, against non-Christian science.[3] How can we enter this jungle of viewpoints? Must we take refuge in a high wall of separation between science and religion, refusing to allow any connection between the two?

I have previously[4] said that Christian theology and science do not exist in two unconnected worlds. In saying this, I do not mean that theology and science are identical, but that they share a unified epistemology, that each can make claims about propositions that lie in the realm of the other. In other words, although sometimes theology and science make different kinds of claims about the same world, sometimes they make the *same* kind of claim about the same world, and therefore can conflict. For instance, theology may say that the universe has a beginning, or that some people love doing evil, and therefore tread on the realms of astrophysics and psychology. The situation is essentially the same as the interactions between, for example, music and mathematics. While these fields are not the same, each of these can have implications for the other, as in a mathematical analysis of music theory.

This view of the unity of things implies an *evidential*, or inductive, epistemology. In evidential apologetics, we learn religious truths from the world around us. Non-evidential apologetics sees religious

truths as arising from another place, a different world, so to speak.

The evidential apologetic of Christians like C. S. Lewis,[5] Josh McDowell,[6] and recently, Hugh Ross[7] has great appeal to many for precisely this reason, that Christianity takes its place in the "real" world and not only in a "pretend" world with no tests of truth. Yet most Christian thinkers view such approaches as harmless naivete or useful fiction. Similarly, modern science rests on inductive, "real world" logic, yet modern philosophy of science essentially sees all scientists as engaging in a naive exercise, since inductive logic is dead in the philosophy departments. The objections of these philosophers to evidentialism essentially rest on one argument, which is the problem of the absolute, or the problem of the starting point, in inductive logic. This question has remained at the center of critical philosophy for hundreds of years, and most philosophers have resolved it by rejecting inductive epistemology altogether.

In this essay, therefore, I look at the problem of the absolute. Is evidential epistemology really unworkable? Can an intelligent person approach both science and Christianity, indeed, all knowledge, via evidential epistemology?

Epistemology is hardly an abstract and dry subject. As the subject of how we know things, it has two intensely practical applications. First, on what basis can I feel *certain* of anything I think I know? I can only act confidently on the basis of things I feel sure I know. Second, how do people learn things, i.e., how do they come to have knowledge? Our approach to teaching and to conveying any message will depend on how we think people come-to-know. These issues will remain central in this essay.

## Two Schools of Thought

To present the problem, let me start by describing the "naive model" of knowledge, called the scientific method, which goes back at least as far as Francis Bacon in the 16th century.[8] In this view, "data" and "theory" are sharply divided. "Data" represents all knowledge perceived through the senses and recorded, perhaps on paper or magnetic tape, perhaps only in the memory of a person's mind. A person can obtain this kind of knowledge "objectively," which means that the person can collect, or receive, data so that the data remain the same despite the theories held by the person. "Theory" refers to a general statement about the data, which a person can create by using the imagination. A theory does not generally remain the same. If a theory contradicts data, then the theory is false — data act as a judge of a theory. To deliberately change data to conform it to a favored theory is immoral, a falsehood. If the two contradict, then the theory must change, not the data, to make reconciliation.

Theories are quite useful because it is much easier to remember a simple statement, such as "All people have two legs," than to remember a long list of data, such as "Joe has two legs, Bob has two legs, Sally has two legs, etc." Progress in science occurs as people create general statements that are initially fictions of the imagination ("hypothesis"). These statements are compared to data ("experiment"), which either supports or overturns them. As the amount of data increases that does not contradict a theory, the theory gains greater trustworthiness. A theory therefore has value since it provides *simplification* (it "unifies" the data) and has *confirmation* (it can be tested by comparison to data, which does not contradict it.)

Some readers may be surprised to learn that this picture of science, still taught in many textbooks,[9] has been rejected as a description of science by almost all modern science philosophers. Philosophers have rejected the scientific method as an epistemology in this century for the same reason that they rejected evidentialism in religion in the last century, because it is inherently an *inductive* epistemology. While some may include inductive thinking as part of their systems, they reject inductive thinking as a *starting*

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*point* of epistemology, because of the problem of the absolute.

Before addressing the objections to this model of knowledge, I wish to point out that while some may refuse to extend this model to all knowledge, few would deny that it applies to a great deal of "normal" knowledge beyond the realm of the scientific laboratory. Three examples illustrate this.

***[The scientific method] applies to a great deal of "normal" knowledge beyond the realm of the scientific laboratory.***

First, very young children learn in a process very much like this.[10] Confronted with a huge amount of new sense experiences, which they do not prejudge, i.e., "data," they constantly try to form simple generalizations with which to organize the world around them. A child repeatedly tosses things off a high chair, and finds that they always come back. An expectation, i.e., a "theory," is created that "what goes down must come up." After repeated trials, however, the parent may tire and items do not return. Faced with this contradiction between experience and expectation, the child may then adjust the "theory" to "all things I throw down will come back up to me at least for a while." This series of creating new, often nonverbal, rules about life and overturning them based on experience continues for years, until perhaps the child tires of learning and decides to stick with established rules, ignoring new experiences. Language is learned in the same way — by repetition of associations of experiences, the experience of the "sign" with the experiences of the "signed." These "experiences" include internal "feelings" and input from the five senses. Chomsky[11] and others have argued that certain innate "forms" of language exist from birth as instincts, such as a sense of "circle-ness" or "face-ness." Whether or not these particular senses exist, everyone agrees that a child is a "*tabula raza*" concerning any *specific* symbolic communication — any child could learn either Chinese or English or American Sign Language by the same inductive process of association of experiences (including the experiences of internal feelings of circle-ness, beauty, guilt, sadness *etc.*). Since language requires induction, one can safely say that all people start life as inductive thinkers.

Law courts, similarly, follow rules of "evidence" (data) and hypothesis. Once evidence is admitted, it becomes the basis of fact that both the theories of the defense and the theories of the prosecution must attempt to explain. A just judge never allows evidence to be thrown out or altered based on which theory he or she prefers.[12]

Biblical theologians also typically attempt to argue in the same way. The statements of the Bible itself form the "data" which cannot be altered, while theology provides the organizing theory, which can and does change. This approach formed the basis of the Reformation — the Reformers insisted that theologians must submit their theories to the test of Scripture, rather than adjust the interpretation of Scripture to make it mean whatever the Church wanted it to mean. Modern evangelical groups teach the "Inductive Bible Study" method. James Sire of InterVarsity Press has written a wonderful book entitled *Scripture Twisting*, that shows the dangers of attempting to conform Biblical data to preconceived theories.[13] InterVarsity Christian Fellowship (IFES) and similar groups train Christians to read the Bible, then draw generalities based on what they have read, instead of "proof texting" their favorite ideas by taking verses out of context and thus, changing their meaning. Theology, in this approach, can progress for individuals and churches, even while the words of Scripture remain venerated and unchangeable.

***There are two basic philosophical objections to [the inductive model of knowledge]. The first objection questions the sharp distinction between data and theory. . . . Second, no theory can have the status of absolute certainty.***

Why do people reject this inductive model of knowledge? There are two basic philosophical objections to this model. The first objection questions the sharp distinction between data and theory. Suppose a scientist writes down the readings of a meter that he thinks show the positions of electrons. He does this to test a theory about electron motion. Yet in testing that theory, he relies on another theory, which is that the meter faithfully records the positions of the particles. If he obtains a contradiction, he may drop the theory of electron motion, or he may question the theory that his meter is reliable. If he has a great deal of confidence in his meter, he will favor dropping the tested theory, but he can never absolutely rule out that his meter errs. There-

fore, the distinction between "data" and "theory" is better represented as a distinction between "little theories" and "big theories," i.e., theories that have limited scope and a high degree of confidence, and theories that have much greater scope, encompassing other, more limited theories, which require much more comprehensive testing to gain a high level of confidence.

Second, no theory can have the status of absolute certainty. No matter how many confirming data exist, the possibility always remains that new data will come along which contradict the theory. Popper[14] is not consistent when he says that a single contradictory datum can overturn a theory, since that would require absolute confidence in the theory that the new datum is interpreted correctly. New contradictory data, however, can significantly weaken a previously strong theory. Are there no theories, i.e., general statements about experience, which we can know with absolute certainty? The problem is compounded when we turn the inductive method upon itself. Since the inductive method is a theory of knowledge, what makes us believe it is a correct theory? By its own terms, we cannot be absolutely sure that it is true! This is Hume's[15] celebrated "problem of induction."

With only theories, then, and none of them absolutely certain, it seems that the scientific method, or inductive method, if generalized to cover all knowledge, leads us to float in uncertainty. We know nothing with absolute certainty, according to this model. We seem to have no starting point, no absolute, for arguing in favor of inductive knowledge. How can we escape the sense of anxiety, the feeling of floating at sea, that arises at this prospect?

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This problem faced the philosophers of the 17th century, and Rene Descartes[16] seemed to find the way out. One cannot underestimate the impact of Descartes. As Hegel said,

> Only now do we arrive at the philosophy of the modern world, and we begin it with Descartes. With him, we enter into an independent philosophy which knows that it is the independent product of reason, and that consciousness, the moment of self consciousness, is an essential moment of truth. Here, we may say, we are at home; here, like the sailor at the end of his long voyage on the stormy seas, we may cry "Land!..." In this new period the principle is thinking, thinking proceeding from itself.[17]

The apparent bedrock provided by Descartes is the *absolute* certainty that seems to belong to certain statements. Starting with this kind of statement as an absolute assumption, every logical deduction that follows has the same absolute certainty.

**Absolute *certainty . . . seems to belong to certain statements. Starting with this kind of statement as an absolute assumption, every logical deduction that follows has the same absolute certainty.***

This framework of Descartes, which has its roots in Aristotle and Aquinas, I will call the "mathematico-logical" model of knowledge. In this view, a distinction is made between "assumptions" and "deductions." Assumptions are propositions taken as absolutely true. Deductions are all of the propositions that can be deduced from the assumptions by the rules of logic. If the assumptions are absolutely certain, then the deductions are also absolutely certain, because the rules of logic essentially provide only a way of saying the same things in different words, without contradicting oneself. All such absolutely certain knowledge is *"a priori"* knowledge, in Kant's terms[18] — not open to question based on experience.

The important truth content, then, lies entirely in the assumptions. Many philosophers, however, have become enamored with the process of deduction because it can produce very surprising results—it may take years to discover all of the implications of even a few, very simple assumptions. The fact that these deductions have the same absolute certainty as the initial assumptions gives the impression that these results are a higher kind of knowledge than empirical knowledge. Nevertheless, they are merely restatements, no matter how complex.

The question remains of where to get the absolutely certain assumptions required by this model.

Descartes felt that the requisite absolutes could be provided by the set of apparently self-evident, noncontradictable statements. This set is small, containing such statements as "Nothing can not exist," or "I think therefore I am." More recently, the evangelical theologians R. C. Sproul, J. Gerstner, and A. Lindsley have also argued in favor of limiting the set of absolutes to these self-evident statements.[19]

*["Self-evident" logic] quickly runs out of steam when one attempts to find answers to important questions like the nature of God and the basis of right and wrong.*

While scholars have deduced many powerful conclusions from apparently self-evident propositions, for example, Aquinas' proof of the existence of an absolute, which we can call "God," reiterated by Sproul, Gerstner, and Lindsley, this approach quickly runs out of steam when one attempts to find answers to important questions like the nature of God and the basis of right and wrong. Immanuel Kant overthrew all of Aquinas's[20] proofs for the existence of God, essentially because all of the axioms they invoke require knowledge of some sense experience, and therefore probabilistic reasoning, i.e., induction.[21] Yet Kant, a Christian, needed a basis for morality. He tried heroically to found a moral philosophy purely on self-evident concepts,[22] arriving at the "universal" concept of "duty," but his efforts have remained unconvincing to most. Others arguing from "self evident" principles have deduced different ethics, such as Ayn Rand's "deduction" of individual selfishness[23] as the absolute of morality. Rather than accepting the limitations of an approach based only on the small set of noncontradictable propositions, the Cartesian rationalist inevitably supplements the set of absolutes with some unprovable assumption to reach the values he or she wants.[24]

Existentialism, in particular as defined by Nietzsche and Heidegger,[25] but with roots in Kierkegaard,[26] overcomes the hypocrisy of "self evident" rationalism by directly affirming that the set of absolutes must be supplemented by unprovable axioms. In this school, the Free Man can generate absolutes by the exercise of choice, or a Kierkegaardian "leap." This exercise of arbitrary choice represents the highest quality of people. Of course, one person's absolutes may contradict another's, so that they cannot be considered absolute in the sense of being universal. Instead, each person works within a unique logical system defined by his or her chosen axioms. These axioms act as absolutes because the individual does not doubt them after that.

The philosophy of science of Kuhn,[27] which dominates modern philosophy of science, is essentially existentialism as applied to science. Science consists in his model mainly of "problem solving," i.e., deduction, based on "paradigms," which are axioms made by existential choice that then act as absolutes until a "revolution" occurs which supplies a new paradigm via a new existential choice. Modern science is not superior to that of Aristotle; modern scientists have simply made different existential choices of value in judging science. Polanyi's approach to science[28] is similar, insisting that in a big universe, the scientist cannot randomly collect data, but must choose the interesting places to look based on definitions of value. Only existential choices provide these. Following the work of Kuhn and Polanyi, some in recent years have created a *false* unity of science and religion by stripping science of that same claim to objectivity that others stripped from Christianity in the last century. The new unity allows us to believe what we choose to believe about either science or religion. This is not the kind of unity I have proposed[4] — I propose that theories be approved or rejected based on evidence in both spheres.

*[Kuhn says that] modern science is not superior to that of Aristotle; modern scientists have simply made different existential choices of value in judging science.*

In orthodox Christian circles, existentialism has a close parallel in presuppositionalism, founded by Cornelius van Til[29] and more recently advanced by Gordon Clark.[30] In this framework, unprovable absolute axioms are seen as necessary, just as in existentialism.[31] The Calvinist presuppositionalist does not see these as arising from arbitrary choices, however, but as implanted directly in the spirit by God. Nevertheless, the presuppositionalist sees these axioms as essentially irrational (or "non-rational")[32] in nature. The Arminian, or "Free Will," presuppositionalist has a closer relationship to existentialism in affirming the power of choice as mankind's highest quality.[33] In this view the axioms of Christianity are seen as universal, but essentially unknowable and unprovable, until a person chooses to believe them.

***Existentialism seems to affirm the value of the individual but has left many empty . . .***

Existentialism seems to affirm the value of the individual but has left many empty because they seek a universal absolute, or truth about objective reality, not merely a subjective personal absolute. It also has served as a justification for all kinds of systems that seem intrinsically evil, for example, Hitler's use of Nietzsche's Superman, because it denies a universal morality. In the U. S., the conflict of personal absolutes has led to a new kind of power conflict of values, documented in books such as *The Closing of the American Mind*[34] and *Illiberal Education*.[35]

Existentialism also has no answer to mysticism, which has blossomed in modern Western society. Having rejected non-axiomatic knowledge as uncertain and embraced perfectly certain knowledge by irrational leap, the existentialist has a hard time justifying the need to feel constrained by facts and logic any time — even the concepts of the reliability of the senses and the need for logical deduction become mere choices of value. A person who does not make these assumptions can simply believe anything he or she wants, even if confronted by direct evidence or logic to the contrary. The mystic, therefore, consciously chooses to forego logic and allow contradictions — all knowledge is equivalent to the choice axioms of the existentialists, with deduction following only when one chooses. Comparison of claims of truth is impossible; each person remains sealed off in a subjective world alone.

Modern religion and philosophy of science seem to have painted themselves into the corner of saying that anyone can choose to believe anything, and there is nothing we can do about it. Calvinist presuppositionalists may substitute an act of God for free choice, but they still allow that the non-Christian has just as much logical consistency following pagan assumptions as the Christian has following the Bible. "Convincing" people to change their minds about fundamental beliefs seems all but dead in Western society. This conundrum stems from the attempt to define all knowledge within the "mathematico-logical" model of knowledge using assumption and deduction in the tradition of Aristotle, Aquinas, and Descartes. While recognizing many weaknesses of other systems, no one in the mathematico-logical school, in which I include Cartesian rationalists, existentialists, and presuppositionalists, ever seems to question directly the validity of Descartes's model of absolute certainty based on axiomatic reasoning. Even some mystics use a highly sophisticated Cartesian logic to validate their approach.

On the other side lies the inductive approach following the scientific method, outlined above, which relies on the senses and allows no absolute certainty, often going under the names of empiricism and positivism. This model is often associated with the famous Scottish anti-Christian, David Hume[15] and the atheists Mach and Wittgenstein;[36] in this century Reichenbach[37] has advanced this school without anti-Christian rhetoric. Christians associated with this approach, usually called "evidentialism" in Christian circles,[38] include C. S. Lewis,[5] John Warwick Montgomery,[39] Josh McDowell,[6] and Francis Schaeffer.[40]

In thinking about the problem of the absolute, the first thing one must realize is that it is only a problem for the mathematico-logical school. In other words, it is a problem *imposed* on the inductive school by the mathematico-logical school. If the deductivist asks, "How can you be *absolutely* sure that evidentialism is correct?" the evidentialist must answer, "I am not and that doesn't bother me. Absolute certainty has no meaning within my world view. I can only say that I am very sure." Few evidentialists have had the courage to speak this way, however. Most have unwittingly capitulated to the mathematico-logical school in trying to produce some absolutely certain argument for evidentialism. By its very nature, inductivism cannot produce absolute proof of inductivism. It can merely show self-consistency by showing *strong evidence* of the validity of inductivism.

Deductivists will say that showing that inductivism is self-consistent does not disprove any other epistemological system, since every axiomatic system also can show self-consistency based on its own assumptions. The inductivist has an advantage, however, since all people start out thinking inductively. To force a change, the deductivist must show inconsistency starting only with the rules of the inductivist system.

## Can We Be Absolutely Sure of Anything?

Let me affirm that perfect certainty is impossible. The concept of perfect certainty is absurd, even within the mathematico-logical model. Consider the

statement, "I am perfectly sure." Who am I? Am I sure who "I" am? An electron microscope will show that I do not end sharply; my skin fades away. Do "I" include all the shed skin of past years? Memories that I have forgotten? If "I" am not perfectly defined, my certainty cannot have a certain definition. The absolute certainty of an apparently non-contradictable statement like "I think therefore I am" disappears when we realize that "I" and "think" cannot be perfectly defined.

Since every proposition is formed from the words of a language, which come from mapping a broad set of sense experiences to a much smaller set of sense experiences (for example, all my experiences of myself are mapped to the sound of the word "I"), no proposition can have absolute certainty about its meaning in the reverse mapping process, i.e., about reality. Language, so essential for thought, automatically rules out exactness. Aquinas believed that his proofs of the existence of God were self-evident, but others later showed that the words he used, like "time" and "cause," had origins in sense experience. One can do the same with any so-called self-evident proposition.

Having ruled out perfect certainty, however, do we then condemn ourselves to a world of questions with no answers? We have all known sophomore college students who lost all sense of direction after exposure to philosophy that called into question the certainty of everything. There is no need for this. On the contrary, certainty is possible even where "perfect" certainty is not. To claim otherwise is foolishness.

***Many scientific propositions exist which are not "perfectly" certain, yet are very certain, to such a degree that to doubt them would be foolish.***

It seems that philosophers and theologians often have great difficulty with the ideas of probability and uncertainty that working scientists do not have. For many students of philosophy, only two possibilities exist, either perfect certainty or uncertainty. For scientists, a whole spectrum of degrees of certainty exists, with perfect certainty and complete ignorance as the two ends of the scale. An exact number is viewed as meaningless by scientists; every number purported to deal with reality must have an associated value of "uncertainty" which reflects the accuracy of the measurements, the number of "significant" digits in the calculation, etc.

***We can become certain of religious propositions in the same way in Christianity as in science: through laws of evidence and experience.***

Many scientific propositions exist which are not "perfectly" certain, yet are very certain, to such a degree that to doubt them would be foolish. For instance, according to microscopic gas laws the remote possibility exists that all of the air molecules in the room you occupy may suddenly stack up along one side of the room, causing you to suffocate. This should not be cause for concern, however — the entire history of the world is not enough time for such an event to become probable, even to occur once. Scientists and statisticians define the probability of some chance, possible events as "insignificant." To all intents and purposes, such an event is "certainly impossible." A slight possibility exists, for example, that a person jumping out of an airplane without a parachute will not die. Few philosophy professors, however, would consider the outcome uncertain enough to warrant a test![41]

Room therefore exists for talking of certainty even in an epistemological model that excludes "perfect" certainty. Of course, we cannot be certain about everything; we are ignorant of many things. We can be very sure about some things, however.

Rather than talking about perfect certainty, we can talk about being "sure enough" — sure enough to act upon a proposition. An engineer who has designed a bridge may not be "perfectly" certain that it will not collapse but certain enough to walk on it; the man who sold all he had to buy a pearl, in Jesus's picture of faith, may not have known "perfectly" that the pearl was not fake, yet had enough confidence to take this dramatic action.

I emphasize that we can become certain of religious propositions in the same way in Christianity as in science: through laws of evidence and experience. Science and Christianity share a unified epistemology. This may seem quite surprising to many people, including many Christians. What about questions of value and meaning, as discussed by Polanyi? I return to the question of value below.

This question of sureness is a watershed issue. Although many epistemological frameworks exist, all epistemologies must belong to either one category or the other, inductive or deductive. We must answer the question, are *all* propositional statements of language open to question and revision based on experience, or are some "protected" as unquestioned axioms?

## What Does the Bible Say?

I have argued that the approach to knowledge in the Bible is the same as that of the scientific method. This even includes faith in the promises of God Himself. If this is so, then does not faith in God have the same vulnerabilities as scientific theory, in particular the absence of perfect certainty?

At this point, let me turn to the Bible, the source book for Christians. What picture does the Bible give of knowledge? Does the Bible tell us to find the perfect certainty of the mathematico-logical model?

Ever since Kierkegaard defined faith as an irrational, or extra-rational, "leap" into a new set of perfectly certain assumptions, many philosophers have taken this without question as the proper definition of faith, and the hallmark of religion. Many modern evangelicals speak like this also. The Bible simply does not talk about faith this way, however.

First, faith in the Bible is very often portrayed as coming about due to *convincing*. The picture is given of "reasons"[42] that could be "examined,"[43] with people being "persuaded"[44] and "convinced"[45] by "proofs,"[46] "witnesses,"[47] "testimony,"[48] and "signs."[49] These terms suggest a weighing of evidence, not an irrational leap. In the New Testament the evidence centers on the works of Christ, in the Old Testament believers were reminded of the testimony of the signs, or evidences, of God's work in the Exodus.[50]

Second, faith in the Bible is spoken of as a quantity that people can have *more or less* of — there are degrees of certainty. Jesus called people's faith "great"[51] or "little."[52] The apostles talked of faith as something that could "increase"[53] and "grow."[54] People could become "more certain."[55] If faith means absolute certainty, how could it become greater? "Doubt," or wavering in faith, is frequently spoken of.[56] In pragmatic terms, Christians do doubt. Should we tell them that they have no faith at all; that they are not Christians if they are not perfectly sure? Or should we tell them that they are not really doubting after all?[57]

A leap of sorts *is* enjoined in the Bible in relationship to faith. This is the leap of obedience. No matter how great the evidence for a theory, one cannot be absolutely sure that its predictions will come true before an experiment is made. In the great chapter of faith, Hebrews 11, each person without exception is commended for what he or she did based on faith. What is "unseen" in each case is the future, while the past actions of God provide the basis of faith. A person watching mountain climbers may be convinced that the rope is secure, but if asked to hang from the same rope himself, he may irrationally refuse to make the leap. Action requires a work of the will besides mental knowledge. Of course, obedient action can increase faith. Just as in scientific theories, certainty increases when tests of experience have been made.

The Bible in no way endorses mysticism. Certain passages have been interpreted as self-contradictory, such as John's "I am not writing you a new command ... I am writing you a new command."[58] In such passages, different senses of the same word are used for emphasis; a direct irrational self-contradiction is not intended, as is clear from the context. The Bible is a book that talks of truth and falsehood, light and darkness — "Mystery" is the name of the harlot of Babylon.[59]

"Being convinced" is essentially passive, requiring neither mystical nor existential choice. Some may say, with Aquinas, "Where then is the merit of faith?"[20] If we are simply passively convinced of something by strong evidence, what virtue is there in that? The Bible answers that there is none — faith is a work done in us by God, out of grace,[60] not a work we do to save ourselves.

## Can an Epistemology be Free of Presuppositions?

To show the lack of consistency of evidentialism, the deductivist argues that the evidentialist *must* make some absolute, unquestioned assumption to evaluate evidence, *i.e.*, to define knowledge. Above, I said that the fact that children learn inductively puts the burden of proof on the deductivist. The deductivist objects that this is beside the point. That they do so (if we agree on the evidence that they do) only implies that they have *implicitly* made an axiomatic presupposition in favor of inductivism.

What could that mean? If we define a "presupposition" as a propositional statement of language, then clearly knowledge precedes any presupposition, since sensory experience, which we must call

knowledge, precedes and forms the foundation of language.[61] As Augustine said,

> For who cannot see that thinking is prior to believing? For no one believes anything unless he had first thought that it is to be believed.[62]

Similarly, knowledge cannot require existential presuppositions made by choice. Small children get knowledge before they form theoretical biases. Knowledge must precede choice; otherwise, there is nothing to choose.

***Knowledge cannot require existential presuppositions made by choice.***

On the other hand, if a presupposition can take the form of an unverbalized bias, which people who have language may later formulate in propositional form, then we can ask whether some such proposition must remain unquestioned by all evidentialists. In particular, does not the evidentialist *assume*, first, that the senses are reliable, and second, that the more evidence of something makes it more certain?

Here I must digress to clarify the distinction between "unifying theories" in the inductive approach and "unquestioned presuppositions" in the deductive method. An unquestioned presupposition is a statement that we take as true with no possible doubt, an "axiom" in mathematical language. A unifying theory is a way of organizing many facts of experience into a single fact. We typically talk of such unifying theories as foundational, or as fundamental, or as first principles, because once they are learned, then many other facts follow as deductions. Such unifying theories are almost never learned first! Fundamental theories of physics, for example, can be learned only after years of study.

Dreadful results occur when scholars attempt to teach foundational, general theories like axioms, before teaching the particulars of a field. The fiasco of New Math occurred when educators decided to teach the basics of set theory to primary students because all math "follows" from set theory. Even when students succeed in learning foundational theories first, they memorize them as irrelevancies. A person can comprehend a unifying theory only after already comprehending some particulars, or specific applications, of the theory. We think from particulars to generals, not vice versa.

Although we start with particulars, nevertheless we like general theories. Unifying theories act as "keys" to knowledge for those who understand them, unlocking great mysteries. In this way the "fear of the Lord" acts as a grand, unifying theory which one can properly call the "beginning of knowledge."[63] Once grasped, the fear of God puts all things in perspective so that believers often feel they knew nothing before, that they "walked in darkness." In the same way, the physicist who grasps the theory of special relativity may feel he or she previously knew nothing of motion, despite having driven a car for years.

Consider the difference between a unifying theory and an irrational assumption, however. With both a unifying theory and an axiomatic assumption, a choice is made by the will to suppose something is true that is not known *a priori* to be true. In the model of the scientific method, or inductive method, this is called "hypothesis." In each case, deductions are obtained from the assumption. In the case of the scientific method, however, these deductions are compared to further experience, and contradictions with experience invalidate the assumed hypothesis or at least force a revision of it, while consistency with experience increases one's level of faith in a theory. Axiomatic assumptions of perfect certainty do not allow this. Also, a hypothesis is built out of some set of other theories with smaller scope, in other words, particulars, or "data." An axiomatic assumption, in the mathematico-logical model, claims to build on nothing.

***Unifying theories act as "keys" to knowledge for those who understand them, unlocking great mysteries.***

Having clarified this distinction, then, I can affirm that evidentialists "assume" (in the sense of positing a fundamental theory) that the senses are reliable, etc. Inductivism is a general, unifying theory. An element of the irrational does exist when formulating a necessary hypothesis to create a general theory. Yet belief in successful theories (whether scientific or religious) is not mere irrational value-choice, because certainty can be ascribed to them by tests of consistency.

The fact that deductivists exist proves that inductivists do not necessarily make inductivism an *unquestioned* presupposition! As discussed above, all

people start as inductivists. Yet some become deductivists, precisely because they question the foundations of inductive thinking and become less sure that its primary assumptions meet tests of consistency.

## The Certainty of the Senses

I have said that evidentialists "assume" as an imperfect theory that the senses are reliable and that more evidence of something makes it more certain. Since these assumptions remain, in principle, open to question, the evidentialist does not violate self-consistency by making an axiomatic presupposition like the deductivist. Before we pass over these assumptions too lightly as "not absolutely proven," however, we would do well to think about what the opposite assumptions really mean.

First, to assume that the senses are not reliable does not mean merely that the knowledge gained from the senses is *incomplete*. Every evidentialist recognizes that knowledge gained from the senses tells only part of the story; therefore, the probabilistic approach to truth arises. The opposite assumption is that *none* of the information from the senses is truly knowledge, that the senses (alone) tell us nothing. The evidentialist says that the senses tell us *something* about reality; those who reject this assumption say that they tell us *nothing* about reality.

How could the senses tell us nothing real? If we merely passively receive sensory inputs, we have at least knowledge of the emissions of some source. One can postulate that Someone Out There deliberately presents us with information that is false our whole life long, so that every sensory experience gives a false view of reality. In that case, we still have knowledge of how that Someone works. Our reality *is* the world of that Someone's deception.

As a matter of definition, we can call the senses "infallible," as Jonathan Edwards[64] did. If "reality" is the total of our experience minus our memory and imagination, then the senses convey reality perfectly, since one can define the senses as the way we experience whatever it is we experience. As Edwards argued, what we typically call our senses "deceiving us" comes from incomplete sense experience, not "wrong" experience.

Simply defining reality as whatever we experience, and the senses as the perfect conveyors of that, may bring scant comfort to many people, however. What makes us expect that certain things will happen again? The question of the "reliability" of the senses, whether they tell me something "real," has more to do with our expectation of repeatability than with the origin of what we sense. Things that are not "real" can vanish; deceptions can stop suddenly. How do we know that things will not suddenly vanish into thin air?[65]

Of course we do *not* know with absolute certainty that things will never just vanish into thin air. A nuclear bomb may go off tomorrow. Indeed, Christians believe that the world will one day vanish, that "the sky will be rolled up like a scroll" in the return of Christ. The inductive assumption (for example, of Hume[15] and Reichenbach[37]), that more evidence gives more certainty, comes from a present-tense *sense of expectation*, or "sense of certainty," we have that things we have experienced often will occur again. Logic can take us no further.

Language comes from the same sense of expectation. We learn a language by repeated association of one experience (the "signed") with another experience (the "symbol"). There are many nonrepeated things in life, experiences that we must simply leave as open questions. Finding a "meaning" consists of finding a language map, a definition, and definitions come only from repeated association.

A person who wishes to deny that repetition increases certainty must therefore call into question his or her own use of language. If a person says, "You just assume that repetition increases certainty. I don't make that assumption," then one can ask, "Why do you use the word 'assumption'? Why don't you use the word 'flibber' instead?" The person uses that word because repeated usage has given that name in the English language to the referent. The person does not switch randomly between the word "assumption" and the word "flibber" because he or she is *certain* that "assumption" is the "right" word. This certainty comes only from repetition — there is no axiomatic "proof" of language definitions.

***Science is merely language with finer distinctions between phenomena than people ordinarily make — the coining of new terms is indispensable for science.***

Any language is tied to successful unifying theories. A "theory" is any rule for grouping together certain diverse experiences in one category, under the same name, while ignoring other experiences

as irrelevant and not needing names, which is precisely what language does. Science is merely language with finer distinctions between phenomena than people ordinarily make — the coining of new terms is indispensable for science.[66] The converse also holds. Anyone who would reject the scientific method must also reject all language. Unless one believes that the English language descended from the heavens directly into his or her brain (something like what Plato believed) then one must see that language requires inductive thinking.

## The Question of Ethics

One may concede that inductivism can provide a self-consistent basis for interpreting everyday experience, i.e., that the scientific method works for *science*. But for a complete world view, do we not need absolutes of right and wrong? How can a world view that has no perfectly certain propositions provide an ethic?

The inductive/empirical approach to knowledge, as I have said, is often associated with Hume, who was vehemently anti-Christian.[67] Because the Christian scholars of his day had largely embraced metaphysics based on speculation of abstract axioms, for Hume this meant the rejection of religion *per se*. As he says at the conclusion of his *Enquiry*,

> If we take in our hand any volume of divinity or school metaphysics, for instance, let us ask, does it contain any abstract reasoning concerning quantity or number? No. Does it contain any experimental reasoning concerning matters of fact and existence? No. Commit it then to the flames: for it can be nothing but sophistry and illusion![15]

Hume's empiricism evolved into the positivism of Mach and Wittgenstein, so named because of Mach's rejection of concepts of "value" and "meaning" as existential, nonmeasurable quantities and his insistence on "positive" experience. Hume and Mach believed that knowledge that has no connection with experience is fantasy. I concur.

Polanyi, however, showed that all science requires beliefs about "value" and "meaning."[28] He is widely felt to have dealt scientific materialism and positivism a fatal blow. In a big universe with many places to look, concepts of value and meaning define the interesting, or "good," places for observations. Random data collection with no purpose is not science. Yet science that restricts itself to observation of nature cannot produce these concepts. I concur with Polanyi on this point.

Where do value and meaning come from, then? Polanyi essentially saw these as arising from existential choice. Does the Christian agree? Many Christians have argued for a separation of scientific and religious epistemology on this basis, for example, Howard van Till.[68] Science deals with ever-changing theories and data; religion deals with absolute, unquestioned assumptions of value and meaning.

The Bible does not make such a distinction. "Good" and "evil" in biblical terms have very concrete definitions. "Good" is that which God loves and will reward, and "evil" is that which He hates and will punish. The statement, "That is good," in the Christian ethic, therefore, has the same nature as a statement like "Tomorrow it will rain." Each makes a claim about an as-yet-unobserved fact of the world of experience, in one case, regarding the judgments of the real God in the universe of time and space, and in the other case, regarding weather in the same universe. We expect to observe both by means of the senses.

For the Bible-based Christian, then, ethics proceeds in the same way as science. Rather than making deductions from prior assumptions about good and evil, the Christian attempts to answer questions such as "Did God really command that for me?" by a process of theory-making and evidence. Christians grow and change in their understanding of ethics, i.e., in their "wisdom." Part of that process may even include questions about the validity of the inclusion of certain passages in the canon of the Bible. It may also include ongoing evaluation of the validity of "internal" sensations of the commands of God, as universal "moral laws" or personal "leadings of the Spirit."

***The Christian attempts to answer questions such as "Did God really command that for me?" by a process of theory-making and evidence.***

In the post-Christian West, since belief in the revelation and universal judgment of God has ceased, morality cannot be defined in absolute, concrete terms. We feel a need for universal morality, though, and therefore philosophers have attempted to construct universal norms. Without a connection to universal consequences, however, any attempt at producing a universal morality must come down to arbitrary choices.

In practice, though, these choices are not arbitrary. As Nietzsche argued, most people in society get their values from the "strong man" of that society. For them, morality is concrete as for the Christian — people make evaluations, from experience, of the desires of the strong man, and the consequences of disobedience. Each person obeys his or her own "god." The "free man" equals the man whose god is himself. He has only two real choices: randomness, or following his natural animal lusts. While he may dignify his choices with names like "the creation of beauty" the free man who has broken free of the societal strong man generally ends up turning to the second choice, carnal pleasure — witness the centrality of sex in contemporary art.

I conclude that all real choices of ethics arise from decisions made from analysis of experience — which is the god most to be feared: God, the local strong man, or the unfulfilled sexual desire? Of course, one must believe that the god exists, and has spoken. A god who exists only as a construct, who never gives commands nor enforces them, has no relevance in the real world.

***Christian ethics is then* absolute *in the sense that it involves* ultimate *and* universal *judgments...***

Christian ethics is then *absolute* in the sense that it involves *ultimate* and *universal* judgments, not in the sense that anyone is absolutely certain that any one proposition of ethics is absolutely certain or absolutely well understood in its implications. In this way, historical Christianity is unique. No other world view based on evidence and inductive reasoning can provide a satisfactory ethic.[69] Scientific materialism, which *a priori* excludes data that could imply intervention by an ultimate God, cannot provide an ultimate ethic.

In principle, science could generate a universal ethic by demonstrating that all people have the same sense of "goodness" and "badness." While evidence for the existence of such "natural law" has important implications for apologetics, restricting ethics to such an approach breaks down for two reasons. First, because of sin people will lie about what they perceive as good and bad. C. S. Lewis's statement[5] that no one could imagine a country where people "bragged of running from battle" makes less sense after the Viet Nam war — many people did brag about running from battle. C. S. Lewis might also have listed as unthinkable in his day a country where mothers marched in the streets for the right to kill their babies in the womb. Second, such an approach does not show universal bad consequences of things perceived as "bad." There is no justice in this world. Therefore, positivists like Mach could say that the perception of "badness" is no different from the perception of "redness" or "blueness," i.e., inconsequential. The Bible, on the other hand, makes the claim that an omnipotent God has spoken intelligibly and unambiguously in space and time (the world of science) about the consequences of right and wrong for all people.

The late Francis Schaeffer, an influential Christian philosophical writer in the twentieth century, addressed this issue at length.[70] In the twentieth century, the world of our experience and the world of religion have been made into two separate worlds. "Religious truth" has no interaction with the data of experience, the realm of science. Therefore, for many people the practice of religion has faded away. Schaeffer coined the term "true truth" for the truth claims of Christianity, meaning that the truth of Christianity deals with the real world of our experience. The stories in the Bible of Adam and Eve, Moses and Joshua, and Jesus and the Cross occurred in real, space-time points in our universe.[71] The Bible does not present its foundational stories as myth and allegory. Characters have extensive genealogies, interact with other historical figures such as the kings of Babylon and Egypt, and live in places with geographic reference points. The genealogical, historical, and geographic details in the Bible are specific to the point of becoming boring for some readers, but show without a doubt that the writers viewed the stories as occurring in the same world as ours.

***Because the stories of the Bible occur in this world, no claim of the Bible can be completely divorced from a scientific implication.***

Because the stories of the Bible occur in this world, no claim of the Bible can be completely divorced from a scientific implication. Henry Morris of the controversial Institute for Creation Research properly emphasizes this point.[72] One may easily say that the purpose of the Bible is not to convey scientific data, but that cannot eliminate the grounding in reality that even statements of ethics have — if Moses

never existed, for example, then one can hardly see the commands attributed to him as originating from the oracle of a real God. Without that grounding in historical reality, ethics must come from nowhere — from the arbitrary choices of existentialism, or from the conflicting opinions of conscience mixed with self-interest.

## The Question of Authority

This unity of religious values and science based on experience may seem especially strange in the context of biblical Christianity. Doesn't the Christian make the Bible an "absolute?" Science deals with repeatable, measurable events in the present and theories that make testable predictions, while the Bible records unreproducible, dogmatic stories from centuries ago. How can the two compare?

Such an antithesis indicates an improper understanding of the role of authority in science. No scientist, no person, has any hope of directly testing through experience even a fraction of the truth claims presented in life. How many scientists, for example, can hope to directly observe the W-boson that led to a Nobel prize for those who claimed to see it, which required a multibillion-dollar particle collider for its observation?

As young children, we learn to evaluate secondhand information from the claims of messengers, or "authorities." While a child may start by simply believing everything the authorities say, the problem will come, as it did for Europe in the 1200's, when authorities contradict each other. Then a person must develop theories of which authorities to believe, based on experience. This process involves experience with the person who claims authority. What is the likelihood that this person will bring false information, either maliciously or by error? History, as a science, deals with exactly this question, as do law and journalism. The complete rejection of authority, an immature alternate response, leads to an extreme narrowing of knowledge.[73]

Does science based on authorities allow for tests of predictive theories? Any historian will affirm this. First, one can predict that other reliable authorities will concur, if they are found. Second, one can predict that details that remain available for observation (for example, archeology) will give corroboration.

The Bible comes to us as a purported authority about things that have occurred in the world of experience. We have every right to expect, then, that the Bible will meet normal tests of historical validity.

What about the concept of inerrancy? This belief, that the Bible, since it comes from God, never errs in any proposition it affirms, raises the Bible to a higher level than mere historical authority. As Sproul[74] and Hackett[75] have argued, the Christian need not come to believe in the inerrancy of the Bible by a leap of faith. Starting with the Bible as a historically valid authority, a person can come to faith in Christ and then evaluate Christ's statements about the Bible contained in itself, in a "bootstrap" process. Some Christians do come to the Bible by irrational leap, as the Mormons come to their books. They have no argument against Mormonism or any other cult, as a result. Evidentialist epistemology allows comparison of religious truth claims based on evidence.

***The Bible comes to us as a purported authority about things that have occurred in the world of experience.***

Perhaps no issue brings this dogma/science dichotomy into focus better than the question of miracles. If I embrace something like Hume's definition of probability of truth based on prior experience, how can I then believe in miracles, in particular, the miracles of the Bible? Hume ruled out miracles based on this approach, since if we have never seen a miracle, the probability of one occurring, according to laws of induction, must approach zero.

To address this, I must first formulate the proper definition of a "miracle." Some atheists have accused Christians of a very silly kind of self-contradiction: defining a miracle as "something impossible," they see Christians as believing that something impossible is possible. Clearly, Christians would define a miracle as something possible, not something impossible! We also cannot embrace the popular definition of miracles as "things that happen all around us." To do that reduces the idea of a miracle to merely something that is good, but otherwise indistinguishable from other things. As presented in the Bible, a miracle is a mighty act of God, which He does to accredit a messenger or to glorify His name.

I have argued that a person may come to a belief in God inductively, based on evidence. Given a belief in God, no one should find it hard to believe that God has the power to do miracles in the universe He created, including speaking words to individuals

and even stopping history to judge the world. Since we find records of miracles in the Bible, we would have reason to disbelieve these only if we have a philosophical bias against miracles, since the Bible is otherwise reliable history. The fact that we do not see miracles of the same kind now does not provide evidence against the biblical miracles. The Bible itself indicates that miracles occur rarely and dramatically, not randomly and frequently.

***[The concept of inerrancy], that the Bible, since it comes from God, never errs in any proposition it affirms, raises the Bible to a higher level than mere historical authority.***

Note that the Christian ascribes certainty to the existence of God, from this belief deduces that miracles are possible, and then sees historical evidence for such. If one tried to establish the occurrence of miracles apart from the existence of God, in other words, to prove the existence of God entirely from miracles, as some would like to do these days, then such a proof must surely fail Hume's test of experience. Despite many claims of modern-day miracles, the number of these in which the hand of God is undeniably present is very small. Many who have relied on the miracles alone as evidence of God's presence have either needed to become extremely gullible or else have lost their faith, as documented by Philip Yancy in his book, *Disappointment with God*.[76]

A miracle violates the standard "law" of nature. Yet no modern philosopher, Christian or non-Christian, accepts the 19th century view of physical laws as inviolable laws or even as causative agents. The presently expressed "laws" of nature are nothing more than inductive theories of varying certainty and levels of approximation of the observed behavior of nature, what the Christian would call the "normal" behavior of God. The distinction between miracle and law is the same as that between special and general revelation — God makes Himself known partly by things that occur regularly, and partly through things that occur rarely.

Because miracles accredit the messenger who claims to bring God's word and will, the stories of miracles are inseparable from the message of the Bible. In the 18th century, many philosophers tried to deduce everything important in religion from scratch, without need for reference to the Bible. In doing so, they hoped to prove the validity of the Bible, but they undermined the "specialness" of the Bible and any hope for generating an ethic within an inductive approach. I have maintained that both ethics and science can arise from an evidential approach to experience. Yet as I argued above, this does not mean that one could generate all knowledge from science and the study of nature, without input from the revelation of God, as though the Bible were merely some superfluous supplement to science. The Bible offers not only a general theory about the universe, but also "news," in the terminology of Walker Percy,[77] or "revelation," which cannot be deduced independently. Like other news, it comes to us via "authorities" which we can judge. That news is largely the story of the unique, miraculous interventions by God that convey to us His personality and will for us. Far from bypassing the Bible, I maintain that belief in the miracles of the Bible can be reached through inductive thought, and this in turn provides the basis for ethics.

## The Question of Sin

So far, I have argued that evidentialist epistemology is self-consistent, in that it does not require unquestioned irrational axioms either for science or for ethical values, when the evidence for miraculous communication from God is allowed as input for ethics. Does the evidence force us to conclusions, though? What about the existence of sin and its effect on our reason?

Cornelius van Til[31] the founder of presuppositionalism, affirmed that all young children have from birth the presuppositions necessary for knowledge. He did not see these as propositional in nature, but as the ability to "see" God in the world, what I would call an inductive outlook. He insisted, however, that later rejection of God entails a voluntary choice of antitheistic assumptions to replace these inborn presuppositions, to blind oneself to the evidence of God. The non-Christian must indeed make irrational assumptions to rule out the testimony of God that the Bible says appears in nature.[78] Christian belief therefore requires a change of presuppositions again.

I agree that sin leads us to make, by an act of the will, "unquestioned axioms" which *preclude* knowledge of God or which excuse our sinful behavior. While we all start thinking inductively, reality often becomes too painful and we simply choose to disbelieve certain experiences. The pain of facing

our own sin is one of the most powerful reasons for this kind of "denial."[79] The Holy Spirit must break down our barriers and lead us to question those unquestioned assumptions in order for us to come to know God and interpret the world correctly.

***I agree that sin leads us to make, by an act of the will, "unquestioned axioms" which preclude knowledge of God or which excuse our sinful behavior.***

The question remains, however, how large a set of assumptions must change for someone to begin to have knowledge of God, and therefore, in the presuppositionalist view, to have understanding of anything. Must we begin by presupposing that the entire Bible is true? Such a notion implies that no one but Christians with a proper concept of biblical infallibility can know God. One deviation from proper doctrine and a person becomes a heretic, an unbeliever, and knows "nothing." Or must we presuppose merely the existence of God? If so, then a God with what characteristics? The God of the Bible? Or a stripped-down God with only a few philosophical attributes such as eternity? The proper definition of God is so difficult that to talk of presupposing God before knowing anything is bizarre. Christians commonly talk of their knowledge of God growing year after year for their whole lives.

I do not see the work of the Holy Spirit as the mere replacement of one set of unquestioned, irrational axioms with another set of unquestioned, equally irrational axioms. The Holy Spirit convicts us of our sinfulness and leads us to call into question all assumptions we have made, especially those assumptions we have made to excuse our sin. A proper recognition of the possible effects of sin on human reason demands that a person not insist on *absolute* certainty of any proposition, including theological ones. Yet as discussed above, this does not mean that we must abandon ourselves to the wishy-washiness of liberal religion, never certain of anything and never offending anyone. The Holy Spirit also demands that we act on the truth when we know it. We can be "very sure" of some things, and we must not retreat when we are "sure" that God has called us to action.

The Holy Spirit must therefore primarily open us to *evidence* that overturns our false presuppositions and supports Christian ones. I can testify from my own evangelistic experience that this openness is sufficient for conversion. When I see a person truly open to new ideas, questioning his or her own assumptions, weighing evidence, and asking questions, I expect that it is only a matter of time before that person will become a Christian. A Christian and a non-Christian who are both committed to such an honest approach to the evidence of experience can have dialogue and attempt to persuade each other of their viewpoints, without a call to simply "change presuppositions by faith." As Francis Schaeffer often said, "Honest questions deserve honest answers."

Many philosophers have gotten caught up in the effect of unifying theories (what some call "presuppositions") on basic knowledge. Belief in a certain theory changes the "meaning" of many experiences. For example, a person may look every night at the stars and simply think of them as "a bunch of stars." If a person believes in astrology, however, a sign in the heavens like a comet may mean something important, while if a person understands modern astrophysics, it may mean something different. But though certain beliefs may affect the meaning of certain experiences, leading one to see them as either supporting or contradictory evidence for some theory, elimination of the theory does not eliminate these experiences as knowledge! Experiences that make up part of the "background" of life, such as the stars, can remain in the memory. Therefore as certain theories become less certain, one can critically evaluate new theories based on experience, without first adopting those theories. The non-Christian can be *convinced* to become a Christian. I am one example.

***The Holy Spirit convicts us of our sinfulness and leads us to call into question all assumptions we have made, especially those assumptions we have made to excuse our sin.***

Both presuppositionalists and I would say that people come to a mature belief in God when they "assume" that God exists and start to make deductions based on this belief. It takes the Holy Spirit to cause this world view change. Basic, underlying assumptions, which they call presuppositions and I would call unifying theories, alter the way we see everything.

I differ with presuppositionalists in saying, first, that the path up to this change of world view, or new assumption, is *continuous*, not disjoint with the past. No matter how fast the process may occur, a person moves to a new world view only out of dissatisfaction with the previous world view. This dissatisfaction occurs on the basis of unsatisfactory experience, evaluated as evidence. Second, I maintain that within the world view of Christianity, tests of consistency and falsification still occur. "Certainty" of one's faith, and consequently one's ability to act consistently, increases or decreases based on these ongoing tests.

Very few people come to God initially because of a scientific or historical argument. The first "evidence" of God comes from our heart feelings in response to the world around us (for example, guilt and beauty.) I share a common perspective with most presuppositionalists in their valuing of this "internal" knowledge of God, which I call internal evidence and see as falsely placed opposing external evidence. It is a false dichotomy to sharply separate "feelings" and "senses," since feelings are sensed by the body just like sounds. The atheist inevitably must seek to explain feelings of God's presence as mere illusions. Here, the Christian apologist must respond in kind — a complex argument deserves a complex response. To refuse to meet the atheist's argument, merely "presupposing" God, weakens faith. Far too many Christians are effectively neutralized by some non-Christian intellectual argument, taking refuge in presupposing God but never again able to evangelize with the confidence they once had.

## Who Gets the Upper Hand?

It should be clear by now that an epistemology that allows science and Christianity to discuss the same things must therefore allow the possibility of conflicting claims. This is an uncomfortable proposition for many Christians. The same is true for any theoretical scientist who faces the prospect of an experiment made to test his theory. Yet a theory that is falsifiable, in other words, which makes predictions that can be tested, has the possibility for a confidence level much higher than an unverifiable theory, if its predictions hold true. Unfalsifiable theories are parlor games, and so every good scientist seeks to find ways in which his theories can be tested.

By constructing epistemologies that do not allow any experience to conflict with Christianity, some have felt that they could protect Christian belief. On the contrary, such attempts undermine Christian belief by making it irrelevant. On the other hand, some have allowed contradiction between the claims of science and Christianity, but have fallen into one of two camps that award all the victories to one side. On one side are the "liberals" who change the teachings of Christianity yearly as new scholarly theories come up in the world. On the other side are the "fundamentalists" who feel free to throw out any scientific data that contradict cherished doctrines. Both ignore the scientific method, or inductive method, which distinguishes between theory and data, or rather, between theories of greater and lesser scope and consequent uncertainty. Christian doctrines represent "theories" of interpretation of the biblical "data." Therefore in assessing a contradiction between a Christian doctrine and a scientific theory, the Christian must not only ask if the scientific theory follows from the data, but also whether the doctrine follows from a proper exegesis of Scripture. The proper exegesis of Scripture involves the sciences of linguistic study and history; even defining exactly what passages belong to the canon of the words of God is a science.

***Science for the Christian must always be interpreted* within *the framework of the unifying theory of the Christian world view.***

I have said that belief in the Bible ultimately derives from sense experience interpreted inductively, i.e., by the scientific method. Some may object that this makes science judge over Scripture. In one sense, I can say, "Of course it does." A gross and outrageous disagreement with experience weakens any religious truth claim. In another sense, I can say, "Of course it does not." It does not make the pronouncements, for example, of non-Christian scientists more authoritative than those of Christian experts in exegesis. Science for the Christian must always be interpreted *within* the framework of the unifying theory of the Christian world view. Here presuppositionalists have made their greatest contribution.

The Christian position is that "general revelation," the communication of God available to everyone in nature, and "special revelation," communication directed only to a few prophets, cannot contradict, since the same God generated each. Nevertheless, at any point in time, each Christian, and for that matter every person, carries some degree of internal "tension" due to contradictions between the theories he or she holds. While the mystic embraces contra-

dictions, the Christian must have a constant goal of eliminating contradictions in the pursuit of Truth. This can occur either by the gaining of new information or through reformulation of exegetical or scientific theories. This basic faith in the truth of Christianity does not imply irrationality, however. Like the scientist who continues to believe in the conservation of energy despite data apparently contradicting it, the Christian can have a deep, underlying knowledge of the basic consistency of Christianity, which prevents "blowing with every wave" of apparently contradictory data. I would love to say that I do not see any contradictions between Christianity and science, or internal to either system. On the contrary, I see many apparent contradictions between the two and within each, but I do not see any of these as so damning, in the light of the overwhelming supporting evidence, that either system must come crashing down. I daily seek to increase my understanding and revise improper presuppositions.

No one gets the "final word," then. Certain scientific theories are "very certain," and so are certain doctrines of Christian theology. Other aspects of science and theology seem to demand revision. Neither is free to operate independently of the other.

## Conclusion

I have not presented here an apologetic for Christianity. Instead, I have attempted to establish apologetics based on evidence as valid from an epistemological standpoint. My argument has been as follows:

> (1) The absolute certainty of deduction from axioms is illusory. Apparently self-evident, noncontradictable propositions always end up open to doubt after all, or else as meaningless tautologies, because they all must be formed from words of a language, and all language comes from a vague organization of prior sense experiences. Systems like existentialism, which create absolute axioms, provide no certainty for the validity of their original axiom of choice.
>
> (2) Certainty is possible via induction, although "perfect" certainty is not. This sense of increasing certainty with increasing evidence comes from the way we are "programmed" at birth, from the form of language itself. It is possible to doubt the validity of this preprogramming, (evidentialists do not need to invoke an *absolute* first axiom) but only at the expense of doubting the existence of language itself.
>
> (3) God speaks to us in this fashion, via propositions in human language with inexact meaning and imperfect justification, but with adequate certainty to demand action. This message comes through the special miracles of revelation that have occurred in the real world of our experience. Although we have an "internal witness" to God's existence and commands in our heart feelings, these alone, without the propositional revelation of the Bible, do not suffice for us to build an ethic or a relationship with God, because of the mind-dulling effects of sin.
>
> (4) These propositions and commands form the basis of our most fundamental assumptions about all of life, including our ethics, which in turn provide the basis for science. Our certainty in them, i.e., our ability to act on them, comes as we see the validity of their origin and implications in terms of the normal tests we make of truth claims.

Too often I have heard evidential approaches to apologetics characterized as compromises successful for the masses but philosophically invalid. Some apologists have not adequately addressed the issue of epistemology, but this does not invalidate their approach. Quite the opposite, I affirm the evidential apologetic as the *only* valid apologetic. To call a person to "choose" faith without adequate reason is to invite commitment to folly because of the charisma of the evangelist; to wait for God to "zap" someone into the proper presuppositions, for example, when the magic incantation of Scripture is read, is to deny the work of the Holy Spirit in convincing people through their reason and ultimately to deny a part of our humanity, our rational part.

***I affirm the evidential apologetic as the* only *valid apologetic.***

I hope that no one will interpret "evidence" too narrowly. A proper evidential apologetic must include the questioning of presuppositions and biases, but in doing so remains *evidential* since the basis of calling these into question is experience. Too, we must not eliminate personal experience and feelings as *evidences*. As professional counselors often say, "Feelings are facts." A proper evidential apologetic should include evidence of the experience of people — do people feel a need for God? A fear of God? Do the lives of believers change? Do some people seem to experience God in a direct way? Evidential apologetics need not deal only with archaeological digs and astronomy.

A full apologetic would involve a discussion of an entire process of weighing evidence by which a

person comes to a Christian world view. I see this process as involving the following steps:

(1) We start by inductively learning who in our lives may be trusted as reliable authorities. These may be parents, if they are trustworthy, or other persons, whom we learn to trust from a pattern of consistency of action and words.

(2) These trustworthy authorities then present us with information about events in history regarding the acts and words of God, whom they claim exists. Faced with these claims which come from otherwise reliable sources, we decide inductively from our experience whether they "make sense" — in other words, if the world around us appears to have design, if our own heart feels a need for and a conviction of the presence of God, and the actions of people around us agree with the description of mankind in the Bible. A more skeptical person may also want to see corroborating historical and scientific evidence.

(3) If we find that these evidences agree with the message, we can then decide to adopt the "theory" of the Bible, organized by the most consistent theology we know, and act on it, interpreting the world around us based on this premise. Within this new theoretical framework, we continue to test our theory by predictions and tests of internal consistency, which cause us to have more or less faith as time goes on. We also continue to form subtheories by hypothesis and induction that deal with all the things of life such as ethical issues, based on the commands of God, and scientific data, based on the design and purpose of God in creation.

***Christian theology, as an imperfect theory of humans, must change in the light of scientific data that affects the interpretation of Scripture.***

I cannot escape the feeling that the predominance of presuppositionalist and quasi-existentialist apologetics betrays a feeling that the evidence is insufficient to bring a truly open-minded person to believe in Christ; that there is *not* a compelling case for the existence of God. Suppose a man is thinking about jumping in front of an oncoming truck. If we wanted to convince him not to jump, we would appeal to the great body of evidence that showed that people who jump in front of trucks die. He might not listen to us if he did not want to, but that would not change our approach. On the other hand, if we *wanted* him to jump in front of the truck, we might appeal to Cartesian philosophy. One hundred deaths do not *prove* that you will die if you jump in front of the truck! The mode of our apologetic will depend on which side we think the evidence really lies. I personally find the case for Christianity compelling, the evidences satisfactory, without a need for irrationality.

***I also feel that the wisdom of the whole Church in framing its beliefs must grow over time in the same way that the wisdom of an individual ought to grow as he or she matures.***

Francis Schaeffer based his fruitful evangelistic approach on the premise that "The Christian must have the integrity to live *open* to the questions 'Does God exist?' and 'Is the content of the Judaistic-Christian system truth?'"[40](emphasis mine) or, even more to the point, "The Christian himself should always be willing sincerely to re-examine these questions as to the possibility of his being 'taken in' by his Christian commitment."[80] Does this imply uncertainty and lack of confidence? On the contrary, as with the senior scientist who examines carefully a purported perpetual motion machine, the willingness to consider the evidence for the other side stems from a confidence in one's own position. The people who refuse to consider arguments against their cherished views are usually those who fear that their position is weak.

The implications of my epistemology extend further than apologetics, however. The flow may go the other way. Christian theology, as an imperfect theory of humans, must change in the light of scientific data that affects the interpretation of Scripture. This does not require liberalism, which puts modern science in the position of absolute supremacy over the Bible, but does require humility and the ability to admit errors and ignorance. I marvel at the audacity involved in altering significant doctrines held by the great body of the Church throughout history and by great minds such as Augustine, Calvin, and Edwards. Thus I view dimly any approach to Christianity which begins by casting aside the orthodox understanding of Scripture. However, I also feel that the wisdom of the whole Church in framing its beliefs must grow over time in the same way that the wisdom of an individual ought to grow as he or she matures. Therefore, we must not auto-

matically resist change and reformulation of theology in the light of scientific and historical research.

Although it may sound strange, eliminating the need for absolute "mathematical" certainty as the starting point for thought leads to real certainty based on strong evidence, in the Christian context. Setting up certain propositions as unquestionable ultimately gives a person no defense against arbitrariness and irrationality. ❋

## Acknowledgements

I thank Dr. R. Jones of CERN, Geneva, Prof. R. Hammer of Louisiana State University, and Prof. F. Skiff of the University of Maryland for challenging and uplifting, though not always polite, discussions on these subjects.

## Notes

[1]E.g. *New Scientist*, 8 August, 1992.

[2]E.g. G. Zukav, *The Dancing Wu Li Masters*, (Morrow, New York, 1979).

[3]E.g. I. Stonehocker, *Creation-Science Dialogue* 8, 5-6 (May 1981).

[4]D. Snoke, "Toward the Unity of Theology and Science," *Perspectives on Science and Christian Faith* 43, No. 3, (American Scientific Affiliation, Ipswich, MA, September 1991).

[5]C. S. Lewis, *Mere Christianity*, (Macmillan, New York, 1943).

[6]J. McDowell, *Evidence that Demands Verdict*, (Here's Life, San Bernardino, 1972).

[7]H. Ross, *The Fingerprint of God*, 2nd ed., (Promise, Orange, California, 1991). A newsletter is available from Reasons to Believe, P.O. Box 5978, Pasadena, CA 91117.

[8]E.g. *The Philosophical Works of Francis Bacon*, ed. J. M. Robertson (Routledge, London, 1902).

[9]E.g. Richtmeyer, Kennard and Cooper, *Introduction to Modern Physics*, (McGraw-Hill, New York, 1969).

[10]For a readable example of modern scholarship on early childhood, see F. Caplan, *The First Twelve Months of Life*, (Bantam, New York, 1978), from the Piaget-influenced Princeton Center for Infancy and Early Childhood. As a father of four, I also claim my own observations in justification of the claim that children learn everything, including language and "common sense," inductively.

[11]See e.g. *Chomsky: Selected Readings*, J. P. B. Allen and P. van Buren, eds. (Oxford University Press, London, 1971); Noam Chomsky, *Language and Politics*, C. P. Otero, ed. (Black Rose Books, Cheektowaga, NY, 1988).

[12]S. Greenleaf, *The Testimony of the Evangelists*, (Storey and Sage, Newark, 1903), reprinted in J. W. Montgomery, *The Law Above the Law*, (Bethany, Minneapolis, 1975).

[13]J. Sire, *Scripture Twisting*, (InterVarsity Press, Downers Grove, 1980).

[14]K. Popper, *Logik der Forschung*, 7th ed., (Mohr, Tübingen, 1982).

[15]D. Hume, *An Enquiry Concerning Human Understanding*, (London, 1748); *Dialogues Concerning Natural Religion*, ed. N. Kemp Smith (Bobbs Merrill, Indiana, 1977).

[16]See e.g. R. Descartes, *Principles of Philosophy*, ed. and trans. E. S. Haldane and G. R. T. Ross (Cambridge University Press, Cambridge, 1911-12).

[17]Hegel, *WW XV*, 328, as quoted in *Hegel's Concept of Experience*, M. Heidegger, (Harper and Row, San Francisco, 1970).

[18]I. Kant, *Kritik der reinen Vernunft*, (Riga, 2nd ed, 1787), *Critique of Pure Reason*, (Macmillan, London, 1968).

[19]R. C. Sproul, J. Gerstner, and A. Lindsley, *Classical Apologetics*, (Academic Press, Grand Rapids, 1984).

[20]E.g. *Summa theologica*; see also F. C. Coppleston, *Aquinas*, (Penguin, London, 1955).

[21]R. Reymond, in *The Justification of Knowledge*, (Presbyterian and Reformed, Philadelphia, 1976), calls Aquinas an "evidentialist" because he reasoned on the basis of imperfect sense evidence; yet Aquinas saw himself as deducing self-evident conclusions with absolute certainty.

[22]I. Kant, *Grundlegung zur Metaphysik der Sitten*, 1785; *Foundations of the Metaphysics of Morals*, L. W. Beck, trans. (Macmillan, New York, 1990).

[23]Ayn Rand, *The Virtue of Selfishness* (Signet, New York, 1970).

[24]Starting with Laplace, another deductivist school of thought avoided this problem essentially by eschewing any concept of morality, *i.e.* definitions of "ought" rather than "is." Only deductions based on the "laws" of nature and mathematics could be held as certain. This school started to fall apart at the beginning of this century when many scientific "laws" turned out to be mere approximations. Gödel put the final nail in the coffin when he showed that *no* logical system of pure assumption and deduction can prove or disprove all statements which can be posed within that system. Certain proofs require an axiom of choice — elements of sets chosen for no self-evident reason. *Any logic which restricts itself to self-evident statements cannot give a complete description of the system in which it is expressed.* (See e.g. Gödel, *Monatshefte f. Math. u. Physik* 38, 173 (1931) in *From Frege to Gödel*, J. van Heihenoort, ed. (Harvard Press, Cambridge, 1967); for a very readable account see D. R. Hofstadter, *Gödel, Escher, Bach: The Eternal Golden Braid*, (Basic Books, New York, 1979).) Atheists like Bertrand Russell, who in the early part of this century contrasted the certainty of mathematical reasoning with the apparent arbitrariness of moral and religious reasoning, found their own system falling to that same enemy, arbitrariness.

[25]E.g. M. Heidegger, *Basic Writings*, and *Nietzsche: Volumes I-IV*, (Harper and Row, San Francisco). For an interesting review of Nietzsche and Heidegger's influence, see Ref.

[26]S. Kierkegaard, *Either/Or* trans. Walter Lowrie, (Anchor Books, Garden City, 1959); see also S. U. Zuidema, *Kierkegaard* (Presbyterian and Reformed Pub., Philadelphia, 1960).

[27]T. S. Kuhn, *The Structure of Scientific Revolutions*, (University of Chicago Press, Chicago, 1962).

[28]E.g. M. Polanyi, *Science*, 113, 1308 (1968); *The Tacit Dimension*, (Doubleday, New York, 1966).

[29]C. van Til, *The Defense of the Faith*, (Presbyterian and Reformed, Philadelphia, 1955).

[30]For a review see R. Nash, *The Philosophy of Gordon Clark*, (Presbyterian and Reformed, Philadelphia, 1968).

[31]In fact, Kierkegaard might well be called a presuppositionalist. In *The Sickness unto Death*, trans. H. V. and E. H. Hong (Princeton Press, Princeton, 1980), Kierkegaard writes an eloquent call for a return to Christian orthodoxy. A presuppositionalist would find little to disagree with in this book. Kierkegaard states that to reject Christ is a sin worthy of eternal condemnation, yet he rejects giving *reasons* for faith as unworthy of a Christian, like a lover giving reasons for his love. (Of course, it is one thing to give reasons for love, and another thing to give reasons for the existence of the loved — if a stranger claimed that the fiancee did not exist, being merely a deception of a con artist, the lover might indeed engage in collecting evidence and making deductions!)

[32]Some make a distinction between "irrational" and "non-rational" thought, the former consisting of belief despite evidence acknowledged to be contradictory, the latter consisting of belief which takes no consideration of evidence at all. I see the distinction as moot — a person who steps into traffic *knowing* he is stepping in front of an oncoming truck, and a person who steps into traffic *without looking at all* may both be called "irrational." Therefore the term "irrational" in this essay refers to both kind of belief.

[33]Although not often called presuppositionalist or for that matter an existentialist, the free-will theology expounded by Ryrie (*e.g. So Great Salvation*, Victor Books, 1990) essentially expounds the view of faith as a choice of axioms about God, totally apart from the world of experience and not necessarily requiring implications for the world of experience, i.e. repentance. Once made, the choice is unquestioned and final, equal to the axiom of the mathematician or the presupposition of van Til; thus a person is "once saved, always saved."

[34]A. Bloom, *The Closing of the American Mind*, (Simon and Schuster, New York, 1987).

[35]D. D'Souza, *Illiberal Education: The Politics of Race and Sex on Campus*, (The Free Press, New York, 1991).

36L. Wittgenstein, *Philosophical Investigations*, (Blackwell, Oxford, 1953); *On Certainty*, (Blackwell, Oxford, 1969).

[37]H. Reichenbach, *The Theory of Probability; An Inquiry into the Logical and Mathematical Foundations of the Calculus of Probability*, (University of California Press, Berkeley, 1949).

[38]Evidentialism also sometimes goes by the name of rationalism, (or pejoratively as "neo-rationalism,") but although rationalism rules out existentialism, the term "rationalism" is very broad, applied to those who would deduce knowledge from "self-evident" propositions, like Descartes and Aquinas, as well as to those who argue inductively. For Christians, the word "rationalism" often carries the connotation of reason operating independently, without the effects of sin or a need for the Holy Spirit; therefore "evidentialism" conveys better the idea of persuasion and the use of evidence in the context of the work of the Holy Spirit.

[39]J. W. Montgomery, *The Shape of the Past*, (Edwards Brothers, Ann Arbor, 1962); *History and Christianity*, (InterVarsity Press, Downers Grove, 1972); *The Law Above the Law* (InterVarsity Press, Downers Grove, 1975).

[40]F. Schaeffer, *The God Who is There*, (InterVarsity Press, Downers Grove, 1968). There exists some confusion about Schaeffer's position because of his use of the term "presuppositional apologetics." For Schaeffer, this means the calling into question of presuppositions on the basis of logic and experience, not the irrational creation of presuppositions. In this book Schaeffer states that "No one can live logically according to ... non-Christian presuppositions." The presuppositionalist, however, maintains that the non-Christian can and does live completely consistently within his or her logical framework. Schaeffer also says in this book, as I do, that "Scientific proof, philosophical proof, and religious proof follow the same rules." The Van Tillian author R. Reymond, in *The Justification of Knowledge*, (Presbyterian and Reformed, Philadelphia, 1976), properly defines Schaeffer as an evidentialist. Presuppositional apologetics calls into question presuppositions on the basis of evidence and experience (can we live with it?); Presuppositional*ism* allows no such questioning. For the presuppositionalist this would allow human reason to become a judge over God.

[41]To use another example, Popper's well-known dismissal of proof by induction (ibid.), that seeing a great number of white swans does not prove that no black swans exist, makes inductive proof seem silly precisely because we all *have* seen black swans, or at least black birds. Yet the fact that we are surprised the first time we see a black swan shows that we had indeed been *certain* until then that all swans are white. In an example completely analogous to Popper's, never seeing baby elephants materialize in the atmosphere does not *prove* that none will ever fall from heaven. Yet if Popper were to express any uncertainty at all about whether this might start to occur tomorrow, we would call for the mental hospital. The evidence against spontaneous materialization of baby elephants is far greater than the evidence against black birds.

[42]Acts 17:2,17

[43]Acts 17:11

[44]Acts 18:4, 2 Cor 5:11

[45]Acts 19:26, 28:24, 1 Cor 14:24, 2 Tim 3:14

[46]Acts 1:3

[47]Acts 1:8, 1 Peter 1:16-18

[48]John 5:31, 36, 39, 21:24, Hebrews 2:4, 1 John 1:2

[49]John 3:2, 20:30

[50]E.g. Deut 6:22, Psalms 78:43, 108:27

[51]Matthew 8:10, 15:28

[52]Matthew 6:30, 8:26, 14:31

[53]Luke 17:5

[54]2 Thes 1:3

[55]2 Peter 1:19

[56]Matthew 14:31, Luke 24:38, John 20:27, Jude :22

[57]A recent book edited by R. C. Sproul, *Doubt and Assurance* (Baker, Grand Rapids, 1993) deals sensitively with the issue of Christian doubts, summarized well by Os Guinness' statement, "There is no believing without doubting."

[58]1 John 1:7-8

[59]Rev 17:5

[60]Ephesians 2:8

[61]John M. Frame, another presuppositionalist, in *The Doctrine of the Knowledge of God*, (Presbyterian and Reformed, Philadelphia,1987) follows Plato (*Theaetetus*) in defining an experience as "knowledge" only when it can be placed in a "normative" framework which makes a judgment about its "meaning." If one accepts this definition then Presuppositionalism follows almost automatically. But this narrows the definition of "knowledge" in the extreme, since it rules out all things which we know but make no judgment about, or which we make a wrong judgment about. It is also subject to a criticism of circularity — does one "know" the normative framework first? If so, what normative framework did one know which gave a judgment about the meaning of the other normative framework? How does one know that prior framework? And so on. Frame acknowledges this circularity and promotes it as a necessity.

[62]St. Augustine of Hippo, in *On the Predestination of the Saints*, in *Nicene and Post-Nicene Fathers*, (Eerdmans, Grand Rapids, 1974).

[63]Proverbs 1:7

[64]J. Edwards, in *The Works of President Edwards*, (Leavitt and Allen, New York, 1857).

[65]A separate question is the problem of "objective" knowledge, whether my perceptions tell me the same thing that they tell you. Do other people really exist who perceive the same things that I do, or are they possibly just figments of my imagination (or "Someone's" imagination)? Since I am attempting to construct an epistemology and not a metaphysic, I do not need to answer this question. Clearly people do exist in my experience, whatever they "really" may be, and whether or not I have full knowledge of what they are (which I almost certainly do not). My knowledge and my language does not require you to be real. Since language consists of a mapping of one set of my experiences (e.g. the sound of the word "ball") onto another set of experiences (finger pointing at a ball), I can define as truth any consistent use of that map by whomever or whatever I communicate with. Mortimer Adler, in his book *Ten Philosophical Mistakes*, (Macmillan, New York, 1985) addresses the issue of "objective" knowledge, or dialogue between people of different world views. Of course, although I cannot prove with absolute certainty that other people exist, and I do not need to assume they are similar to me in order to have a theory of knowledge, nevertheless the assumption of their existence is the simplest unifying theory for explaining a vast amount of experience.

[66]B. Gregory, *Inventing Reality: Physics as Language*, (John Wiley and Sons, New York, 1988).

[67]Actually, Hume called himself a Christian— in the sense that Madonna calls herself a Catholic, one might say. After ridiculing the Torah on the basis of anti-semitism as a book "presented to us by an ignorant and barbarous people, written in an age when they were still more barbarous," (ibid.) he states it would take a miracle for anyone to believe it, and

then proposes exactly that kind of belief-against-all-reason as the basis for Christianity — the same kind of pure fideism not infrequently encountered in churches today.

[68]H. Van Till, D. Young, and C. Menninga, *Science Held Hostage*, (InterVarsity Press, Downers Grove, 1989).

[69]I must include some heretical descendents of Judaism and Christianity, such as certain schools of Islam, as world views that also espouse an evidential approach to morality on the basis that "God has spoken." In these cases I must simply say that a direct evaluation of the evidence for these claims to experience with God in history, using good lawcourt reasoning, reveals severe deficiencies. In general, however, heretical groups thrive on the existentialist mentality that their "unprovable axioms" as just as good, but different, from those of Christianity.

[70]F. Schaeffer, *Escape from Reason*, (InterVarsity Press, Downers Grove, 1968).

[71]E.g. F. Schaeffer, *Genesis in Space and Time*, (InterVarsity Press, Downers Grove, 1972), *Joshua and the Flow of Biblical History*, (InterVarsity Press, Downers Grove, 1975).

[72]E.g. *Scientific Creationism*, H. Morris, ed. (Master Books, El Cajun, CA, 1974); H. Morris *The God Who is Real: A Creationist Approach to Evangelism and Missions*, (Baker, Grand Rapids, 1988).

[73]Mysticism, as usually practiced, is actually an extreme form of veneration of authority. The words of authorities are taken as the source of knowledge to such a degree that even logical contradictions can not devalue their validity. On the contrary, even the slightest little detail of the words of the authorities becomes venerated, such as the exact spelling of words. Almost all forms of mysticism have their "holy man" whose words, though contradictory, must be accepted because of his authority. Mysticism is therefore essentially an alternate branch from the "child's epistemology" when the child finds that the authorities contradict, and often appears in cultures with strong scholastic traditions, such as the Roman Catholic church, the Muslims, and the Chinese. Rather than judging the credibility of various authorities, as I propose, or rejecting all authority, as often occurs, the child may simply decide to cease to think logically and accept authority blindly.

[74]R. C. Sproul, *Reason to Believe (Objections Answered)*, (Zondervan, Grand Rapids, 1978).

[75]S. C. Hackett, *The Reconstruction of the Christian Revelation Claim*, (Baker, Grand Rapids, 1984).

[76]P. Yancey, *Disappointment with God* (Zondervan, Grand Rapids, 1988).

[77]Walker Percy, *The Message in the Bottle*, (FS&G, 1975).

[78]Romans 1:18-20

[79]R. C. Sproul, *The Psychology of Atheism (If There is a God, Why are there Atheists?)*, (Tyndale, Wheaton, 1988).

[80]As quoted by R. Reymond, ibid.

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# The Future of Medical Science: Ethical and Theological Implications Part II

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## Future Issues in Psychiatry and Neuroscience

How one views homosexuality scientifically affects the way one regards the morality of this condition. If homosexuality is due to a genetic defect or a deficiency of certain brain cells in a particular area of the hypothalamus, then discriminating against homosexuals could be likened to discrimination by race or gender.

One of the primary goals of militant groups, such as the AIDS Coalition To Unleash Power (ACT UP), is to eradicate the social ills of racism, sexism, and homophobia (Wachter 1992). These groups will use science to support their argument. The genetic work of Bailey and Pillard (Bailey 1991) and the neuropathologic work of Simon LeVay (LeVay 1991) have given empiric evidence to the concept that homosexuality is decided by nature and not by nurture.

The study of Bailey and Pillard studied monozygotic twins, dizygotic twins, and adoptive brothers. This study confirmed earlier studies that showed a concordance in sexual orientation for monozygotic or identical twins compared to dizygotic or fraternal twins. An identical twin to a homosexual had a 50% chance of being homosexual. A fraternal twin was no more likely to be homosexual than an adopted brother to a homosexual. These twin studies imply a genetic component to homosexuality but do not take it to necessity. An absolute genetic trait such as eye color would show 100% concordance.

The search for a difference in the homosexual's brain structure has centered in the hypothalamus because of nonhuman primate studies suggesting that the regulation of male sexual behavior be found in the hippocampus. The study of LeVay measured the volumes of the interstitial nuclei of the anterior hypothalamus (INAH) in women, homosexual males, and heterosexual males. Differences were found in INAH 3. The homosexual males had a reduction in cells in this nucleus similar to normal females. The conclusion from this study might be that homosexuals are homosexuals because of structural differences in their brain. Thus, unlike Romans 1 implies, they do have an excuse.

This study has several deficiencies: First, the homosexual population died primarily of AIDS. Equally important is the fact that there is a great deal of overlap; some heterosexuals had a small INAH 3, the same size as homosexual males. If these structural defects are real, one might expect hormonal differences between heterosexual males and homosexual males but in fact these have been looked for extensively and there are none (Hendricks 1989). Furthermore, if homosexual behavior was determined by structural changes in the brain then one would expect homosexual behavior to be present in all cultures. In fact, homosexual behavior is absent in many cultures. Moreover, homosexuals have been shown to completely change their sexual orientation. Eleven homosexuals studied by Pattison showed an

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abrupt and radical shift in their sexual orientation following their conversion to Christianity. At an average of four years following conversion, all eleven were functioning as heterosexuals. Three patients still had some evidence of neurotic conflict, but eight were emotionally detached from homosexual identity in both behavior and intrapsychic process (Pattison 1980). This study suggests that homosexual orientation could be a spiritual disease and not due to structural changes in the hypothalamus.

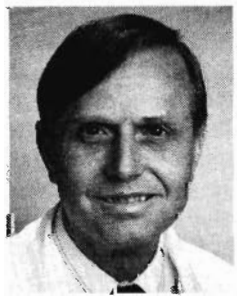
Homosexuality has been associated with greater depression and general unhappiness. Militant homosexual groups might argue that this difference is due to societal ostracism. Equally possible is the hypothesis that homosexuality is an abnormal lifestyle and, because of this, homosexuals are unhappy and depressed. Freudian psychiatrists argue that homosexuality is due to an abnormal family dynamic with a mother's contempt for an overly passive or an overly aggressive father and the son's refusal to accept the male role. The Freudian psychiatrist forms an uneasy alliance with the evangelical Christian in calling homosexuality a problem.

Despite how this recent data is interpreted, Bailey clearly believes homosexuality is decided by prenatal brain development. This hypothesis challenges the Christian concept of homosexuality as sin. No absolute genetic or structural connection has yet been identified. Even identifying a predisposing hypothalamic lesion or proving a 50% concordance among monozygotic twins does not excuse sin any more than the demonstration of a genetic predisposition toward alcoholism excuses the individual alcoholic. This argues only for original sin; man has a genetic predisposition to sin. If science can discover to which sin a person is predisposed, it might be helpful to that person. For example, a child of two alcoholics would be advised to avoid mood altering drugs and a brother of a homosexual should avoid behavior predisposing to homosexuality. Males with an extra Y chromosome (XYY) are twice as likely to go to prison; thus, they should be schooled in gentleness and respect for authority.

A genetic predisposition does not excuse sin because we all have our own peculiar weaknesses. We all sin; our expressions are only different. Scriptural teaching on homosexual practice is clear (see Lev. 20:13 and Romans 1:26,27). If the practice of homosexuality is sin, then the solution must come from the transforming power of the Holy Spirit acting through the Christian life. This is precisely what Pattison described. After conversion to Christ, homosexuals in his study became involved in support groups and small group Bible studies. Accepting homosexuality as sin and trusting Christ to transform their sinful nature was the first step toward changing to normal heterosexual relations. Charles Colson in his book, *The Body*, describes several groups working in the church that are helping homosexuals convert to heterosexuals (Colson 1992). This is the Christian solution to the problem of sin in general and to this sin in particular.

Understanding certain chemical imbalances in the brain and showing them through positron emission tomography or other brain mapping techniques will accentuate the conflict between structural or functional changes in the brain and human responsibility. If abnormal neurohumoral transmission can be identified in a depressed patient, does this explain his depression? Is this person no longer responsible for certain behaviors associated with his depression? The answer from theology is that man is both sinful and accountable. The ability to discover defects that predispose one to sin or occur because of sin does not excuse man.

The 1990's have been designated as the decade of the brain because of the anticipated great number of discoveries that will result from new modalities of investigation; we will learn that neurological defects and neurotransmitters are associated with certain behaviors. But structural and functional defects



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do not excuse man; they merely delineate and describe individual manifestations of the sin nature.

## Health Care Costs

Medical and governmental groups have conducted studies on health care costs. Whether such studies can be considered science or not is open to debate. Nonetheless, there are many ethical issues involved in the current health care financial crisis. As a background, it is important to understand the source of increasing health care costs. It is not all due to high technology. Within this background, two ethical issues should be exposed: first, the injustices in the current health care system and second, ethical problems with proposed solutions to the health care crisis that involve false alternatives.

The cost of the current health care system and its rate of growth are a great concern for government and industry in the United States. The United States may spend 14% of its gross national product on health care this year. This exceeds by several percentage points the amount spent in other industrialized nations for health care. In the global economy, it means that our products for export will be more expensive because of health care costs. An analysis of the way the money is spent is particularly troublesome. While 19% of total U.S. health dollars are spent on physician fees, 20-24% of health care dollars are spent on administration (Weissman 1992).

Since 1970, the number of health managers and administrators in the United States has grown at four times the physician rate. The U.S. spends $497 for health care management compared to $156 per capita in Canada (Weissman 1992). The United States with 5% of the world's population has 70% of the world's attorneys. Their litigation and threat of litigation have added billions to the cost of health care, new device development, and new drug development. Dow Chemical spends 40 cents on every dollar received from silicone breast implants on legal and regulatory fees (Fisher 1992). Ethically this creates problems for physicians who wish to lower health care costs. In Louisiana, an obstetrician will spend nearly $30,000 per year on medical malpractice, a neurosurgeon over $46,000 (see Table 1). Louisiana has a cap on malpractice suits so that these figures are relatively low. In some areas of the U.S., such as southern Florida, similar malpractice coverage is over $100,000 per year.

If medicine becomes more expensive, it will put Americans out of work. If one attempts to lower costs without compromising care, serious efforts to reduce administrative and legal costs must be pursued.

There are many injustices in the current medical system. So-called cost shifting has made the amount of money received by a hospital for a given procedure vary 2-3 fold. For example, the standard cash price for an angioplasty might be $22,000. Medicare might pay $8,800, Medicaid might pay $3,000, and an insurer with a special contract might pay $9,500. In order for hospitals to break even, they raise the cash price to such a ridiculous amount that the poor, uninsured, or underinsured are strapped with a lifelong debt to the hospital.

The current system of reimbursement favors procedures over cognitive skills. This system has resulted in a predominance of specialists over primary care doctors. The number of specialists in Canada and most European countries is limited. In Canada one-half of the physicians are primary care physicians, while only one-third of U.S. physicians are primary care physicians (Whitcomb 1992). More specialists result in more procedures per capita whether the procedure is a hysterectomy or a coronary bypass. Physicians choose the specialty based partly on projected future earnings and their own indebtedness following medical school. While many specialists improve access to specialty care, there is a greater potential for abuse since more marginally-indicated procedures may be performed.

Our current system of competitive medical units does not often consider the needs of the community or country when making decisions. Training programs for specialists are often large despite the lack of need for these specialists because the institution wants to use resident physicians to help with patient care. Although a town might have little need for another Magnetic Resonance Imaging (MRI) scanner, an individual hospital might acquire such a scanner for its own financial benefit. This policy has lead to a proliferation of technology. Americans enjoy the convenience of good access but at the cost of efficiency. At present no one has the economic mo-

**Malpractice Insurance 1992 - Louisiana**

| Specialty | $1,000,000 limit |
|---|---|
| Orthopedic Surgery | $26,555.00 |
| Obstetrics/Gynecology | $29,303.00 |
| Neurosurgery | $46,727.00 |

Table 1

tivation or the legal power to assist the community or the country as a whole to limit the application of new technology. This adds to overall medical costs.

Finally, proposed solutions to the health care crisis create further ethical dilemmas. The Oregon paradigm of prioritizing health care by disorders and not funding Medicaid payment for low priority items has been widely watched as a potential solution to rising health care costs. The proposal has some merit in that it eliminates public funds for truly dubious procedures such as sex-change operations and aggressive treatment of end stage AIDS. It also tries to look hard at cost effectiveness. By initially denying experimental solid organ transplant payment, it has caused us to realize that the dramatic new therapy is not always cost effective. The cost per year of life saved is over $40,000 per year for a liver transplant and $28,000 for a cardiac transplant. Since the cost was great and the numbers benefited small, Oregon initially chose not to fund such treatment. By not funding some solid organ transplants and not funding the treatment of intervertebral disc disease, chronic pancreatitis, and other disorders for which there exists effective therapy, Oregon is saying that there is not enough money to treat everyone, especially when the cost benefit ratio is relatively low.

***Reducing legal fees, administrative costs, and redundant medical services should be done prior to eliminating public funds for the potentially beneficial therapies.***

Before one can ethically deny beneficial health care to an individual based on cost alone, one must be very sure that the health care house is in order. As outlined above, there is a great need for improvement. Reducing legal fees, administrative costs, and redundant medical services should be done prior to eliminating public funds for the potentially beneficial therapies. We, as a society, must choose between a $2 million legal award to the family of a deceased victim of dubious malpractice or the funding of back surgery for 40 living patients with herniated discs. Which shall we choose? Shall we have medical redundancy with complete service hospitals convenient to every corner of the community or shall we centralize high tech services to allow full utilization so that we can continue to offer truly beneficial procedures to the indigent?

***A major reason for the increase in administrative costs is a lack of trust.***

It is well beyond the scope of this paper to propose a comprehensive solution to the health care crisis but there are some ethical issues at the crux of the solution. A major reason for the increase in administrative costs is a lack of trust. Physicians do not trust insurance carriers and insurance carriers do not trust physicians. According to the *Wall Street Journal*, this lack of trust has created a $7 billion medical review industry. Insurance companies employ armies of nurse reviewers for concomitant review of patient care. This nurse will call the physician's office every 1-2 days checking on the patient's progress, encouraging early discharge. The Professional Review Organization (PRO) is charged with the review of Medicare patients. This group employs nurses and physicians to review the charts of Medicare patients after their discharge to assure the federal government that quality of care standards are being met. If the medical record is inadequate to justify the diagnosis or the treatment employed, the Medicare payment for service will be denied. Physicians who achieve negative points from PRO reviewers will be subjected to comprehensive reviews. If enough negative points are accumulated, they will lose payment under the Medicare system.

In 1990, the inspector general looked at the effectiveness of the review organization with respect to cataract surgery; the conclusion was that the U.S. paid $13.3 million to utilization reviewers to save $1.3 million in possibly unnecessary cataract surgery (Burton 1992). Hospitals, to defend themselves from a loss of payment from PRO reviewers, employ their own nurse reviewers to assure that the patient's chart is in proper order before patient discharge. Other nurse reviewers monitor Medicare and HMO patients' length of stay to maximize reimbursement and avoid loss of payment. The University of Chicago had 15 employees and paid a total of $1.2 million per year to answer utilization review (Burton 1992). Hospitals employ consultants to educate physicians on proper charting to avoid loss of Medicare payment and to list any possible diagnosis to maximize Medicare payment. Paying people to copy thick charts for review adds further to the administrative cost of health care.

If there is a lack of trust among physicians, hospitals, and insurance carriers, there is a good reason

for this. It is estimated by *U.S. News and World Report* that fraud could account for nearly 10% of the $817 billion spent on health care this year (Witkin 1992). Physicians have begun advertising, often unprofessionally. Many physicians have become quite wealthy. Physicians have been poor at policing their own ranks. Hospitals have changed greatly from the early church affiliated hospital that saw its work as a mission to today's for-profit hospital that seeks to maximize return and views other hospitals as competition. This mentality has become the guiding force in not-for-profit hospitals also. Chief executive officers of the for-profit hospital chain may make over one million dollars per year in salary and stock options. These large salaries make physicians skeptical that the hospital administration acts in the best interest of the community or in the best interest of the patients. Thus, any solution to the health care financial crisis must address the lack of trust among insurers, physicians, and hospitals. This lack of trust in part reflects a system that had not been responsive to direct market forces. Lack of integrity and greed on an individual and corporate level has created much of the rise in medical health cost. The legal industry in this country has been very successful at capitalizing on this lack of trust.

For the past 10 years, I have been involved with a reuse program for coronary angioplasty catheters. This concept has been borrowed from the developing world where reuse is essential. Minntech, a Minnesota company, has developed a system that systematically cleans and sterilizes coronary angioplasty catheters. These plastic catheters, specifically labeled "for single use only" by the manufacturer, cost over $600 each. By selective reuse, hospitals could greatly reduce their budget for disposables that now consumes 10-15% of their budget. Reuse would also reduce the amount of biohazardous garbage produced by the country. The barrier to reuse is not scientific; the emotional fear of AIDS transmission is unfounded as the AIDS virus is easily killed. The barrier is in part the manufacturer's resistance, in part the Food and Drug Administration's regulation, and in part the fear of legal suits. Even groundless legal suits take years to defend and cost millions in legal fees.

Any solution to the health care crisis that limits care but does nothing to reform the current system is ethically unsound. It creates a false alternative: the only method to reduce care cost is to ration care. It is better to ration greed and litigation and to increase individual and corporate integrity.

## Preventive Medicine

Acquired Immune Deficiency Syndrome (AIDS) will move increasingly to center stage as the prevalence of the disease increases and the disease spreads to the heterosexual population. In 1992, there were more productive years lost due to AIDS than to heart disease although heart disease killed over 12 times as many (see Table 2). Because AIDS kills a younger age on average, the impact on productive years is greater. Only cancer causes a greater loss of productive years. If projections continue, AIDS will soon overtake cancer. Thus, for the 1990's, the prevention of AIDS should be the most important preventive medicine priority.

There are many Christians who are calloused to AIDS victims and believe that AIDS is God's judgment on homosexuality, intravenous drug use, and promiscuity. Yet this fairly simplistic explanation fails to account for the one million babies in sub-Sahara Africa who acquire AIDS *in utero* from their mothers or for the innocent faithful sex partners who acquire AIDS from their promiscuous spouses. This is especially true in Africa where AIDS is spread through heterosexual sex; usually the wife is faithful and receives the virus from her husband. Male to female transmission occurs more easily.

One need only see one young child under five suffering from AIDS to change from indifference to compassion. After seeing such children, you, like I, will earnestly seek a scientific cure for AIDS. Yet,

| | Years of Potential Life Lost | | Deaths | |
|---|---|---|---|---|
| | 1991 | 1992 | 1991 | 1992 |
| Cancer | 1,845,000 | 1,848,000 | 514,073 | 523,040 |
| AIDS | 1,299,500 | 1,546,000 | 47,500 | 56,500 |
| Heart Disease | 1,316,000 | 1,269,000 | 722,160 | 713,128 |
| Stroke | 239,000 | 237,000 | 144,870 | 143,602 |

Source: U.S. Public Health Service

**Table 2**

because of the intracellular location of the virus and the unique characteristics of the retrovirus infection, a major curative breakthrough is not expected in the foreseeable future. Immunization effective in preventing viral infections, such as polio and measles, is not effective in preventing AIDS. The presence of antibodies to rubella in the would-be pregnant female assures the potential mother and her fetus of protection from measles caused by rubella virus. Antibodies to the AIDS virus are produced by every person infected by AIDS. However, they do not prevent the development of the disease because the AIDS virus directly attacks the immune system.

If curative medicine and usual preventive medicine through vaccination offer no reasonable hope for prevention of the AIDS epidemic, what does? Barrier methods, especially the use of the condom, have been advocated as has extramarital sexual abstinence. From a scientific and public health perspective, each method requires different societal support and promises different outcomes.

***The use of the condom for AIDS prevention sanctions continued promiscuity.***

The use of the condom for AIDS prevention sanctions continued promiscuity. Making condoms freely available through the school health nurse has the effect of condoning extramarital intercourse. Since the public health service advocates the use of condoms, it provides the blessing of authority and a false sense of security. Users feel that condoms can always prevent AIDS. In fact, condoms can become dislodged during intercourse; they are associated with a definite pregnancy risk despite conscientious use. The AIDS virus is much smaller than human sperm.

Condoms, if used properly, will reduce the probability of infection with the AIDS virus but will not provide absolute protection. This is one reason why the use of the female condom has been advocated and will soon be marketed in the U.S. and Europe. Clinical trials in massage parlors in Thailand have shown that while the male condom provides 50-60% protection from sexually transmitted disease in coital acts, an additional 15-20% can be protected using the female condom (*Global AIDS News*). The application of this complex methodology with scrupulous attention to detail is problematic in the predictable passion of romantic love as practiced in this country among teenagers. A Center for Disease Control survey of sexually active high school students revealed that only 46% reported that they or their partner used a condom at their last sexual encounter (*Morbidity and Mortality Weekly Report* 1992). Advocating barrier methods is offering a less effective method of protection from AIDS compared to abstinence.

Furthermore, barrier methods are economically impractical in the developing world where AIDS prevalence is highest. A 50-cent condom could represent 50% of a man's daily wages in East Africa. In the country of Uganda with 18 million inhabitants, an estimated 600,000 sexual acts are performed daily. To supply barrier protection for all citizens would require more than the total Ministry of Health's budget.

If abstinence and marital monogamy are the best form of protection against AIDS, what prevents the widespread application of this technique? This ethical issue in public health and preventive medicine has personal and existential ethical implications. According to *USA Today*, 60% of females and 73% of males at 19 years old are sexually active outside of marriage. About 25% have sex regularly, 50% have had two or more sex partners.

The majority of adults in the U.S. are guilty of extramarital intercourse. To suddenly prescribe absolute moral chastity, is to tinker with societal permissiveness and individual freedoms — two values deeply cherished by the majority of Americans and especially the intellectual elite. Historians have traced these values to science. Science and scientists have always had influence outside the direct impact of their discoveries.

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Historian Paul Johnson has stated in his book *Modern Times* that the impact of Einstein and Freud have been uniquely used as intellectual priests in moral relativism. Because of the widespread circulation of the theory of relativity in the 1920's, the absolutes of Newtonian physics had been dethroned.

Absolute time and absolute length were no longer and all motion was curvilinear.

> At the beginning of the 1920's the belief began to circulate, for the first time at the popular level, that there were no longer any absolutes: of time and space, of good and evil, of knowledge and above all of value. Mistakenly but perhaps inevitably, relativity became confused with relativism. (Johnson 1983)

This lack of absolutes greatly distressed Einstein so he devoted the later portion of his intellectual life trying to anchor his physics to field theory; he greatly disliked uncertain principle, stating in a letter that he believed in law and order but not in a God who plays dice with the universe.

Freud, the other scientific high priest of modern relativism, was antireligion in his philosophy. For Freud personal guilt feelings were an illusion to be dispelled (Johnson 1983). Freud's effect on society has gone far beyond his scientific contribution. Freud's gospel was an agnostic cult — there is a secret and special sexual meaning to people's motives and actions. Sexual overtones could be seen in all of life's activity. The oral phase, the anal phase, the Oedipus complex and the Freudian slip were all means of understanding life in sexual terms. Free sexual expression was the logical consequence of freedom from the harsh super ego. Sexual innuendo and sexual joking have dominated sexual discussions from bars to operating rooms until slowed by legal threats of sexual harassment. It has been popular to believe that we should be obsessed with sex. This was a natural corollary to Freudian teaching.

***The introduction of AIDS into the paradigm and especially the unequivocal scientific evidence that abstinence is the superior method of prevention should cause much questioning of the moral relativism of the 20th century.***

With the license of birth-control pills in the 1960's and the backup system of abortion on demand in the 1970's, promiscuity has been on the rise. Believers in evolution and the survival of the fittest could take existential satisfaction in having multiple sexual partners or conquests. The introduction of AIDS into the paradigm and especially the unequivocal scientific evidence that abstinence is the superior method of prevention should cause much questioning of the moral relativism of the 20th century. Here is an absolute and if this absolute exists then there may be others. Condoms are embraced as a means to avoid an encounter with an absolute.

***The ethical dilemma of preventive medical science is the final stop to the ultimate ethical dilemma for the individual: to deal with moral absolutes and his personal sin.***

For the individual, there is the realization that guilt also may be real. There is no means in the modern Freudian paradigm to deal with real guilt. While few commit the sin of actual murder and the sin of lying is easily dismissed, there is something so concrete about sexual sin that it cannot be dismissed. If 70% of adult men are guilty of this sin, then lifting high the standard of abstinence might have a tremendous psychic cost unless the forgiveness through Christ's atonement can also be offered. The ethical dilemma of preventive medical science is the final stop to the ultimate ethical dilemma for the individual: to deal with moral absolutes and his personal sin.

If we are to create a society where marital monogamy is the standard, there will need to be major changes that differ from classic preventive measures. If closing of the gay bathhouses and notification of sexual partners were viewed as a violation of privacy by the gay community, imagine the public outcry that might come from efforts to ban pornographic literature and to censor from commercial television programs that exalt promiscuity. All these are logical decisions if we are to move toward a society where moral faithfulness will be the standard. The scientific data (Minnery 1986) gathered from controlled exposure of college males to pornography and public confessions of rapists and other perpetrators of violent sexual crime clearly demonstrate the corrupting influence of sexually explicit materials. Thanks largely to child pornography, more boys and girls are infected annually with sexually transmitted disease than were stricken with polio during the entire 1942-53 epidemic (Minnery 1986). We are only now clearly seeing how later medical illnesses are often linked to childhood sexual abuse. Not only do adults, sexually abused as children, suffer from more frequent psychological difficulties such as anxiety and

depression, impaired interpersonal relationships, and suicidal behavior, they also have a higher incidence of chronic pelvic pain, gastrointestinal distress, premenstrual difficulties, and somatic complaints and sleeping difficulties. Sexually abused women are more likely to use cigarettes, have a greater number of sexual partners, and avoid regular preventive care measures (Briere 1992). Thus, the impact of sexual abuse facilitated by pornography has health implications for the next generation as well as for this generation.

If it were possible to prevent or decrease sexual permissiveness in our society by banning pornography and changing the media, then we might improve the health of the next generation on many fronts. Our public prevention programs must present measures to prevent sexual impurity. But sexual purity does not come just from censoring the media and closing public areas that encourage the spread of disease (such as gay bathhouses) but from changing the heart of man from within by the power of God. It is cruel to prohibit teenagers from doing an act and not help them change from within. Moreover if we are to teach that there are moral absolutes and therefore real guilt, we must be kind and offer the forgiveness of God through the atonement of Jesus Christ. Therefore, kindness requires that the gospel and AIDS prevention be linked.

Although I have tried to draw the above argument as cogently as possible, it does not mean that secular man will accept this. Because he starts with different presuppositions, he will interpret the scientific data regarding AIDS differently. Formulating a viable public health policy in a pluralistic society is much different from constructing policy where the Christian world view is accepted. Open, honest, nonviolent, and respectful dialogue between Christian and secular scientists offers the best opportunity to influence public policy. Tact, diplomacy, and even compromise will be a part of these discussions. The resultant public health policy will likely not be completely true to pure Christian ethics but it will be better than policy formulated in the absence of Christian scientific input.

## Conclusions

These medical ethical issues challenge us to move from Biblical truth to social action. We must make our culture aware of the weakness of the scientific evidence supporting the hypothesis that homosexuality is due to innate constitutional differences; we must lovingly tell them that this is sin. More importantly the church must demonstrate the transforming power of God to change homosexual practice. Health care reform needs to be accomplished not just because of the economics but also because there are injustices in the current system. The church has always been involved in healing; it needs to renew that responsibility in creative new ways. Finally the AIDS epidemic should cause our society to question moral relativism. Prevention of AIDS for us and our children will require us to try to change our society by changing the public media and banning pornography. Medical ethics teaches us that the Gospel is inherently social. As Christians in the world of science, we must integrate scientific knowledge and Biblical truth; from this base we must help the church move to appropriate social action. ✱

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# Adler's Cosmological Argument for the Existence of God

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*Fifteen years have passed since the book,* How to Think about God, *by Mortimer J. Adler was published. It is a revised version of the traditional cosmological argument for the existence of God. Since then, many relevant developments in science have occurred and new philosophical critiques of cosmological arguments have appeared. In this article, I review the status of the concept of inertia, current theories of cosmology, and arguments by J. L. Mackie and Adolph Grunbaum that consider their implications for the plausibility of Adler's argument. I conclude that, on balance, these developments enhance its plausibility.*

## Adler's Cosmological Argument

In 1980, Mortimer J. Adler published an interesting little book titled, *How to Think about God.*[1] He subtitled it "a guide for the 20th-century pagan" and immediately appended a footnote to the subtitle defining a pagan as someone who does not worship the God of Christians, Jews, or Muslims. In the book, Adler critiqued traditional proofs for the existence of God as a springboard for presenting his own variation of the argument from contingency.

The philosophical asides on the French existentialists, the errors of Immanuel Kant, and the fads of theological and philosophical thought alone make the book enjoyable and worthwhile reading. The main argument, however, is of considerable interest in its own right. Moreover, many relevant developments have occurred since the publication of the book that, I believe, strengthen his case. Therefore, it seems appropriate to reconsider and extend his arguments and considerations.

The first move Adler makes is to discount the possibility that the cosmos had an absolute beginning. He does not argue the cosmos has existed forever; he explicitly assumes so. The reason for this move is that if the universe truly had an absolute beginning, it was made from nothing. In Adler's words, it was "exnihilated." But, an exnihilated cosmos implies "... that God, the exnihilator, exists."[2] Therefore, Adler is compelled to assume an eternal universe to avoid creating a circular argument for the existence of God.

Starting with an eternal cosmos, Adler also rejects attempts to argue for the existence of a first cause of the cosmos, which would, of course, soon turn out to be God. With a universe stretching back into an infinite past, an infinite series of causes without *terminus* is just as possible as the eternal universe he has just assumed.

The basic premises of his argument derive from the traditional argument for the existence of God based on the existence of contingent entities (which Adler calls "the best traditional argument"). He lists these premises as follows:

> 1. The existence of an effect that requires the operation of a coexistent cause implies the coexistence of that cause.
>
> 2. Whatever exists either does or does not need a cause of its existence at every moment of its existence; that is, while it endures, from the moment of its coming to be to the moment of its passing away.

> 3. A contingent being is one that needs a cause of its continuing existence at every moment of its endurance in existence.
>
> 4. No contingent being causes the continuing existence of any other contingent being.
>
> 5. Contingent beings exist in this world and endure, or continue in existence, from the moment of their coming to be to the moment of their passing away.[3]

If these premises are true, it then follows that a noncontingent being must exist that continues the existence of those contingent beings we most certainly know exist. That is, a necessary being exists and holds all else in existence. The necessary being can only be the supreme being, God.

However, Adler judges the third premise probably false and the traditional argument for the existence of God from contingency a failure. The judgment is based on the observation that the contingency we observe in the universe is superficial, involving only transformations. Radical contingency, involving exnihilation and annihilation of entities, if it occurred, would call for a different conclusion. Adler also judges the third premise false because it is plausible that contingent beings, once generated, can indeed continue to exist on their own until some cause proves their contingency by causing them to cease to exist. Adler cites the way the inertia of an object continues the motion of the object and suggests an "inertia of being" may exist to continue existence and falsify the third premise.

Taken together, these ideas show that it is reasonable to reject the argument from contingency. That is, the argument does not lead inexorably to the conclusion that God exists. It might be true but one is not compelled to accept it. Rejection is intellectually respectable.

At this point, Adler recasts the argument. While he regards the third premise as implausible concerning particular entities in the universe, it might be true of the universe as a whole. The entire universe might be radically contingent though no part of it is radically contingent. What is true of the whole is not always true of the parts. For example, the set of all counting numbers is infinite but no one counting number is infinite. Adler argues that the cosmos as a whole is radically contingent.

The argument has two steps. He first notes that the present universe is only one of many possible universes. The long standing discussions among cosmologists about the type of universe we live in are ample evidence of the plausibility of this step. If cosmologists have not reached a conclusion, then the question is open and the possibility of other universes is a reasonable consideration. Do not misunderstand here. Adler needs only the *logical possibility* that the universe might have been other than it is. Physical actualization of the possibility is irrelevant to the force of the argument. Indeed, the *existence* of other universes confuses the argument by confusing the meaning of the term *universe*. Granted that the present universe is not the only possible universe, it then follows that the present universe has only *possible* existence; it does not have *necessary* existence.

The second step is to note that whatever might be otherwise might not exist at all. Anything that necessarily exists must be exactly what it is; it cannot be other than what it is. The converse is also true then — whatever can be otherwise does not exist necessarily and must be able to not exist. However, for the cosmos to cease to exist, it must be annihilated and not merely transformed.

Another way of arriving at the same conclusion is to rely on the principle of sufficient reason. Anything that exists does so because there is sufficient reason for it to do so. The cause that is the sufficient reason may reside either in the thing or in something else but the cause must exist. For a merely possible entity, the sufficient reason cannot reside in the entity

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but must reside in another. If the universe is merely possible, then the sufficient reason for its existence resides not in the universe but elsewhere. But the universe is all of the physical reality so the merely possible existence of the universe points "outside" the universe to the existence of a nonphysical reality.

Adler concludes then that, by the previous premises, there exists a necessary supreme being so that the universe stays in existence. God must be there to sustain the universe even if the universe is eternal. Beginning by rejecting belief in a creating God, Adler finds evidence of a sustaining God. The existence of a sustaining God, however, then becomes grounds for asserting the creating activity also. Thus, the idea of a created universe with a beginning (and, likely too, an end) now becomes more plausible than the idea of an eternal universe.

Adler regards his argument as showing *beyond reasonable doubt* that God exists. He does not claim *certainty* for the argument.

## Critiques and Commentary from Physics

Physical science forms a significant background to the argument. At one point, Adler defends theology against the complaint it deals with things beyond or outside the reach of common experience or observation by noting that most of modern physics also deals with theoretical constructs rather than empirical concepts.

A more important use of physical ideas occurs when Adler rejects the premise that for a contingent being to continue to exist requires the continuous action of a sustaining cause. Adler thinks something like "inertia of being" might plausibly be expected to continue the existence of contingent beings just as the inertia of a body keeps the body in motion (or at rest) without the continuous action of any cause. That is, he takes inertia to be inherent in the nature of a body, independent of the existence or action of other bodies. He is encouraged by that to suppose existence might also be inherent in a contingent object; independent of external causes.

Inertia is the only imaginable example of an inherent agent of perpetuation. Lacking this example, there would be no encouragement to think being might be self-continued. In fact, by Ockham's Razor, inventing an "inertia of being" might be an indefensible proliferation of entities. Since Ernst Mach is often said to have thought that the inertia of bodies is caused by distant bodies in the universe, deeper inquiry into the inherentness of inertia seems in order. An inertia caused by distant bodies can hardly be inherent or self-caused. It might be that Adler is mistaken, that the concept of inertia does not, after all, cast doubt on the third premise and the traditional proof from contingency.

It is true enough that classical, Newtonian inertia is inherent in an object. In fact, Newton frequently called it *vis insita*, the innate force. The modern view is not so clear. Leibniz, and then, most forcefully, Ernst Mach, insisted that motion is relative. As a consequence, Mach believed, inertial effects cannot be detected but for the existence of other bodies external to the body whose inertia is to be observed. Einstein attempted to incorporate Mach's ideas into his General Theory of Relativity. Taking Einstein as an authority, the modern physicist may not be so confident that inertia is inherent in an object.

Much as I would like to reconstitute the argument from contingency by seeing inertia as externally caused, I do not understand Mach to be denying the inherence of inertia. What Mach actually said on the subject is carefully, even cautiously, stated. I do not think he would describe distant objects as the *cause* of inertia. I think he would say they are the *measure* of inertia. In 1912 and at the end of his life, in response to his critics he said, for example, "I have remained ... the only one who insists upon referring the law of inertia to the earth, and in the case of motions of great spatial and temporal extent, to the fixed stars."[4] Notice he speaks of *the law of inertia* rather than of *inertia* itself. Notice too his lack of dogmatism about which reference frame is preferred, the earth or the stars. It seems to me his primary concern was always focused on the problem of how motion was to be detected and measured. He categorically rejected absolute space and time but was uncertain exactly what was the best replacement for them.

***[Adler] takes inertia to be inherent in the nature of a body, independent of the existence or action of other bodies.***

Nevertheless, there are good reasons why people have understood Mach to be suggesting distant matter as a cause of inertia. Mach was a monist given to asserting the unity of the All, to arguing that everything affects everything else. Also, at several points in his discussions of Newtonian mechanics, Mach notes that we cannot be certain the inertia of

a body is not affected by adjacent and/or distant matter. His remarks are plainly intended to tempt readers into wondering if such a causative interaction is possible. He is, however, always careful to avoid committing himself to the reality of an interaction. Mach was also known to think that it should some day be possible to explain both inertial motion and accelerated motion with the same concepts or same theory. If we think of accelerated motion as caused by external agents, then it seems that inertial motion would be externally caused also.

***One usual way of quantifying inertia (inertial mass) is to have a component that is externally determined, the relativistic mass increment. If inertia is not certainly inherent, perhaps the continuing of existence is not inherent either.***

Though Einstein's efforts at incorporating Mach's ideas into relativity theory are generally judged to have succeeded only partially, the interest the great man showed in them has kept them alive as subjects of discussion to the present day. Perhaps that is because Einstein anointed them with the title, "The Mach Principle."

In Special Relativity, the increase in inertial mass above the rest mass of an object depends on the speed of the object. Consequently, at least part of the mass of an object is relative. Therefore, at least one part of the inertia of a body is not completely inherent to the object. In General Relativity, inertia acts to continue motion on a geodesic of space/time. Far from massive bodies, that is still a straight line despite the actual measured value of the mass. But the straight line (and this is Mach's main point) is defined with reference to the distant masses. Thus, our ability to see that the motion is continued is relative to those distant masses.

These considerations suggest how difficult it can be to decide whether a quantity is inherent in an object. It is not at all obvious that inertia is inherent in a body. One usual way of quantifying inertia (inertial mass) is to have a component that is externally determined, the relativistic mass increment. If inertia is not certainly inherent, perhaps the continuing of existence is not inherent either. Thus, the plausibility of the traditional argument may be stronger than Adler allowed.

My own view of the matter is that talk of distant matter causing inertia is wide of the mark. If one considers two small, uncharged objects moving in opposite directions near each other, seeing both motions as caused by distant objects quickly leads to trouble. Neglecting the very weak gravitational interaction, we have only distant matter as a cause of their linear motion if, tempted by Mach, we assume inertia is not inherent. But then we are faced with a single cause that produces exactly opposite effects. What sort of cause produces opposite effects simultaneously? Now add a third and a fourth object in arbitrary directions. Add as many as you like. What sort of single cause can produce an enormous and unpredictable range of effects? Is it a cause in any recognized physical sense? It would seem much more parsimonious to retain the Newtonian idea of an inherent inertia, altered, of course, by the relativity of measurements, than to countenance this type of causality.

We must remember that Adler's prime support for supposing that the continuing existence of an object might not require the continuous action of an agent was based on the fact that the motion of an object continues without the continuous action of an agent. To be sure, inertia of motion is logically distinct from inertia of existence. However, when one suggests the existence of until now an unknown property, inertia of existence, the case for the new property is strengthened by the suggestion that it is not wholly unique but is similar to something already known and accepted. That was Adler's purpose in referencing inertia of motion. Also, if it appears that the new property is truly unique, the case for its existence is accordingly weakened. Thus, a review of ideas about inertia weakens Adler's objections to the traditional cosmological argument.

## Critiques and Commentary from Cosmology

Astrophysics and cosmology also bear on Adler's argument. Adler believes that "to affirm ... that the world or cosmos had an absolute beginning — that it was exnihilated at an initial instant — would be tantamount to affirming the existence of God, the world's exnihilator."[5] Because he is attempting a secular proof for the existence of God, he feels constrained to posit an eternally existent cosmos. He carefully explains that this position is not inconsistent with the big bang theory of the cosmos.

Adler has obviously read with careful attention the literature of modern cosmology. From this effort he feels safe in concluding that "the big bang theory does not posit an absolute beginning of the cosmos — a coming into being out of nothing — but only an initial event in the development of the cosmos..."[6] That is, the present cosmos is not understood to have come into existence out of nothing. Something preexisted the present cosmos. The big bang theory does not necessarily entail exnihilation of the universe and only exnihilation of the universe implies an exnihilator.

However, Adler overlooked a most interesting development. In 1973, Edward Tryon made a suggestion[7] that seems obvious in retrospect. Noting that the gravitational energy of the universe is necessarily negative, Tryon speculated that the negative gravitational energy might be enough to cancel the positive energies of motion and mass. In short, he suggested the total energy of the universe be zero.

Defending the idea, Tryon did a very short calculation to show the plausibility of the idea and suggested such an event be a variation of the familiar vacuum fluctuations that are "... utterly commonplace."[8] Of course, the familiar vacuum fluctuations are very small scale, creating electrons, positrons, or photons for a very short period. Tryon noted that the duration of a fluctuation is limited by the Heisenberg uncertainty. Then he used that fact as an argument in favor of a universe of *zero* total energy! Tryon explicitly invoked the Anthropic Principle as a defense, saying that the fact that we are here to observe the universe implies there has been such a large scale fluctuation as he supposes.

***Because [Adler] is attempting a secular proof for the existence of God, he feels constrained to posit an eternally existent cosmos.***

These defenses are feeble. The common vacuum fluctuations are not and have not been thought of as events with zero energy. In fact, their energy is large enough to limit the lifetime of the fluctuations to unobservably short durations. By this and by its enormous scale, the zero energy universe differs from a vacuum fluctuation. The zero energy universe shares no feature with vacuum fluctuations save its origin from a vacuum. In short, nothing but a desperate wish for nonuniqueness supports identifying the zero energy universe with a vacuum fluctuation.

Invoking the disputed Anthropic Principle is an even poorer defense. To show the absurdity of the principle, Richard Swinburne has told a fable about a man placed before a firing squad of 12 sharpshooters each of whom fires 12 shots. All 144 shots miss! The man laughs and remarks that it is no surprise they all missed since he is still around to be noticing it![9] Swinburne points out that the remark is fatuous; the 144 misses require further investigation. That we are here to think about it in no way explains the mystery of a zero energy universe.

***Adler overlooked a most interesting development. In 1973, Edward Tryon made a suggestion[7] that . . . the total energy of the universe be zero.***

Tryon's idea has received a great deal of attention. Efforts have been made to find a reasonable, physical mechanism for causing this peculiar type of vacuum fluctuation to occur. Versions of the inflationary big bang theory have adapted to a zero energy universe, though multiple universes may arise to complicate the situation. The important point is that a zero energy universe is now considered almost certainly correct.

The zero energy universe affects arguments for the existence of God. One hears arguments like this. If the universe has zero total energy, then, assuming conservation of energy, the universe came from and amounts to nothing. The universe was and continues to be exnihilated. But, since the universe is everything physical and material, it must have been caused to arise by something beyond or outside itself. The universe must have been exnihilated by an exnihilator, by God.

This line of argument is too hasty and runs to a conclusion quite unacceptable to most modern cosmologists who, not surprisingly, go to great lengths to avoid encouraging it. One way to avoid it is to claim that current physics fails near the singularity of the big bang. The point is that the material density and gravitational fields associated with the singularity are so far beyond those for which current physics has been tested that we cannot be sure that current physics applies to the singularity. Furthermore, current theories predict "nonphysical" properties like an infinite density for the singularity. Presumably, the singularity makes sense within another, naturalistic, framework and there is no need to think

there might be something supernatural about the singularity and the origin of the universe.

Another possibility arises quite naturally out of the inflationary scenario into which the zero energy universe seems to fit. The universe we see, in this scheme, is not the entire universe; not everything there is. Only a part of everything there is had inflated into the bubble we think of as our universe. And it is only this bubble that has zero energy. As to the rest of everything that is, it is forever beyond reach because the expansion puts the other universes beyond the reach of light signals. This is a wildly speculative idea out on the very edge of what may be considered proper science. If Karl Popper is right that only falsifiable ideas belong to science, a forever unknowable and unobservable universe does not belong in science. The idea also means one must be very careful using the word *universe* because here it is plural and means less than "everything there is."

These responses are not notably satisfactory. The reason they are preferred by cosmologists is obvious. Bad as they are, they are preferable to believing God exists.

A final, major point of contact with cosmology appears in Adler's argument that the continued existence of the cosmos requires the continual action of a preserving agent. The first step in the argument is a conclusion drawn from cosmology; "... the cosmos which now exists is only one of many possible universes that might have existed in the infinite past, and that might still exist in the infinite future."[10] This picture is consistent with his decision to posit an eternal cosmos.

***In Adler's argument . . . the continued existence of the cosmos requires the continual action of a preserving agent.***

The next and crucial step is to say that "whatever might have been otherwise in shape or structure is something that also might not exist at all."[11] But "whatever can be otherwise than it is can simply not be at all."[12] Thus, we are led to the primary conclusion of Adler's effort. If the cosmos at every moment has the potential to not be (that is, to annihilate), then at every moment it must be caused to exist. The cause of this continual exnihilation is God, the continual exnihilator, whose existence as an initial exnihilator Adler took such care to avoid positing. Adler then immediately notes that there is no longer any need to avoid believing in an initial exnihilator.

***The primary conclusion of Adler's effort [is that] if the cosmos at every moment has the potential to not be (that is, to annihilate), then at every moment it must be caused to exist.***

Modern cosmology must be judged to be supportive of Adler's argument to the extent it seriously countenances the possibility of many types of universe. Ironically, the significant degree of enthusiasm in current cosmology for other worlds arises from exactly the opposite intent. Most of the advocates of the existence (or possible existence) of other worlds — other parts of the universe — are very clearly motivated to deny the uniqueness of this part of the universe. They want to avoid explaining that uniqueness and readily perceive that the possibility of other worlds conveniently obscures that uniqueness.

There are many serious versions of many worlds theories. An early one, the Everett many worlds theory, was derived not from cosmology but from an effort to understand quantum theory. A more recent one is J. Richard Gott's inflationary model of our universe as one of many inflated bubbles. Whether any of these is true is not particularly important. What is important is that the variety and present health of these ideas makes plain there is no reason now to suppose the whole universe is *necessarily* what it is. The consensus of cosmologists is that the universe out there has the contingency Adler needs for his argument.

A notable dissenter from the consensus is Stephen Hawking. Much of his recent work has focused on the possibility of a universe without boundaries. His well-known popular book, *A Brief History of Time*, describes this idea and, more importantly, gives us a better sense of his underlying metaphysical opinions than do his more formal writings. The theory grows out of attempts to combine quantum theory with general relativity and is partially motivated by the general desire for simplicity. An unbounded universe is simpler because no boundary conditions are required to explain it. Boundary conditions and

the basic physical laws are the main unspecified features of most cosmological theories.

***Modern cosmology must be judged to be supportive of Adler's argument to the extent it seriously countenances the possibility of many types of universe.***

At first, Hawking is careful to note that the theory is only a proposal that "... cannot be deduced from some other principle. Like any other scientific theory, it may initially be put forward for aesthetic or metaphysical reasons, but the real test is whether it makes predictions that agree with observation."[13] Hawking showed that simplified versions of this idea predict the observed uniformity of the background radiation and an inflationary stage of expansion with enough non-uniformity left over to explain the present degree of structure in the universe.

The significance of the theory for our purposes is that Hawking does not stop there. He goes on to say, "So long as the universe had a beginning, we could suppose it had a creator. But if the universe is really completely self-contained, having no boundary or edge, it would have neither beginning nor end: it would simply be. What place, then, for a creator?"[14]

The force of his question comes from the fact that the universe he envisions is completely determined, it must be as it is. It cannot be otherwise than it is. No gap remains into which God can be fitted. Hence, Hawking's idea attacks both arguments for the existence of God: from the origin and from the contingency of the universe.

We must remember that his original characterization is correct. The theory is just a proposal. It is not the only theory that fits the observations. There is a hint of circularity in his choice here since, like Hoyle before him, he is clearly more comfortable with a universe without beginning or end. His reason is the same as Hoyle's: no beginning, no God.

An important feature of this theory that is easily overlooked is that time, for technical reasons, is treated as a space dimension. That is, real time is not used but is replaced by imaginary time (time multiplied by the square root of -1). Therefore, the lack of a beginning and end occurs in imaginary time. Conversion to real time reintroduces the singularities that imply a beginning and an end. Hawking then suggests "the so-called imaginary time is really the real time."[15] He supports this thought with the remark "...it is meaningless to ask: Which is real, 'real' or 'imaginary' time? It is simply a matter of which is the more useful description."[16] The usefulness of a description surely is determined by the use one has in mind. If one wants to describe a universe containing no room for God, Hawking's theory may be useful. Hawking has made his choice but no scientific criteria demand we follow him.

Hawking's views are presently not representative of the main stream of cosmological thinking. They do serve to show that there is always the potential for the scientific consensus to swing away from what may have become a comfortable accord with prevailing philosophical or theological ideas.

## Critiques and Commentary from Philosophy

Of course, philosophical ideas also impinge on the validity and utility of Adler's argument. J. L. Mackie, an atheist, has examined cosmological arguments generally in the fifth chapter of his book, *The Miracle of Theism* (the name indicates his surprise that theism is still believed by anyone).[17] His critique consists of denials. He denies the certainty of the assertions that: (1) "nothing comes from nothing," (2) a necessary being exists, (3) past time must have been finite, and (4) nothing occurs without a sufficient reason. As one might expect, these denials enable him to survey the remnants of variations of the cosmological argument like the proverbial bull might be imagined surveying the wreckage of the china shop.

Adler assumes an infinite past for the universe, so his form of the cosmological argument is impervious to Mackie's third denial. Denying that "nothing comes from nothing" threatens the idea that the "somethingness" of the universe requires a source in something other than itself. The first denial is thus a form of the fourth, which I will consider shortly. Also, since Adler's argument supports but does not assume the existence of a necessary being, only the denial of sufficient reason has a potential for damaging Adler's argument.

Mackie denies the principle of sufficient reason on two grounds. First, the principle of sufficient reason is empirically derived. We expect to find sufficient reason for any occurrence because we previously could do so for other occurrences. His thinking here is like Hume's idea that the sun need

not rise tomorrow; we just expect it to because it always has before. What Mackie does not say, though it is implicit in the very nature of his counter argument, is that the expectation of sufficient reason is very probably correct. After all, if our experience prejudices us to expect everything to happen as it does for sufficient reasons, it must be true that things usually do occur for sufficient reason. Since Adler is constructing a plausible or probable argument rather than a deductive one, it might not be damaged by this denial.

However, it is just at the point where Adler most needs sufficient reason that Mackie is most determined to deny it. His second ground for denying the principle of sufficient reason is that what is true of parts of the universe need not be true of the universe as a whole. "Even if, within the world, everything seemed to have a sufficient reason ... this would give us little ground for expecting the world as a whole, or its basic causal laws themselves, to have a sufficient reason of some different sort."[18] That is, Mackie is also saying the existence of the universe is of a different sort from the existence of things in the universe. Therefore, our experience of things in the universe provides no information about the universe in its entirety. Even if things generally have a sufficient reason for being, we have no right to use that information when we think about the whole universe. Mackie quickly goes on to deny that he is rejecting intelligibility of the world. He had, of course, asserted a restriction to that intelligibility, a point I will return to later.

***Since Adler's argument supports but does not assume the existence of a necessary being, only the denial of sufficient reason has a potential for damaging Adler's argument.***

While Mackie's concern is only with the sufficient reason of coming into existence of the universe his remarks also apply to the sufficient reason of the continuing in existence of the universe. Presuming to read the mind of the late J. L. Mackie, I think he would agree with Adler that the continuing in existence of the universe is radically different from the continuing in existence of a part of the universe. This radical difference actually strengthens Mackie's case for denying that the principle of sufficient reason is applicable to the continuing in existence of the whole universe. That is, Mackie's point is that the existence of the whole universe may be very different from that of any part of the universe. Adler's argument for a radically contingent universe affirms this point.

***Adler denies any form of the principle of sufficient reason that would amount to assuming God does not exist.***

What can be said in response to Mackie? Adler denies any form of the principle of sufficient reason that would amount to assuming God does not exist. Since the simple statement of the principle (used by Mackie and others) "everything that exists is caused to exist" runs into the problem that "God's existence, if God exists, is uncaused,"[19] Adler restates the principle: "Everything that exists or happens has a reason for its existing or happening either (a) in itself or (b) in something else."[20] In distinction from all other entities, the sufficient cause of God's existence resides in God alone.

If, for the sake of argument, we expand Mackie's denial to include Adler's form of the principle of sufficient reason, what impact does that have on Adler's conclusions? Since Adler is framing a plausibility argument, which is more plausible: Adler's affirmation or Mackie's denial?

I have problems with Mackie's mode of argument in this area. For example, he rejects the form of the cosmological argument that posits God as the *terminus* of a sequence of causes by raising the possibility that other (unspecified) things might be the *terminus*. Otherwise, he believes we must "simply accept this [that God is the *terminus*] as sheer mystery (which would be to abandon rational theology and take refuge in faith)."[21] But, by denying the universe exists (or continues in existence) by sufficient reason, Mackie himself takes a large step in the direction of "sheer mystery." Denying that the principle of sufficient reason applies to the universe views the universe as a great, and apparently, permanently impenetrable mystery. Is "sheer mystery" acceptable in an atheistic position and not in a theistic one?

Perhaps I am being too hard on him. He clearly denies that *we know* the principle applies to the universe and I think it fair to read him as denying that the principle applies in actuality. For example, at the end of his consideration of the use of the principle

in the cosmological argument, he says this sort of argument "fails completely as a demonstrative proof."[22] If he only meant to deny that we know the principle can be applied, it would be more appropriate to say that the argument is incomplete and, if it is to be used, must be supplemented with reasons showing how we can know the principle is relevant. Saying the argument fails "completely" implies considerable confidence in the counterarguments.

I may, of course, be wrong. Perhaps Mackie only intended to deny that *we know* the principle applies to the universe. Then, the state of our knowledge becomes relevant. From the earlier discussion of big bang theories we can see that modern cosmologists have doubts about either form of Mackie's denial; some of them, at any rate, assume the origin of the universe was caused and that we can think about that cause. They even hold out hope that an improved physics will provide a naturalistic explanation of the singularity. Their efforts also imply that we even now have evidence (but certainly not proof) that can be interpreted to mean that the universe exists by sufficient cause. In turn, evidence that the universe had sufficient reason for coming into existence implies it is likely that the continuing in existence of the universe is by sufficient cause.

## *Mackie denies that his rejection of sufficient reason undermines the scientific enterprise.*

Mackie denies that his rejection of sufficient reason undermines the scientific enterprise, saying,

> The sort of intelligibility that is achieved by successful and causal inquiry and scientific explanation is not undermined by its inability to make things intelligible through and through. Any particular explanation starts with premises which state 'brute facts,' and although the brutally factual starting-points of one explanation may themselves be further explained by another, the latter in turn will have to start with something that it does not explain, *and so on however far we go*.[23]

I accept this picture of the fabric of explanations, scientific or philosophical, but note that a primary assumption is that unexplained features of an explanation can be investigated at another level. Mackie is positing a level at which explanation must terminate with something still unexplained. What he seems to be saying is that the suggested failure of sufficient reason is not unusual. Indeed, he is trying to persuade us that it would fit a familiar pattern. The irony is that he is simultaneously denying the already familiar pattern in which things happen for sufficient reason.

## *Adler concludes by affirming that the universe was created for sufficient reason.*

Furthermore, Mackie does not appear to appreciate just how necessary motivation is in science. The history of science generally and the history of cosmology in particular can be read as one long lesson in how deeply held beliefs, presuppositions, and prejudices have been a major force behind scientific discovery and invention. Think of Kepler's belief in God, The Supreme Mathematician, and how that belief sustained his thirty years of work toward the three laws. More recent examples of the same thing are Einstein's invention of the cosmological constant to satisfy his prejudice for a static universe and Hoyle's work on steady state theories because big bang theories were too Christian. Now, if one believes the universe came into existence for no reason, what motivation is there to investigate the origin of the universe? Mackie's denial does not undermine the entire scientific enterprise but it surely does undermine cosmogony.

We see that the costs of denying the principle of sufficient reason as it applies to the origin of the universe are significant. The overall consistency of Mackie's position has been jeopardized by it and motivation for scientific effort in cosmogony is undermined.

Granting the *possibility* that the universe came into existence for no reason or without cause, there is yet no reason to grant this idea higher status. While there is no calculus by which we can determine the plausibility level of an idea, all we know of the universe, of science, and even of Mackie's argumentation point to the conclusion that the idea is unlikely. The scientific mind rightly resists it. It seems fair to demand that the burden of proof lie with those who would deny the applicability of sufficient reason to the universe as a whole.

Since Adler concludes by affirming that the universe was created for sufficient reason, I should also briefly comment on an argument by the noted philosopher of science, Adolph Grunbaum.[24] Like

Mackie, Grunbaum raises the question of how concepts of ordinary causality can be applied to creation out of nothing. He also denies that ordinary causation can apply to the origin of the universe because causes precede their effects in time. But before the universe existed, there was no time. Therefore, it is incoherent to speak of a cause of the origin of the universe since there was no time in which such a cause could have existed. With no cause of the origin of the universe, no argument can be made from the cause to a creator. Grunbaum apparently does not continue this line of thought to its full conclusion that scientific investigation of the origin of the universe is, therefore, an incoherent enterprise.

Now, causes may precede their effects incidentally but what is critical is that they must *coexist* with their effects. A cause *never* produces an effect except on a body that exists in a place and time where the cause too exists. If I hold a stone in my outstretched hand, it will fall when I release it only if gravity is available to act on it from the time it is released. Surely the stone would behave in the same manner had a gravity field not existed in that region of space prior to its release but had sprung into existence exactly at the time of release. Grunbaum's argument has no force against *coexistent* causes.

The idea of coexistence of a cause and its effect is likely to seem strange because it is axiomatic that *a cause precedes its effects.* A little reflection should show that the axiom as stated goes beyond the known facts. A more reasonable statement in better accord with the facts is that *a cause never follows its effects.* In this latter form, the axiom does not conflict with the coexistence of a cause and its effects, while the former form obviously denies such a possibility. Thus, a better statement of the axiom takes away the starting point of Grunbaum's argument, leaving it unsupported.

***If time began with the beginning of the universe, then it is incoherent to speak of anything existing before the universe existed. Thus, it is incoherent to speak of God "preexisting" the universe.***

A response to this change of the axiom might be that a cause coexistent with the beginning of the universe is still a cause that cannot "preexist" the universe. If time began with the beginning of the universe, then it is incoherent to speak of anything existing before the universe existed. Thus, it is incoherent to speak of God "preexisting" the universe.

It may be incoherent to speak of God existing before the universe came into existence. But that may just be a trick of our limitations as creatures enmeshed in time. Even aside from questions of origins, the existence of God outside time has always been subject to this complaint of incoherence (a problem worth worrying about once we are sure of what time is). However, an idea may be incoherent or unintelligible and still true. For example, it is commonly recognized that a materialistic explanation of thought is self-defeating. If ideas are only neural epiphenomena, then the idea that ideas are only neural epiphenomena is itself only an epiphenomenon with no legitimate claim to being true. A truth claim for the idea is incoherent. Nonetheless, *it might be true*! "Incoherent" is not equivalent to "false."

## Conclusions

Philosophically, we have found it can be doubted that the principle of sufficient reason applies to unique events such as those contemplated in cosmological arguments for the existence of God. Nevertheless, I have urged that it be not unreasonable to use it in such situations. If that is so, Adler's argument remains a plausible argument as he claimed. Recent developments in cosmology appear to converge with and support Adler's argument. Trends in cosmology surely strengthen the plausibility one might claim for the argument. There is, of course, no way to *quantify* the impact of these developments on the plausibility of Adler's argument. A warranted, *qualitative* judgment is that the argument is no worse for the wear and may, indeed, now be judged somewhat more probable than it was originally. ❋

### Notes

[1]*How to Think About God,* Mortimer J. Adler, New York, Macmillan Publishing Co., Inc., 1980.
[2]Ibid., p. 38.
[3]Ibid., pp. 116-119.
[4]*The Science of Mechanics,* Ernst Mach (trans. Thomas J.McCormack), 6th ed., LaSalle, IL, The Open Court Publishing Co., 1989, pp. 336-337.
[5]Ibid., p. 38.
[6]Ibid., p. 33.
[7]*Is the Universe a Vacuum Fluctuation?,* Edward P. Tryon, *Nature,* Vol. 246, No. 5433, Dec. 14, 1973, pp. 396-397.
[8]Ibid., p. 397.

[9]*Argument from the Fine-Tuning of the Universe,* Richard Swinburne, *Physical Cosmology and Philosophy,* ed. John Leslie, Macmillan Publishing, New York, 1990, p. 165.
[10]Adler, p. 143.
[11]Ibid., p. 144.
[12]Ibid., p. 144.
[13]*A Brief History of Time,* Stephen W. Hawking, Bantam Books, 1988, pp. 136-137.
[14]Ibid., pp. 140-141.
[15]Ibid., p. 139.
[16]Ibid., p. 139.
[17]*The Miracle of Theism,* J.L. Mackie, Clarendon Press, Oxford, 1982.
[18]Ibid., p. 85.
[19]Adler, p. 104.
[20]Ibid., p. 103.
[21]Mackie. p. 92.
[22]Ibid., p. 87.
[23]Ibid., pp. 85-86.
[24]*The Pseudo-Problem of Creation in Physical Cosmology,* Adolf Grunbaum, *Philosophy of Science,* Vol. 56, No. 3, Sept. 1989, pp. 373-394.

# The Human Cadaver: An Assessment of the Value We Place on the Dead Body

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*The dead human body has failed to elicit much theological interest, and until recently, little ethical interest. However, many issues are forcing it into the center of ethical debate. These include the donation of cadaveric organs, fetal tissue transplantation, and what we do with archaeological human remains. This paper is an attempt to provide a backdrop to such issues by investigating the ways in which we treat dead human bodies, and specifically issues emanating from the way in which human cadavers historically were obtained for medical school purposes. My aim is to uncover crucial ethical principles for contemporary society's use of human material and human tissues. Throughout this analysis, there is an awareness of Christian perspectives to discover ways in which they may prove important in this debate.*

It may seem exceedingly strange to devote attention to the value to be ascribed to the dead body or to ethical issues surrounding the dead body. After all, it may appear that there are few ethical issues surrounding dead bodies in comparison with living bodies and living people, where ethical constraints are undoubtedly required.

Tempting as this emphasis on only living bodies may be, it ignores crucial facets of current debate within bioethics. Although the debate is frequently focused on elements other than the value to be placed on the dead body, many diverse issues are liked by a common thread — society's attitudes toward the dead body. Some of these issues have existed for many years. A well-known historical example is the nefarious means of obtaining human cadavers for dissection in medical schools two hundred years ago. A more recent example is the growing ethical sensitivity about the study of archaeological human remains. In addition, the possibilities opened up by organ transplantation (including fetal neural transplantation) have brought to the fore important questions concerning how cadavers are to be treated. In this paper, my aim is to illustrate the intimate connection that exists between the valuation of the human body in death and the valuation of human beings during life. I shall also attempt to demonstrate that this is a debate in which Christians have a stake.

## What to do with the Dead Body?

Imagine a world with a totally different view of the human body from anything remotely like the one we now have. In this other world, dead human bodies are regarded as of no significance with no monetary, spiritual, or sentimental value; people regard them as garbage. Consequently, when someone dies, instead of going to the expense and trouble of arranging a funeral with a funeral director, people do what they like with the bodies. It is a matter of individual choice and taste.

Inevitably, there will be some restrictions, if for no other reason than that bodies deteriorate. Poor people may throw the bodies away. They simply buy a cardboard 'body box' from the supermarket, place the body in it, and put the box out with the garbage to be picked up with the next collection. People with gardens may decide to burn the body. This would be more difficult, and there would probably be a few restrictions, all of which would cost money. Nevertheless, it would still be far cheaper than employing a funeral director.

People with more financial resources may decide to get their loved one preserved, just as anatomy departments currently preserve bodies. Then the preserved corpse could be displayed in the clothes they wish to remember him or her in. The suitably-dressed corpse could be put in a position of honor in the living room, in a large case perhaps, with doors that could be opened whenever desired. An alternative would be to get the flesh removed, and merely keep the skeleton. That, too, could go on display.

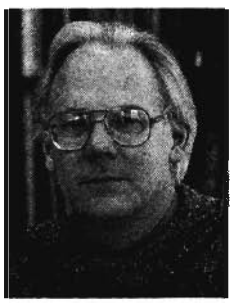
A further possibility for the research-minded is to donate the body to some worthy cause. Let us imagine that a research group is experimenting on the effects of automobile crashes on the driver and passengers. It would be far more realistic to use real human bodies than artificial models or computer simulations. This use of dead human bodies may even prove of value for the living, and may be viewed as exemplary ethically since it would benefit others.

Such a macabre scenario seems frivolous, but its message is not — the dead body should not be taken too seriously. What does such a world tell us about attitudes toward the dead body? Is it ethical to act in certain ways, and unethical to act in other ways? Is it nothing more than a matter of mere preference if one person arranges for a funeral director to bury his or her mother and another throws his or her mother's body on the local tip?

It is only possible to act as I have imagined if no value is placed on the human body. We can only dispose of it as we dispose of rats or mice, if we consider human beings to be disposable. One laboratory rat is like any other, and one human being is like any other; neither is there any difference between the rats and the humans. But do we think like this? After all, when one's favorite dog dies, we do not dispose of it without a second thought. We may not treat it exactly like the remains of our grandmother, but if it has meant something to us, we are aware of our loss and we treat the remains of the dog in a way that we consider is appropriate to our feelings during its life. In other words, most people have deep moral intuitions, which point toward valuing the dead remains of human beings in special, respectful ways consonant with what they were as human beings when alive. In the same vein, when we see pictures of corpses being dumped into mass graves after a holocaust, we are horrified. Such a sight touches something very deep in our moral sense of right and wrong; we recognize that this is a form of indignity, and we react appropriately. Not only this, but we would be even more horrified if one of the bodies was that of someone close to us.

## Person and Bodies

Why, then, is the treatment of dead human bodies important? Several reasons have been proposed (Campbell et al., 1992). The first is that a person is so closely identified with his or her body that the two become almost inseparable. We recognize each other because we recognize each other's bodies, in particular, features such as the appearance, voice, and attitudes of each other. Although this applies during life, it is also true that some very important aspects of this identity continue following death. May (1985) has written: "... while the body retains a recognizable form, even in death, it commands the respect of identity. No longer a human presence, it still reminds us of the presence that once was utterly inseparable from it." If this is the case, it is not surprising that, in Wennberg's (1985) words: "...



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we don't treat human corpses as garbage, because the corpse is closely associated with persons: it is the remains of a physical organism that at one time supported and made possible personal life." This suggests that there may be a link between our treatment of the living and the dead, with the treatment of the living influencing our treatment of the dead. However, if this holds, so may the opposite, that mistreatment of the dead signifies a lowered evaluation of the living.

*There may be a link between our treatment of the living and the dead, with the treatment of the living influencing our treatment of the dead.*

A second reason centers on other people's responses to the cadaver. Those who knew the person have memories of that person: what he or she was like, his or her personality, foibles, beliefs, and hobbies. In a way, therefore, the cadaver has an array of built-in memories that are integral to it. It is these memories that lead to the conviction that a corpse should be respected and treated decently. To desecrate the corpse is, in some way, to desecrate the person, though the person we knew is no longer 'there.' We know that Mary has gone, because Mary's dead body can no longer do or think anything that Mary did or thought. Nevertheless, everything we remember about Mary is made even more poignant when we look at Mary's dead body. All that remains of Mary is her corpse, and yet our respect for Mary and for her memory leads us to respect her remains.

From this follows a third reason for treating a dead body decently, namely, that the deceased person was someone's relative or friend. As a result, these people are now grieving the death. Not only has Mary died, but those close to her are suffering the effects; they miss her and all for which she stood. A person has gone, and all the relationships of which that person was a part have been depleted. The living, Mary's friends and relations, are suffering a permanent loss, and so respect for the cadaver is respect for their grief. The intensity of this loss will decrease as time passes, but this is not to deny the significance of the cadaver as an integral part of the initial grieving process.

These reasons fail to provide any justification for the dissection of human bodies in medical schools, nor do they provide assistance in helping us understand why such bodies can be dismembered in ways society would not contemplate on other cadavers. Neither do they tell us why we allow organs to be taken from bodies for transplantation purposes, nor why we do not allow economics students to dissect bodies.

An initial reason, although not a very convincing one, is that society allows dissection under stringent conditions. However, this varies from one society to another; even in Western societies, attitudes have changed dramatically over the centuries. Consequently, it is essential to look for more substantial reasons, beginning with the notion that the bodies have been donated for a specific purpose, dissection or transplantation. Donation implies that the people concerned made a free and informed decision prior to their death. They decided to make a gift of their own bodies, freely willing that they should be used in this manner, for educational purposes in dissection or as a source of organs in transplantation. By acting like this, they are making a gift of something more closely identified than anything else with what they are and represent. As a result, a donation of this type revolves around the 'gift' element, with its overtones of altruism by the person making the donation (May, 1985).

## Ethical Principles Relating to Cadavers

Taking these concepts further, a series of ethical principles bearing directly on treatment of the dead body can be elaborated. Principles of relevance have been formulated with organ donation in mind (Vawter et al., 1990), and although they have to be adapted somewhat when used in a more general context, they constitute a useful position from which to start.

The first principle is that of autonomy. According to this, each individual should have autonomous control over the disposition of his or her body after death. Emphasis here is on what an individual decrees should or should not be done with his or her body at death, despite social need or public interest. This is a principle that has been overlooked far more frequently than it has been followed. In fact, it was ignored until the 1950s or 1960s at the earliest, and it continues to be ignored in many societies where bodies for dissection and organs for donation are scarce. The use of unclaimed bodies has become so much an integral part of the anatomical ethos that the ethical dimensions provided by the autonomy principle have been generally ignored. This is not true with organ donations, where the wishes of the deceased have been seriously taken note of, even in societies adopting an 'opt out' stance (Teo, 1991).

Autonomy lays stress on the values of the individual at the center of the decision-making process. This individual, however, has sets of relationships, and this brings into focus a second set of ethical principles, those of the interests of family members. When this is allowed for, it leads to the ability of family members to override the wishes of the deceased, even when the latter has specified that his or her body is to be donated for teaching or research purposes. This is the one principle that comes through clearly in legislation governing bequests, and yet it manifests a clash of ethical principles — pitting the autonomy and interests of the deceased against the autonomy and interests of the living. The emphasis on the latter as opposed to the former may be because living family members are regarded as having greater interests, and are more susceptible to harms or wrongs, than is the dead person. A similar emphasis is frequently found in societies where the final decision regarding organ donations lies with living relatives, even if they oppose the prior wishes of the deceased.

***[The principle of autonomy] is . . . what an individual decrees should or should not be done with his or her body at death, despite social need or public interest.***

Underlying the previous principles is a premise that the giving of one's body is preferable to being coerced into doing it. This is the principle of altruism, in which giving is better than taking, and the good of others is better than self-interest. This underlies the entire notion of body bequests, and of requiring consent for the use of organs from bodies for grafting purposes. In terms of this principle, bequests are preferable to the use of unclaimed bodies, while an opt-in scheme for organ donation is preferable to an opt-out scheme. The latter has no ethical merit, since it has no hint of being altruistic. Something (a body or organ) is taken without permission; the people from whom it is taken have no means of defending their own bodily integrity.

A further principle stems from the response of many who see death, especially premature or unexpected death, as evil or tragic. Such people may find solace and meaning in the use of body parts to help others. This is what is sometimes called the redemptive aspect of body or organ donations. The death of one person can be interpreted as conferring life on another. Out of the evil of a tragedy can come new life and hope. Such a transformation of the situation can only occur, however, if the body is willingly donated to a medical school or if organs are freely given to another in need of them. Consequently, this principle is intimately linked to the autonomy of the donor and to the altruism that the donation signifies.

## Elements of a Christian Response

Up to this juncture, I have dealt with these issues in general ethical terms. In turning to the elements of a Christian response, the first one of note stems from examples in both the Old and New Testaments of the high view held of the dead body. An example is found in Amos, who specifically separated out for condemnation the crimes of one group of people who, not content with marauding, pillaging, and killing, unleashed their venom on the body of one of their enemies. Having killed the king of Edom (Amos 2: 1-3), they burnt his bones to ash. Not content with killing him, they desecrated his dead body, thereby undermining his integrity as an individual.

Another instance of the significance ascribed to the dead body is provided by Joseph who, prior to his death, had his relatives promise to take his bones with them to the land of Canaan when they were finally able to leave Egypt (Genesis 50: 22-26; Exodus 13:19). Dead though he would be, Joseph did not want his mortal remains to be left in Egypt, the land of captivity. This may have been symbolic, and yet it strengthens the notion that the dead body is sufficiently important to require commitment by others.

In the New Testament, we find that, following Jesus' death, his followers carefully and sacrificially tended his body (Matthew 27: 57-61; Mark 15: 42-16: 2; Luke 23: 50-24: 1; John 19: 38-42). They considered it inappropriate to leave his body on the cross, especially as this would have meant leaving it there over the Sabbath day. Joseph of Arimathea ensured that Jesus' body was laid in his own new tomb, while many of his followers, including Nicodemus and Mary Magdalene, were concerned that the body be anointed with spices and bound according to Jewish custom. While there are many cultural factors here, there is no hint that Jesus disapproved of their actions. There was nothing improper in looking after his dead body in this way. His followers may have underestimated the likelihood of his resurrection, but that was another matter. What is encountered in these instances is clear recognition that the dead body is to be treated with respect.

This conclusion is not surprising since there is no suggestion in the Bible that human beings can exist apart from the body, even in the future life after death. In unequivocal terms, Paul enunciated the point that the resurrection is a physical one (1 Corinthians 15:42-52; 1 Thessalonians 4:13-18), a belief foreshadowed in the Old Testament (Daniel 12:2). The biblical view, therefore, militates against any idea of humans existing apart from some bodily manifestation or form of expression (Banwell, 1980). The mortal body we now know will be replaced by a resurrection body, a form of spiritual body, which while not identical to our present material body has sufficient similarities to it to warrant the term 'body.' Jesus' own resurrection body serves as the only guide we have to this (Luke 24:12, 31), with its recognizably human and personal features but also its ability to pass through material objects and leave no corpse.

Bearing this similarity in mind, we can go further and argue that respect for the dead body now foreshadows respect for the resurrection body in the future. While I am in no way suggesting there is a close parallel between the two, there would appear to be connections. A willingness to desecrate or devalue the dead body shows a disregard for what that person may become, as much as it shows a disregard for what that person has been. While it is not our prerogative to judge what any person may be like in eternity, it is our responsibility to provide support and protection as far as we know how. A Christian perspective, therefore, is to take account of this future dimension in deciding how a dead body is treated in the present, taking account of the notion that this present life is preparation for a future one. An element within this perspective is that the prior wishes of the deceased are respected as far as possible, since our body is the one common strand between what we are now and what we may become.

*. . . there is no suggestion in the Bible that human beings can exist apart from the body, even in the future life after death.*

A Christian response has many similarities to the general ethical stance I have previously outlined. However, it goes further by recognizing that the dead body serves as a link between what that person has been and what that person may become. The body itself is an inadequate token of these dimensions, but it is all that remains. It is a reminder of the greater ongoing dimensions of human existence, of the reality of our limitations and needs, and of our mortality. We shall all die and be like this one before us who is now dead. Respect for the dead body reminds us, not only of the significance of the one who has died, but of the significance of all human life. All have been created by God, to reflect him and to serve all others, who equally mirror his image. Consequently, to value the corpse is to value the person, and to see that person as one who mirrors God. To devalue the corpse is to devalue those still alive; also to question the purposes and intentions of God in creating people in his image.

*[A Christian response] goes further by recognizing that the dead body serves as a link between what that person has been and what that person may become.*

Dissection may appear to be the antithesis of these principles, amounting as it does to mutilation of the body. This is a crucial perspective from which we should not wish to escape, since its aim is to highlight the respect with which the dead human body should be treated. My argument is that the only way in which this perspective of respect and a dissecting or donation ethos can be held together is via altruism. In these terms, the sole justification for dissection within a Christian perspective stems from the altruism of the living, in that the person while alive decided to gift his or her body to a medical school to be used in a certain way following his or her death. The specific Christian thrust within this principle is that the supreme model, Jesus himself, gave up his own life for others. To give one's life for one's friends is ethically commendable, but to do it for those who are undeserving is the height of altruism (John 15:13). In first becoming a human being, and then in giving up that life voluntarily for others, Jesus showed in unequivocal terms the characteristics of a life of humility rather than of arrogance or conceit (Philippians 2:3-8). The gift of one's body after death in no way matches altruism of this caliber, but contained within it is the essence of altruism and it serves as a salutary reminder of the moral significance of even this limited form of altruism.

Against this background, I shall now consider one concrete illustration, that of the historical events implicated in the dissection of cadavers.

## Obtaining Bodies for Dissection — the British Experience

Although it would be possible to use either British or American history (Lassek, 1958) in this section, I shall concentrate on the British experience since it shows very succinctly important ethical principles.

A central thesis for understanding the British history is that the Second Anatomy Act of 1832 made poverty the sole criterion for dissection in Britain (Richardson, 1988). To understand this thesis, some appreciation of the various sources of cadavers prior to 1832 is required, and it is here that we encounter the use of murderers' bodies, grave robbing (body snatching), and murder.

Early dissections in Britain (from the sixteenth century onwards) were of criminals executed for murder. The result of this was that dissection became recognized as a punishment, since it was something beyond execution itself. Following execution, the body of a murderer was normally hung on a gibbet (an upright post with a projecting arm) to emphasize the grim fate awaiting murderers by denying them burial. However, judges could substitute dissection for gibbeting, so that dissection became recognized as being as bad, if not worse than, gibbeting. Both denied burial to the murderer. Not only this, but dissection was regarded as doing something to the body beyond that already inflicted on the scaffold.

Unfortunately for these early anatomists, this means of acquiring bodies provided very few of them. Consequently, the beginning of the eighteenth century saw the emergence of another means, namely, grave robbing, which, with the passage of time, became by far the most significant means of getting bodies. The earliest grave robbers were surgeon-anatomists or their pupils, and there was often a close liaison between them and the body snatchers, with the latter providing several thousand bodies annually. However, most of the bodies stolen in this way were those of the poor.

Not surprisingly, by the early nineteenth century, these activities were frowned upon by many within society, who expressed disquiet regarding the moral and social acceptability of both grave robbing and the subsequent mutilation of the dead. The seriousness of the situation was aggravated by activities that apparently took place inside dissecting rooms, including sexual indecency and violence inflicted on bodies (Richardson, 1988). The urgent need to stop the grave robbers led to the first Anatomy Bill in 1829, recommending the use of hospital and workhouse patients (who were seen as consenting to dissection by the simple act of applying for treatment) with no relatives to bury them, or whose relatives were too poor to do so. The consequence of this move was to class the poor alongside the worst of criminals as potential subjects for dissection. It was this socially divisive aspect of the Bill that led to its rejection. Bad as this was, the situation was aggravated by the committing of murder to obtain bodies for dissection.

*The 1832 Anatomy Act reflected the predominant opinion within the medical profession that the most noncontroversial source of bodies would be 'unclaimed bodies.'*

Around 1830, various options for obtaining bodies were being considered and, although there had been a steady stream of bequests between 1828 and 1831, this option was not taken seriously. The result was that the 1832 Anatomy Act reflected the predominant opinion within the medical profession that the most noncontroversial source of bodies would be 'unclaimed bodies.' Since the Bill abolished the use of dissection as a punishment for murder, poverty became the sole criterion for dissection (Richardson, 1988), though no reference was made to the social status of the proposed subjects of dissection. As a result, in the 100 years following the passage of the Anatomy Act in 1832, less than 0.5 per cent of the bodies dissected in the London anatomy schools came from anywhere other than institutions housing the poor, that is, workhouses and asylums. It was not until the 1960s that bequests exceeded 70 per cent. A similar situation has been found to have occurred in some other countries, such as New Zealand, where, from the 1870s onwards, the bulk of bodies came originally from the 'poor houses' and after this from mental hospitals (Jones and Fennell, 1991). The bequest ethos, in this instance, was established in the late 1950s.

The early history of obtaining bodies for dissection in the United States had much in common with the events in Britain, except that the early Anatomy Acts were less decisive than in Britain concerning the use of unclaimed bodies (Lassek, 1958). This prolonged the reign of grave robbing. Legislation to punish offenders occupied a more prominent place

than in Britain, with fewer efforts being made to find a socially acceptable, let alone ethical, use of human bodies.

There need be no discussion regarding the unethical nature of practices such as murder and stealing. What is far more interesting is to ask whether a profession built on such an ethically dubious base can itself be ethical. There is no way in which historical calumny can be bypassed or ignored. It is there, and many past gains were built on unethical foundations. Are we today involved in moral complicity, accepting as we do the data and ideas obtained in such scurrilous ways? While we ourselves may not act in such a manner, we cannot totally isolate ourselves from the endeavors of our predecessors. Nevertheless, I have argued elsewhere (Jones, 1991) that there is a moral chasm between historical incidents, such as these, and our standards today, as long as our standards follow accepted bioethical principles in the area under discussion and as long as we are not guilty of serious ethical lapses in related professional areas. With these provisos, we today are not guilty of complicity in these unethical practices, even if we do use data emanating from them.

However, what are we to make of some other practices, such as exploitation of the poor and the lack of informed consent for the use of cadavers? There is no problem if contemporary procedures avoid these practices. If this is not so, ethical dilemmas remain. This raises the question of the use of 'unclaimed bodies,' a practice that continues to this day in countries where too few bodies are made available by prior donation. How are Christians to respond to this practice?

## The Use of Unclaimed Bodies

In an attempt to address such questions, a starting point is provided by asking why the treatment of cadavers is considered of ethical significance. One answer is that the cadaver has intrinsic value: it is an end by itself. An alternate response is that the cadaver has instrumental value: it can be used as a means to an end.

I consider that the cadaver has both intrinsic and instrumental value, and that the manner in which cadavers are treated is of moral significance (Jones, 1994). If this is the case, it can be argued that we show disrespect to a person now dead when we allow that person's body to be dissected in the absence of any consent on the person's part prior to death, and/or in the absence of any close friends and relatives to argue the case for the deceased. In other words, dissection of an unclaimed body may be a form of exploitation, since those with greater rights and opportunities *pre mortem* are protected from this. It may also follow that the manner in which unclaimed bodies are treated may differ from the manner in which bequeathed bodies are treated. The question with which I am concerned is whether the use of unclaimed bodies is accompanied by consequences such as these.

***I consider that the cadaver has both intrinsic and instrumental value, and that the manner in which cadavers are treated is of moral significance.***

The use of unclaimed bodies has three parallels. The first is with grave robbing. The bodies have been taken and used, without asking anyone's permission, let alone because of someone's gift. The 'taking' element is uppermost in both instances. Tempting as this connection is, there are ethical differences between the two situations — the absence of living relatives and their interests in the unclaimed bodies, but not in grave robbing. I find these differences more compelling than the similarities.

A second parallel is with presumed consent (opt-out) for the donation of organs from cadavers for transplantation (Teo, 1992). However, in most societies operating this scheme, there is in practice provision for consent by the family and it is this that separates it from the use of unclaimed bodies. It is true this is not universally the case, but it is sufficiently widespread for the purposes of my argument.

A third parallel is with the use of newly-dead patients for teaching and practicing intubation techniques in the absence of consent (Iserson, 1993). Here there is conflict between the respective claims of effective education and patient welfare on the one hand, and respect for the cadaver and the significance of consent on the other (Orlowski et al., 1988). However, what is done to these cadavers is slight compared to complete dissection of unclaimed bodies, and this difference imposes a major gulf between the two.

Consequently, my conclusion is that the use of unclaimed bodies in the dissecting room does not directly correspond to any procedure we use today

in the realm of organ donation. What, then, are the problems with the use of unclaimed bodies?

The crucial problem revolves around the absence of altruism. The 'unclaimedness' of these bodies stems from the weakness, vulnerability, and frequently dereliction of the people when alive, and it is this unclaimedness that mirrors their 'unwantedness.' This may be warranted if cadavers are regarded as of instrumental value alone, although even here it is made possible only by treating cadavers for dissection and cadavers for organ transplantation in different ways. The result is that, rather than protecting the interests of such people, their interests have become subservient to other interests. But is this making the argument too strong, if for no other reason than that a dead body lacks interests? There is no hint that these people were, of necessity, mistreated during life, neither is there a general ethical objection to dissecting dead human bodies.

***My conclusion is that the use of unclaimed bodies in the dissecting room does not directly correspond to any procedure we use today in the realm of organ donation.***

The inevitable query from which we cannot escape is a dual one, stemming from a lack of consent by anyone with an interest in the unclaimed person, and from the fact that such people come from disadvantaged sectors of society. Taken together, these considerations hint in forthright terms that the process may be unfair, and that it may allow the exploitation of one individual by another, or one group by another.

On the other hand, it may be argued that what is done to a few disadvantaged individuals has no repercussions for the far greater number of individuals who are not likely to end their lives as unclaimed cadavers. It may also be considered that these few (by-and-large) elderly individuals can be assessed in isolation from the many young individuals who are killed in road accidents, and who may be candidates for organ transplantation. Is there an ethical link between how bodies get in dissecting rooms and how bodies get in operating theaters as organ donors or how human tissue gets in research laboratories? I would argue that there is. How bodies come to be in dissecting rooms cannot be isolated ethically (and should not be isolated procedurally), from how the bodies come to be in operating theaters as organ donors, or how the tissue comes to be in research laboratories.

It may also be argued that when unclaimed bodies are used, there are no family interests. Therefore, these interests are not susceptible to being infringed by use of the deceased's body without prior consent. This may be used to justify employing unclaimed bodies. But does a willingness to ignore the previous interests of those who have now died lead to a neglect of the autonomy of similar individuals when alive? It is arguable that there is a link between treatment of the living and the dead. I suggest that ignoring the previous interests of those who have now died leads directly to a neglect of their autonomy when alive. At the very least, if the value of people after death is perceived as being greater than prior to death, there is a moral compulsion to improve conditions when alive.

The use of unclaimed bodies continues to this day where too few bodies are made available by prior donation, or where the legal system directs that unclaimed bodies automatically go to anatomy departments. My contention is that society's (and the medical profession's) willingness to use bodies without the consent of the 'donors' before their death is a reflection of society's (and the medical profession's) attitudes towards the poor and the mentally ill. This attitude accords the educational value of dissection and possible future medical benefits stemming from dissection as more important than the autonomy of the disadvantaged within society. At the other end of the scale is the use of bequeathed bodies. Prior to their burial or cremation as dissected remains, they receive a memorial service (Bertman and Marks, 1989). While these services take a variety of forms, they bring together the altruism of the donors, the gratitude of the students and faculty, and the memories of close relatives and friends. Such services are fitting symbols of the positive use to which bodies can be put after death.

Putting these considerations together, I conclude that it is preferable to err on the side of using bequests. We may have to accept some educational inconvenience if we are to retain the more significant value of individual free choice (by an individual prior to death and by the family at the time of death). Nevertheless, what is done with dead bodies for good reasons is not the most important of all ethical matters. There is a balance to be attained at this point, a balance that emerges in other areas, where ethical strictures against use of organs from both adult and fetal cadavers for transplantation purposes have to be weighed against the potential benefits accruing to debilitated patients. The question with

which we are left is whether the benefits of dissection are sufficiently great in practice to justify the type of ethical compromise I have discussed.

## Conclusions

In view of the preceding discussion, many general statements about the use of human material can be made (Jones, 1991).

1. The study and use of human material are implicit within medicine, since there is no way of avoiding research on human persons. The ethical question is not whether this should be done, but *how* it should be done. Although the use of human material is not always justified, it is sometimes justified. We need to build a framework that balances the needs and aspirations of this human being, upon whom research is being conducted or who is being used for therapeutic purposes, against the needs and aspirations of that human being who is expected to benefit from the research or therapy. Clearly formulated ethical guidelines are essential in such circumstances, realizing that there will always be tension between the status we ascribe to the human body and human persons, and the scientific, clinical, or cultural value we ascribe to that material.

2. We have obligations regarding the human body, including honoring the wishes of the deceased or of the parents of infants, and protecting the integrity of the cadaver. These follow from the close identification a person has with his or her body, an identification so close that the two become almost inseparable. A dead body commands the respect of identity, since it reminds us of the presence that once was inseparable from it.

3. Present ethical standards frequently differ markedly from past ethical standards. While we cannot dissociate ourselves completely from how material was obtained, it is difficult to accept that the use of material obtained in an ethically dubious manner automatically reduces our own ethical standards to the same level. Nevertheless, we need to recognize that there is a danger at this point, and it is important that we address the question of the original ethical standards in these circumstances. It is also important to be aware that ethical standards and expectations may vary widely within society on medical issues and even among medical personnel, and these variations have to be both acknowledged and respected.

4. Much of the problem with the historical instances I have alluded to lay with the lack of informed consent that, in turn, highlights the importance of the gift principle. Such giving lies at the base of donating one's body for educational and therapeutic purposes. This is a gift of something that is more than anything else closely identified with what we are as persons. Informed consent lies at the base of the gift principle, and is crucial to all such transactions. This is also a recognition of what we are as persons. It is this that prevents the exploitation of one individual by another, or one group by another. While the notion of informed consent is strongest when the consent is made on one's own behalf, there are instances where it has to be made on someone else's behalf (proxy consent).

5. The supply of human material will always be limited, and will always be hemmed in by moral constraints. ✱

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# Communication

# What if They Debated and Nobody Came?

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Once upon a time there was a controversy — quite a public one — pitting cool, rational science against solid biblical faith: at least that's the way each proponent described his or her own position. The world learned about these opposing ideologies through books and articles, interviews with key people representing each position, and ever increasingly, through the spectacle of "The Debate." Here the contestants, like gladiators, waged verbal combat before large audiences of their fans or others eager for the shedding of philosophical blood.

One such infamous debate featured the leaders of each camp. Professor Curt Sageone, the celebrated astrometaphysicist from the Cornwell Institute of Technology, stood at a podium on stage left, with Dr. Heinrich Ignorus, director of C.R.I. (Center for Religious Information) at a podium on the right.

The specific issue under debate that night has been forgotten. Perhaps it was whether the whole atmosphere was created by the lungs of God during a single exhalation ten thousand years ago or whether it was accidentally captured by Earth as a wayward comet passed by. The important thing is that, according to the experts, we get the true orthodox explanation from scripture or the prevailing theory (read "fact"). Somebody, representing something, was the moderator, but no one really noticed him. On and off for an hour and a half, they pointed and counterpointed with great rhetorical flourish. Truth exposed was much less in evidence than untruth attacked. An exit poll showed that the final impressions of the paying guests were really no different from their inclinations as they entered. Was no one swayed by the arguments? What actually occurred and what was at stake?

As Marshal McLuen has indicated, in our time the medium of communication becomes the message. Individuals who refuse to engage in these debates are wise enough to anticipate futility, because debates like these are not about issues as much as they are about salesmanship. The details of each debater's position are overshadowed by his or her methods of persuasion. The debaters typically display more common ground than differences. They *do* arrive at completely opposite explanations, but they do so with the same black or white certainty with no room for shades of gray. Pick your base of truth: science or the Bible. Such positivistic approaches are the *modus operandi* of many strong promoters. Assurance builds confidence in your position and in your followers.

One way of depicting a range of positions in the perceived creation/evolution controversy is with a linear continuum (Figure 1, below). Atheistic evolutionists such as our Prof. Sageone could be the left endpoint and young-earth creationists like Dr. Ignorus could be at the other extreme. Popular media, much of the scientific community, almost all of the general public, and too many people in the Church are unable to recognize intermediate positions. There are, of course, nearly inexhaustible possibilities on a spectrum between the poles. Another

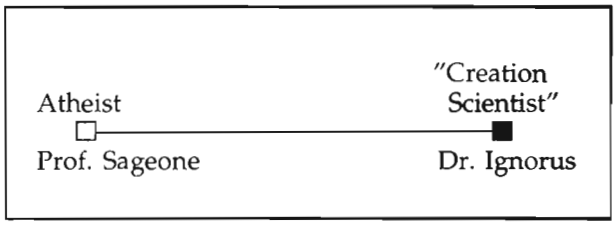


**Figure 1**

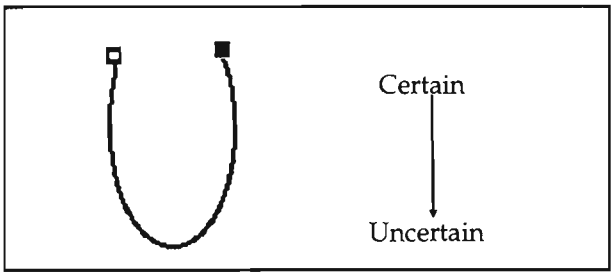


Figure 2

depiction (Figure 2, above) demonstrates a strong paradox that such opposing conclusions can be arrived at using the same philosophical approach. Dogmatic certainty causes the previous continuum to distort into a curve. The endpoints are drawn together and almost touch. Any degree of uncertainty or humility moves the thinker/believer away from the extremes.

This illustration of the "Sageone-Ignorus Certainty Principle" doesn't indicate that opposites attract, but it does suggest that the same character quirks operate at the extremes. Figure 2 contradicts the simple dichotomy between rationality and faith. A strong faith of one sort or another is essential for the debate. Each advocate arrives at a conclusion necessary to his or her world view. This starting point may be informed and modified by experience, but it represents a bias at the core of the person's being. With prominent spokespersons, perhaps they identify so nearly with what they espouse that any ideological threat is considered personal. We sense a fear of threatened ideological security and identity that subverts real truth-seeking in the debate format. In a debate, uncertainty or compromise displays weakness, and weakness means insecurity and the loss of control.

Sageone and Ignorus are characters that should warn us to beware egoism and humanistic personality cults. Gurus have become powerful symbols of their respective ideologies, and vice versa. Although we often attribute ignorance or dishonesty to those with whom we strongly disagree, it may be that we fail to realize the potential for personal deception. Many types of rationalization are common. Data conflicting with our thesis may be excluded because "we already know the answer." Or perhaps those aberrant data points are just expected within analytical error and need no further explanation. Besides, if taken seriously, this data could cause a reevaluation of the last ten years' work.

In the early 1900s, G.K. Gilbert urged a devotion to multiple working hypotheses among geological researchers. Today we rarely see openness, honesty and humility as rewarded traits in either science or theology.

It is a big mistake to believe that debating evidence will prove a point and convert the infidel. Besides the problems with methodology that force data to support preconceived conclusions, there is the additional difficulty of legalism to contend with. The mind's door is closed to all but the most narrowly defined standards. Innovation, novelty and creativity of mind are perceived as threats.

In his classic, *The Structure of Scientific Revolutions*, Thomas Kuhn makes the point that, in science, this stubborn line of defense must be greatly overwhelmed before new explanations will be accepted. My personal experience with outreach to Jewish people at the University of Wisconsin illustrates this difficulty in the area of religion. No matter what cultural or biblical data I presented, they had to overcome certain fundamental biases rooted in personal identity before they could consider Christ as the Messiah. To accept Yeshua was to reject self and start over. Only the Holy Spirit can accomplish the new birth. First, there must be some gap in the defenses. The hypercontrol of legalism, with its humanistic dependence, is the antithesis of Christian freedom. Humility and honesty result from trust that the mind of Christ will guide us into truth.

In respect for honesty, I must recognize my own pride as a hindrance to spiritual as well as intellectual growth. As a Christian academic, I have a long way to go in countering sinful attitudes. If I truly believe in the double proposition that God is the author of all creativity and that I will always fall short in my depth of understanding (of anything), then many personal interpretations should be held tentatively. This does not compromise those tenets essential to our Christian faith, including basic ethical standards. Christians and academics need to be more particular in choosing which ideological battles are worth fighting. Martin Luther is credited with the recommendation that there be strong unity in the essentials, but that in all other areas diversity of opinion is allowed.

An alternative to "the debate" resides around a table with a few contributing parties. The aspect of theater may be lost but here is an environment that may be effective in achieving a consensus. Open discussion of issues can occur with maximum input and a minimum of rhetorical showmanship. This is how many business negotiations, international treaties, and policy decisions are hammered out. It is also how scientific meetings in the past presented and analyzed papers.

Perhaps Prof. Sageone and Dr. Ignorus would refuse to meet, if the meeting was to really probe each other's ideas. That would not be a great loss. Without debates and other sensationalized public displays we might just find that the games and their star players have changed. ✱

# Book Reviews

**WHAT MAKES NATURE TICK?** by Roger G. Newton. Cambridge, Massachusetts: Harvard University Press, 1993. 257 pages, index. Hardcover, $27.95.

"Newton's book is, quite simply, a masterpiece. I wish that I had written it." Sheldon Glashow, Nobel laureate, and author of another well-known book popularizing physics, splashes these words across the dust jacket. While Glashow's book, *The Charm of Physics*, was a notable addition to a plethora of recent work popularizing exotic and often speculative theories in particle physics and cosmology, Newton's book focuses almost entirely on well-established theories covering a much wider range of physics. The author, distinguished Professor of Physics at Indiana University, shows the comprehensive style that made his 1966 textbook, *Scattering Theory of Waves and Particles*, the classic it is. Unfortunately, this style is now his undoing. From bosons to tachyons, Brownian motion to EPR, ferromagnetism to CPT violation, and partial derivatives to Lie algebras, Newton discusses almost every topic covered in a well-rounded theoretical physicist's education. According to the preface, the book is "intended to be comprehensible to readers who are scientifically uneducated and who know very little mathematics." With breathtaking speed, Newton plows through his material, a given page will typically introduce three or four new concepts, many with no more than a sentence devoted to them. To its target audience it will often seem a cacophony of terms rather than a comprehensive introduction to the main themes of physics.

This book is a typical example of "death by details"; it's as if the original manuscript was about ten times as long and then shortened to ten more or less self-contained chapters instead of ten books, but without leaving out any topics. For example, on p. 97, Newton introduces the terms "scalar" and "vector" potentials, without ever explaining what they are, why they're called "scalar" and "vector," or why we should even care. Hidden in the text are also a great many mathematical derivations almost certainly too difficult for readers who know little mathematics. On the other hand, Newton's pleasant prose, especially on those topics he takes enough time for, is a real joy to read. One can only imagine what the book would be like had he either drastically reduced the number of subtopics, or expanded it to the 750 odd pages of his textbook.

Coming back to Glashow's praise: Is Newton's book a "masterpiece"? No, it certainly is not. Although the author must be commended for his broad grasp of physics, the book falls short of its intended goals.

How about the second part of the dust jacket quote: Should Glashow wish he "had written it?" Yes, he should. The last decade has seen an exponential growth in the number of books popularizing physics for a general audience. From Stephen Hawking's *A Brief History of Time* to Leon Lederman's *The God Particle*, many of these focus on recent and exciting developments in particle physics and cosmology, and often contain speculative applications to theological concepts such as the existence of God. Newton's book is refreshingly free of such pompous claims, and is one of the first to focus on more established ideas in theoretical physics. He hopes "the reader of this book will come away with an appreciation of the role beauty plays in the construction of scientific theories and the adoption of scientific concepts." Theoretical physics is a discipline of great intrinsic aesthetic appeal and internal consistency, and by his choice of topics Newton shows that there is no need to resort to exotic topics to demonstrate this. His down-to-earth style and emphasis on curiosity-driven research being the driving force behind great science (from whence the title) are typical of the community of physics practitioners he represents. From its pages can be gleaned some of the wonderful order of God's creation, and the sense of awe many of us feel as we slowly uncover its secrets. Newton's approach is commendable, and Glashow and his compatriots would serve us well with books along similar lines.

Despite its major flaw—covering far too many topics—I found it worth my while to read. This book is a good one for a physicist wanting a broad overview of his/her field. It should also be accessible to readers with a general scientific background. For its intended audience though, it will be confusing in many parts, although not really more so than many other popularizing books. Most of the chapters are self-contained, and with the help of the generous bibliography, the book could be used as a starting point for any topic one is interested in.

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**THEODYNAMICS: Neochristian Perspectives for the Modern World** by John A. Creager. Lanham, MD: University Press of America, 1994. 452 pages, index. Hardcover; $54.50.

Creager wants to modernize theology. The preface tells us that theodynamics is ... "a conception of God consistent with the modern view of the world as an organic process. ... God is creatively immanent as an eternal presence, yet transcendent in the sense of being unidentifiable with any concrete individual entity or act." Creager's God and the Christian's God are different. The Christian's God is identifiable, not an unidentifiable presence. Creager challenges

traditional religion and philosophical notions held by scientists.

Calvinists agree with Creager that Greek philosophy influences modern scholarship. They disagree, however, with the unchristian conclusions Creager draws. Unfortunately, Creager shows that he does not know Calvinism. On page 346, he draws a conclusion about Calvin's view on predestination without showing his source. G. C. Berkhouwer discusses the Calvinist view in *Studies in Dogmatics, Divine Election* (Grand Rapids, 1972, page 254-277). Berkhouwer shows, that both predestination *and* man's responsibility for sin are scriptural. On page 401, Creager denies the Trinity as it is stated by the Council of Nicea. He accepts the Greek dichotomy of soul and body. Gordon Spykman shows in *Reformational Theology, a New Paradigm for doing Theology* (Grand Rapids, 1992, pages 398-400) how the Council came to the confession that Jesus is true God and true man.

Creager uses biblical language, but inappropriately. Sin and its resulting pain become a step in the evolution from passive unconscious participation with God to active conscious participation. Creager calls Christ's death for our sins "savage symbolism" (page 281). He places the creation and fall-in-sin "myths" on apar with creation myths of pagan cultures (pages 271-274). This book attacks Christian faith. Studying it shows how Creager wants to see the relationship between faith, religion, and science.

It is not always easy to check Creager's sources. Often the writer does not mention his source, or if he names a book, the page number may be missing.

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**IN THE WAKE OF CHAOS: Unpredictable Order in Dynamical Systems** by Stephen H. Keller. Chicago: University of Chicago Press, 1993. 190 pages. $19.95.

The broad goal of the author of this book is "to demonstrate that the relatively new field of chaos theory is rich with philosophical interest." This extremely thought-provoking and stimulating book does precisely that.

Chaos theory is taken to be "the qualitative study of unstable aperiodic behavior in deterministic nonlinear dynamical systems." After pointing out that chaotic systems have a "sensitive dependence on initial conditions"—small changes in initial values of parameters can result in large changes in final values—Kellert goes on to examine interesting questions that arise from this feature.

Much of science assumes that "small errors will stay small" but chaotic systems challenge that assumption, forcing a consideration of what kind of limitations this imposes on our scientific knowledge. In general, while the exact behavior of chaotic systems cannot be predicted, it is often possible to determine general characteristics of system response (e.g., identifying an attractor—a shape in the phase space of the system—to which specific behaviors will be drawn). Thus the kind of predictability striven for with dynamical systems is a more qualitative than quantitative one.

While chaotic systems are often said to be deterministic, this notion needs to be carefully considered when the behavior of the systems under discussion cannot in practice be predicted for any significant time into the future, based on a given accuracy of the initial values used to start the system. Kellert talks about an effective predictability limit associated with a system, and discusses how sensitive dependence on initial conditions leads to system behaviors that are unpredictable over desirable predictability windows with any achievable accuracy of the initial conditions, thus challenging the difference between "in theory" and "in practice" predictability. This challenge arises because "chaotic systems require impossibly great resources for accomplishing useful predictions." In conjunction with quantum-mechanical considerations about inherent limitations on accuracy of initial conditions, this limitation raises doubts about the viability of the doctrine of determinism in modern physics. Kellert contends that we cannot speak of the world as deterministic. "Chaotic dynamics will take the tiny inaccuracies of quantum-mechanical systems and stretch them into huge variations, dilating the smallest patch (representing uncertainty of quantum mechanical measurements) until, at some distant time in the future, almost anything is possible." So, determinism is "rendered meaningless."

Some of the mathematical tools available to explore chaotic systems have been available for much longer than they have been put to use. The final chapter of the book asks why these tools were not put to use earlier, and concludes that sociological reasons had a considerable impact—scientists were taught to look for linear solutions and to ignore chaotic effects, and did so.

Chaos theory is thus "an occasion for investigating the interaction between our methods for gaining knowledge about the world, our notions of what that knowledge should look like, and our conceptions of what kind of world we inhabit."

In addition to the matters which Kellert discusses directly, the considerations in this book raise interesting questions for readers of this journal. Kellert comments that "what makes some prediction tasks impossible is some fact about us — in the sense of finite beings in this physical universe and not merely some fact about us — in the sense of just us poor humans with our current historically limited resources." Further, "Chaos theory discloses a region of logical possibility closed to us neither by physical law nor by limited resources, but by the fact that we are finite beings."

The ASA has had a long-time interest in such matters. For example, Donald MacKay's work on predictability for an observer, as distinct from predictability for the par-

ticipant, has been discussed in the pages of this journal on several occasions; that work represents one approach to resolving an apparent conflict between determinism, predictability, and responsibility. If Kellert's analysis stands, there should perhaps be other approaches to this problem pursued by members of this affiliation.

This book contains enough background on the scientific matters it discusses that readers of this journal should have no trouble following Kellert's arguments. It is well-documented with footnotes and references for those who want to read further. The presentation is clear and cogent. I highly recommend this book. It helped me to clarify my thinking about chaos and I believe it could do the same for most readers.

*Reviewed by David T. Barnard, Queen's University, Kingston, Canada K7L3NG.*

**DAVID BOHM'S WORLD: New Physics and New Religion** by Kevin J. Sharpe. Lewisburg: Bucknell University Press; London and Toronto: Associated University Press, 1993. 168 pages, bibliography and index. Hardcover; $32.50.

Kevin Sharpe has two doctorates, one in mathematics, and one in religious studies. His doctoral dissertation in 1987 dealt with Christian theology and the metaphysics and physics, as well as the mathematics of David Bohm. The first five chapters in the book under review deal with the views of David Bohm. In the last two chapters, Sharpe compares Bohm's theories with Christianity. He thinks that Bohm's theories may be valuable for Christianity in defining relationships between science and theology. I agree.

Sharpe uses the terms "religion" and "theology" interchangeably. Religion and theology deal with values according to some scholars. Our discussions would gain clarity if we would use the word "faith" on a personal level. "Faith" indicates what moves people at their deepest levels. "Religion" is the communal serving of God or an ideal (not necessarily Christian). "Theology" is then the scholarly pursuit of matters that relate to the service of God (or gods). I think that it is not possible to study "God" in a scholarly way. That is scholasticism. Scholars can study how we serve God (or gods). Not every church member who serves God, that is, a church member who has a religion, is able to study "theology."

We would also gain by a better common understanding of the word "science." I always have to try to understand what a particular writer means when he uses the word. For some it is just the "natural" sciences, some include mathematics, some do not, while others mean scholarship in general. Is it scholarship dealing with facts? Most of the time Sharpe means the natural sciences, or even more specifically physics.

Sharpe notes levels of interaction in reality. On some of these levels, religion and science interact. Sharpe propagates a ladder model of relationships between theology and science. The ground on which the ladder stands is the real world. The two vertical poles of the ladder exemplify theology and science. Rungs depict the levels on which both science and theology have knowledge and assumptions. It made me think a bit of the philosophy of the cosmonic idea.

The point I enjoyed most in this book was that Sharpe and Bohm stress the unity of the cosmos. They say that we cannot understand reality unless we consider the fact that the cosmos is a unity. What happens at a particular place and time in creation may influence all of the creation. Bohm uses the term holomovement; he thinks it is not God. Sharpe wants to use Bohm's idea of God to build a Christian theology. He says that the idea has a long history in the Reformed tradition (Barth). Though I am standing in the Reformed tradition, I do not recognize my thinking in it, except for the fact that the creation is a unity. I do not think that we may, or even can, build a Christian theology or philosophy in that way. We must start from the fact that God created, that man fell in sin, and that Christ redeemed the creation (see Rom. 8:1-21).

The book has an extensive bibliography. I miss in it, however, books written in the Reformed tradition as represented by the Philosophy of the Cosmonic Idea. As an introduction to that philosophy, one does not have to start with the four volume work of Dooyeweerd with the same title. The first chapter of physicist Marinus Dirk Stafleu's book, *Time and Again* (Bloemfontein, S. A. and Toronto, Can., 1980), gives an easy-to-read overview of that philosophy. He then deals with relativity and quantum physics.

Despite these critical remarks I heartily recommend Sharpe's book. It is written by a mathematician-theologian about a physicist who wrote a book about quantum physics. Keep in mind, though, that Bohm was not a Christian. He grew up in a Jewish family, and was very much influenced by Eastern religions.

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**TOWARD A THEOLOGY OF NATURE: Essays on Science and Faith** by Wolfhard Pannenberg. Edited by Ted Peters. Louisville, Kentucky: Westminster/John Knox Press, 1993. 166 pages, index. Paperback; $19.99.

In this book Wolfhart Pennenberg, the distinguished Professor of Systematic Theology at the University of Munich, discourses in a philosophical vein on many of the themes common to science and theology. The jacket carries a quote from R. J. Russell, describing one of the activities of the book as "reformulating theology in light of science,"

and also the complementary statement by the editor that "Pennenberg ... challenges scientists to incorporate the idea of God into their picture of nature." In his Introduction, Peters says, "This is the world setting within which Wolfhart Pannenberg asks how theology might become more scientific and how science might become more theological." This is a tricky area and great care is needed to avoid losing the integrity of science and/or the integrity of theology.

The book consists of seven chapters on the general themes, "Theological Questions to Scientists," "The Doctrine of Creation and Modern Science," "God and Nature," "Contingency and Nature Law," "The Doctrine of the Spirit and the Task of a Theology of Nature," "Spirit and Energy," and "Spirit and Mind."

As an example of the treatment given in the book, consider the fundamental "theological questions" that the author raises for scientists. (1) Is it conceivable, in view of the importance of contingency in natural processes to revise the principal of inertia or at least its interpretation? (2) Is the reality of nature to be understood as contingent, and are natural processes to be understood as irreversible? (3) Is there any equivalent in modern biology of the biblical notion of the divine spirit as the origin of life that transcends the limits of the organism? (4) Is there any positive relation conceivable of the concept of eternity to the spatiotemporal structure of the physical universe? (5) Is the Christian affirmation of an imminent end of this world that in some way invades the present somehow reconcilable with scientific extrapolations of the continuing existence of the universe for at least several billions of years ahead?

The author finds issues in unusual places. For example, he mentions in several places that "inertia" is a major theological problem. In several places the author is attracted to the possibility of drawing a connection between "field theories" in science and theological statements about "spirit." He delves deeply into philosophical history to develop themes across the centuries. He dismisses process theology: "The philosophical theology of Whitehead seems to me to be subject to considerable misgivings, from the points of view both of theology and of philosophy of nature."

He invokes the concept of the Trinity in an unusual way, "Today's Christian Theology of creation will use, in distinction from Newton, the possibilities of the doctrine of the Trinity in order to describe the relationship of God's transcendence and immanence in creation and in the history of salvation. Perhaps a renewed doctrine of the Trinity would combine the Logos doctrine of the ancient church with contemporary information theory and recognize the activity of the divine spirit in the self-transcendence of life and its evolution."

He makes provocative statements that sometimes leave the reader wondering. It seems clear when he says, "The theological doctrine of creation is not bound to this or that individual scientific hypothesis." But then he follows this with, "It can claim different scientific models, although there are conceivable scientific hypotheses which — if they can be verified — would exclude the idea of creation." In describing the doctrine of the Spirit, and the Spirit and energy, the author makes frequent reference to the ideas of Tillich and Teilhard.

The form and the intellectual challenge of the book can be seen by considering a specific sentence (characteristic of the style of the whole book) on the final page. In discussing "evil spirits," the author writes, "However, if its self-centeredness dominates its self-transcendent activity in such a way that it can no longer become a member of more comprehensive spiritual integrations, the drive toward self-transcendent integration itself becomes disruptive and divisive."

This erudite book by a recognized theological scholar can bring puzzles, challenge, and insight to the patient and discerning reader.

*Reviewed by Richard H. Bube, Professor Emeritus of Materials Science and Electrical Engineering, Stanford University, Stanford, CA 94305.*

**THEOLOGY FOR A SCIENTIFIC AGE: Being and Becoming—Natural Divine, and Human** by Arthur Peacocke (Enlarged Edition.). Minneapolis: Fortress Press, 1993. 416 pages, notes, index. Paper; $21.00. Includes the author's 1993 Gifford Lectures.

I must admit I have grown suspicious of titles like this. Too often we find just another attempt to domesticate Christianity, to make theology inoffensive to polite company. But in the hands of Arthur Peacocke, biochemist, Warden Emeritus of England's Society of Ordained Scientists, Dean of Clare College, Cambridge, Director of the Ian Ramsey Centre, Oxford, and by any measure a leading scholar in the field, *Theology for A Scientific Age* is not at all meant as a dilution of Christianity. Peacocke is in fact developing a theology, one based on an exploration of how science affects our understanding of the world, ourselves, and God. But it might better reveal the spirit of the work to say he is taking advantage of science to help us understand how God works in creation. It is clearly an exercise in faith seeking understanding.

The introduction, a summary and orientation to the program, provides an interesting perspective on the themes to follow. If I ever act on my plan to compile a science and theology reader for undergraduates, this little piece will be high on my list. In Part I, "Natural Being and Becoming," Peacocke describes the relevant science, introduces some important concepts (irreducible levels of organization and top-down causation) and considers the wholeness of human personhood. Part II, "Divine Being and Becoming," concerns God's interaction with the world, making use of the previous discussion. Finally, Part III, "Human Being and Becoming," addresses in more detail what it is to be human, and makes use of the pre-

viously developed perspectives to consider God's self-revelation (both its nature and content, with an emphasis on Jesus, God's ultimate self-revelation) and its implications for human becoming. We recognize our unfitness, our alienation. But the message from science on where we should be going, what humanity *ought* to be, is ambiguous, making God's revelation all the more important. Parts I and II (a little over half the book), comprise a reprint of the first edition, while Part III is an expansion of Peacocke's Gifford lectures, delivered at Saint Andrews University in 1993.

This outline hardly reveals the range of Peacocke's themes. The analogy between God's creation and creativity in the arts offers one illustration of his approach. He observes, for example, that while artists may freely choose their media, they then face some constraints in order to effectively work in that medium. Or, concerning the theater, while a play may develop broadly in the way the playwright always intended, drama is always "both the playwright and the actors" (p. 172). And, in a more extended analogy, he notes: "Introduction of improvisation into this model of God as composer incorporates that element of open adaptability which any model of God's relation to a partly non-deterministic world should ... represent" (p. 175).

Peacocke here uses his well-known concepts of irreducible levels of organization, top-down causality, and human agency as a model for understanding God's work and to provide insights into providence. Reducing humanity to chemical activity ignores our experience of agency, and it may well be that our intentions affect what goes on chemically in, say, muscle action. Similarly, if God's interactions are seen as top-down causality, God would genuinely affect what is going on, yet no more violate the laws we observe at each lower level than my intention to raise my hand violates the laws of biochemistry. We cannot claim a full understanding of my movement based on a study of chemicals in my muscle cells, however well that serves as an explanation within its own level. In the same way, we cannot grasp the full meaning of events in creation without reference to God's purpose and intentions.

One of Peacocke's great concerns is avoiding an "interventionist" model of God's interaction, a view in which God is perceived as working against the causal mechanisms of the world. In his model, "events could occur in the world and be what they are because God intends them to be so, without at any point any contravention of the laws of physics, biology, psychology, sociology, or whatever is the pertinent science for the level of description in question" (p. 159). I should note that his concern is not simply to square with science but to have a consistent theology. Thus, for example, if God made the causal network to bring about his purposes, wouldn't actions which contravene it signal inconsistency?

This is important, of course, but even so I am not as bothered as Peacocke by the idea that God might work in other ways than through the existing causal network of the world as we happen to understand it at the moment. And this model is not without its price, for its implications seem to include—at least as Peacocke develops them—a need to subsume miracles under general providence, to make them rather like any other event. For many people this is no objection at all, in fact a major advantage of the model, and I should note that for Peacocke it is not a matter of naturalizing miracles. On the contrary, his overall thrust is to recognize a more active and important place for God in the basic workings and specific events of the world than many Christians embrace (except, perhaps, in the most abstract way). But I question whether his admittedly very powerful and appealing model, along with his objection to interventionism should be given priority when they lead us to reject certain Gospel passages.

In an extended and most interesting study of Jesus's miracles (in Part III), Peacocke embraces the healing miracles, but the nature miracles he considers highly improbable for they cannot, as far as he can tell, be explained by top-down causation within naturalistic workings of the world. His discussion of the doctrine of the virgin birth is perhaps the most important for understanding this model of God's action in the world. Peacocke is led to reject this as history, but for some very interesting reasons — such as how could we say Jesus was truly and fully human if he had no human father? His discussion of the resurrection is also important because he fully accepts this central doctrine of Christianity, yet observes that accepting Jesus's appearances following his crucifixion does not require us to accept the Gospel accounts of an empty tomb. The distinction is important, for if the resurrection was not a reanimation of the physical body, it would not be part of the natural world, and so not an interventionist miracle.

Theologians may well find other matters in this wide-ranging work that must be considered with care. Polkinghome's earlier objection to Peacocke's dependence on process theology is probably just as applicable to this work, and despite Peacocke's effort to defuse concerns, mere mention of the word panentheism will set some on edge. But this is also a book with much wisdom, with much to say that is worth thinking about, and I believe it will be of interest to many scholars. It should also work nicely as a text. Peacocke explains well all of the science, and if he assumes too much of a general reader, it is in the area of Christian theology. This is the work of a Christian exploring what the world and God are like, and while he addresses issues relevant to apologetics, Peacocke seems to have fellow Christians in mind as a primary audience.

*Reviewed by Paul K. Wason, Bates College, Lewiston, Maine 04246.*

**PHILOSOPHERS WHO BELIEVE: The Spiritual Journeys of Eleven Leading Thinkers** by Kelly James Clark, Ed. Downers Grove, IL: InterVarsity Press, 1993. 284 pages. Hardcover; $24.99.

Does your attitude toward philosophy need rejuvenating? This collection of the spiritual and philosophical

journeys of intellectuals with international reputations and "robust Christian faith" is the book to do it. Clark, a successful Christian philosopher, has persuaded eleven of his friends and colleagues to contribute essays on the development of their Christian belief. Although a "substantial number of women" were invited to contribute, only one did. Each philosopher has been given the latitude to tell the story in his or her own way; some have provided a very personal statement, whereas others have concentrated more on the development of their philosophy within the context of their lives. This variety in approaches enhances interest and strengthens the intended message of the book: there are many philosophers of genuine intellectual stature, who are also warm human beings with a strong vibrant faith. Some of the contributors were raised in the church and either came back or never saw any need to leave. Others came to their Christian faith after long philosophical study or even after becoming established in a distinguished career. One, Mortimer Adler, came to Christian faith from Judaism. The confessional stance of the group varies from conservative Protestant to Roman Catholic and one or two who consider themselves faithful Catholic but don't believe much of the doctrine.

This is an excellent introduction to Christian philosophers; most readers will be stimulated to delve more deeply into some of the books listed at the beginning of each essay and the sources given in the numerous notes.

*Reviewed by Eugene O. Bowser, Reference Librarian at James A. Michener Library, The University of Northern Colorado, Greeley, CO 80639.*

**COMPUTER VIRUSES, ARTIFICIAL LIFE AND EVOLUTION: The Little Black Book of Computer Viruses Volume II** by Mark A. Ludwig. American Eagle Publications, 1993. 373 pages. $22.95.

When I began reading this book I was put off by the conversational style which slid into sloppy and incorrect usage of English too frequently for my taste, as well as by the numerous mistakes that should have been caught by normal editing (footnotes with text at the bottom of the page also repeated in-line in the body of the page, spelling errors, punctuation errors, and so on). However, having been asked to review it, I stuck with it to the end. (I infer from the correspondence included with the book that the publishing house is a private venture of Mr. Ludwig's; if so, he could use some help from independent readers or editors.) Reading Mr. Ludwig's text was for me like getting to know a new acquaintance who is very different in style and mode of expression—after a while the things that were initially irritating become part of the persona one expects, and one puts up with it. While it might be less true to his face-to-face persona, some tempering of this mode of expression in his writing might gain Mr. Ludwig more readers.

This book evidently grows out of the author's interest in computer viruses and is a follow-up to a previous book he has written on this subject. The starting point for this one is a consideration of whether computer viruses can be considered to be "alive," which in turn leads to a consideration of what is meant when something is said to be alive. These questions are pursued at some length in a discursive, eclectic style that includes considerations from many different fields. Mr. Ludwig reads widely. Some bits of required background for some of the ideas are included as appendices to the text.

Another important theme of the book is a consideration of what a "theory of evolution" would mean. The author contends that Darwinian evolution is not a theory because it cannot be used to predict anything, and thus is not falsifiable—it simply explains how one life form, A, could evolve to another, B, and the arguments it supports are so weak (according to Mr. Ludwig) that they could easily be reversed to show how B could evolve to A. It is claimed that the study of computer viruses in their "natural habitat" can give a way of considering a theory of evolution independent of the world in which we live, and the theories, philosophies and religious views we all bring to discussions of evolution in that setting. Mr. Ludwig is not a Christian, but he does believe in some reality that transcends the physical world that apparently limits us. This transcendent reality may be inserting "information" into the world we observe, and thus directing its evolution, since evolution seems to be (in his words) reactive to external stimuli, rather than creative.

The author takes a more positive view of the writing of computer viruses than I can take (these things are essentially interesting bits of technology from which we can learn a great deal, and efforts to curtail their creation and dissemination are ill-considered). I wonder if the attitude he has on this point is a justification of his own interests, or a position a responsible "scientist" — as he styles himself—would otherwise come to. And in the end, there is no definitive answer to the questions he raises; they are left as provocations to further thought. In this the author is successful — if one persists to the end, one cannot but have been stimulated by this discussion.

*Reviewed by David T. Barnard, Queen's University, Kingston, Canada K7L3NG.*

**REFORMING SCIENCE EDUCATION: Social Perspectives & Personal Reflections** by Rodger W. Bybee. New York: Teachers College Press, 1993. 198 + xviii pages, complete bibliography, index. Paperback; $19.95. Cloth; $43.

Bybee's *Reforming Science Education* is the premier volume in the *Ways of Knowing in Science Series* edited by Richard Duschl. The book is a compilation of essays written by Bybee over a period of fifteen years, beginning around the mid 1970s. The author is specifically interested

in the personal and social goals of science teaching and points out the significance of defining these goals to conform to contemporary realities in order to achieve meaningful reform in science education.

The essays are organized into four parts. Since the essays were written over a period of time, the author provides *Reflections* at the end of each part. As the name indicates, *Reflections* are the author's new insights regarding the essays in respective parts, based on the data and trends that have emerged since the essays were first written. Each essay ends with a conclusion section which essentially summarizes the main arguments presented in the essay. The selection of essays in each part are linked to a particular theme. Thus, each part represents a theme which the author wishes to address.

The first essay in Part I provides a summary of the transformation of science education and its relationship to social changes. In this essay, the author also highlights five factors in contemporary society which are influencing science education. These are economic, environmental, ethical, societal, and global factors. In the second essay, the author labels contemporary society as an emerging ecological society, and discusses the significance of the five factors mentioned earlier in the new ecological society. He points out the role that science education must play in the evolution of this emerging ecological society. In the *Reflections* on Part I, the author suggests the term sustainable society in place of "ecological society." The last essay in this part deals with the aim and goals of science education for this ecological society. The three main goals listed by the author are as follows:

> 1. Fulfilment of the student's basic human needs and strengthening respect for these needs and for the fundamental rights of all humankind (p. 46)
>
> 2. Student's understanding various aspects of the physical and human environment and the ethical decisions required in the use of natural resources (p. 47).
>
> 3. Student's understanding of the interdependence of individuals on one another and on their environment (p. 49).

In conclusion, the policies regarding science education for an ecological society must require scientific literacy of the kind which meets the above mentioned goals.

Part II attempts to answer the question, "What should the scientifically and technologically literate person know, value, and do as a citizen?" This question arises from the conclusion in the last essay of Part I, about science education policies requiring scientific literacy. The first essay in Part II deals with the crisis in science and technology education from a social perspective and suggests some new ideas regarding the features of scientific and technological literacy. These ideas "incorporate an orientation for goals and an implied curriculum emphasis" (p. 68). The second essay provides a framework for scientific and technological literacy based on three essential themes: namely, science and technology concepts, the process of inquiry, and science-technology-society interactions. In the third essay, the author focuses on the science-technology-society (STS) theme. It summarizes the history of the development of STS as a theme for science education, featuring the debate between Yager and Good regarding the location of STS topics within the discipline of science education. The author argues in support for the STS theme in science education based upon the goals of providing scientific literacy for the emerging ecological society.

Having considered the question, "What should the scientifically and technologically literate person know?" in Part II, the essays in Part III provide some insights on how this might be achieved. The first essay in this part deals with a review of new science programs, especially those of the 1960s and 1970s, with a discussion of the challenges for teachers in implementing these new programs. The main idea in this essay is that teacher empowerment is the ultimate key to educational reform and that permanent changes in the larger system are necessary for sustained implementation of innovative programs. The second essay focuses on the planetary ecological crisis, and the need for greater recognition of environmental issues in science education. It appeals to the responsibility of science educators to "construct a vision of sustainability" (p. 123), to "clarify policies for curriculum and instruction" (p. 124), and to "implement program and practices" (p. 129). The role of science education is seen as critical in promoting the ideas and values of sustainability. The third essay considers the implementation of the STS theme in science education and finds that even though incorporating the STS theme into science curriculum was supported by the NSTA policy statement developed during the early 1980s, its implementation has been poor. The author recognizes the STS theme as the innovation that has the promise of producing the desired kind of scientific and technological literacy and supports its implementation.

Part IV, which consists of only one essay, focuses on the issue of leadership. The idea of empowering teachers is featured again in this essay. The author discusses the dimensions of leadership and uses a version of leadership model for science education, adapted from the original model presented by Edwin Locke and his associates (1991). He advocates distributed leadership and holds that with widespread assumption of the responsibility for leadership by science educators, reforming science education by the year 2000 is an achievable vision. According to Bybee, "If all individuals within the science education community recognize and accept their responsibility for change and improvement, then reform can be accomplished. For each person who assumes the responsibility of leadership, the burden on others is reduced and we have taken a constructive step toward reforming science education" (p. 174).

Throughout the book, the author emphasizes the importance of the translation of purpose to policy to programs to practices for reform to be effective. The selection of essays and the parts into which they have been organized present a smooth flow of perspectives on science education reform, from the relationship between reform and social changes, to the current needs of the society and the responsibility of science education to meet those

needs, and finally, to the ways in which this responsibility should be handled by science educators. On the whole, it is a fine compilation of research based ideas presented in an easy to follow manner.

This book would be a useful resource for anyone who is interested in learning about the why, what, and how of contemporary science education reform.

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**CREATION VS. EVOLUTION: A Comparison** by Lonnie Erickson. Poulsbo, WA: Scandia Publishers, 1993. 59 pages. Paperback.

This small book is another traditional young earth "creation science" discourse. The author was a chemical engineer but is now owner of an international marketing business. This background may explain why he used absolutist terms such as "only," "instantly," and "completely" in a subject characterized by probabilities and gradual developments. Although this is the third edition, the most recent reference cited is 1974; one third of the citations are older than 1940.

The author started well by stating that encounters between creationists and evolutionists are about the interpretation of facts rather than the facts themselves and asks the reader to keep an open mind. Midway through the book, Erickson finally defined some key terms such as *special creation*, a bringing into being basic kinds of organisms suddenly "using processes which were instantaneous." He considered two categories of evolution: the "General Theory," concerned with the origin of life and major groups of organisms, and the "Special Theory," which takes into account "minor variations one sees within related species." Industrial melanism (intraspecific variation) and the Galapagos finches (intrageneric variation) were given as examples of special evolution groups sharing a "common gene pool." I see nothing "special" about the microevolutionary changes so commonly found between populations within a species. I also question whether the rare intrageneric gene flow and the very common intraspecific gene flow belong to the same level of evolution.

Erickson limited his discussion of evolution to the "general theory," which is basically the original Darwinian version. Neither the neo-Darwinian nor punctuated equilibrium versions of evolution were considered. He did mention theistic evolution, gap theory, day-age theory, and progressive creation as "major compromises" but did not describe these theories or the way in which he thought they were compromised.

Erickson stressed that because there are "no enormous numbers of transitional forms" in the fossil record, which he considered the "only" evidence for evolution, evolution is a faith. He concluded by stating that "Creation is just as scientific if not more so, than evolution, and evolution is just as religious as creation."

Although this book adds nothing to the creation/evolution debate, persons wanting a different author to repeat the same young-earth message might enjoy this book.

*Reviewed by L. Duane Thurman, Professor of Biology, Oral Roberts University, Tulsa, OK 74171.*

**THE MORAL SENSE** by James Q. Wilson. New York: The Free Press, 1993. 313 pages, index. Hardcover; $22.95.

Behavioral scientists who work in a college setting often begin their courses with a consideration of the age-old nature versus nurture dispute. Why does mankind behave as he does? What is most influential in directing the human experience? James Q. Wilson's *The Moral Sense* attempts to define the essence of human nature as he discusses the issue of morality. In the process he provides a panoramic review of the literature of psychology, sociology, philosophy, and the history of Western Civilization. Quite a daunting task!

Wilson is James Collins Professor of Management and Public Policy at UCLA. He has also written *Bureaucracy, Crime and Human Nature* and *On Character*. This book is divided into three parts which the author labels Sentiments, Sources, and Character. Wilson has provided a brief notes section with virtually no annotation, and a very extensive bibliography. There is also a comprehensive index of terms and names.

Wilson begins by acknowledging that contemporary readers raise their guard when a writer discusses virtue or character. However, he points out that we all regularly evaluate people in terms which clearly imply a standard that could be referred to as relating to character. "The fact that you discuss morality with practically anyone suggests to me that the word 'ought' has an intuitively obvious meaning and that people are, in the great majority of instances, equipped with some moral sense" (xii).

The author indicates that he does not believe people have direct intuitive knowledge of certain moral rules, but rather a more general, imprecise sense of good, bad, right and wrong. He gives examples of such a moral sense which he says includes the "sentiments" of sympathy, fairness, self-control, and duty. Wilson identifies the sources for these moral sentiments as being human nature, family, experiences, gender, and culture.

The author is clear that human beings have within them great potential for good, and yet at the same time a strong bent toward self-centeredness. People have a nature characterized by polarities. He points out that even

when human beings pursue their own ends ruthlessly they seem bound to provide a justification for their behavior. This is, he believes, a strong indication that people have a moral sense.

The greatest portion of the book is Wilson's review of a diverse literature that he believes is supportive of his ideas. The range of disciplines he examines and the historical comprehensiveness of his effort is quite impressive.

At the heart of the discussion of moral sentiments and of their sources is Wilson's belief in the supreme importance of the social nature of human beings. Our need for and our attraction and personal commitment to other people is definitive of the human experience.

The primary value of this book, in my view, is in its ability to raise significant questions, and to relate them to a diverse literature. Wilson expends great effort in discussing Darwin's evolutionary theory, and the Enlightenment. He does not give religion the same level of attention. This is paradoxical since much of what he argues fits with the historic Christian understanding of what it means to be made in the image of God.

This book would be stimulating reading for all those who are interested in non-theological arguments for morality or who want to consider a range of ideas about human nature. I believe that this work would be particularly useful for psychologists, who often lack an appreciation for the significance of the wider social context.

*Reviewed by Craig Seaton, Associated Professor of Psychology and Sociology, Trinity Western University, Langley, BC V3A 6H4 Canada*

**NOT A CHANCE: The Myth of Chance in Modern Science and Cosmology** by R. C. Sproul. Grand Rapids: Baker Books, 1994. 224 pages, 2 indices. Paperback; $15.99

As described by its author, "This book is an effort to explore and critique the role chance has been given in recent cosmology." It may be viewed as a diatribe against chance.

Sproul's central thesis is that scientist are committing a logical fallacy when they claim that chance acts as an instrumental causal power. Chance has no power because it is not really an entity; "...it has no being in nature." Sproul is especially critical of the role chance plays in contemporary cosmology and quantum mechanics, two sciences which seem to invoke chance as an ultimate explanation of phenomena.

In this 200 page work, Sproul presents an overview of some of the issues at stake, issues such as the law of noncontradiction, the law of causality, and the rationality and integrity of science. Using his philosophical and theological expertise, he argues against the notion of a self-existent universe but for the notion of a self-existent God.

Sproul interacts with the thinking in the literature. He cites various philosophers and theologians in a historical study as well as contemporary popularizers of science such as Isaac Asimov, Timothy Ferris, and Carl Sagan. Several times he quotes with approval Stanley Jaki.

As a college physics teacher with no pretensions of having much philosophical acumen, I found Sproul's philosophical arguments generally convincing. Trained philosophers, such as those mentioned by Sproul might think otherwise. I found particularly interesting Sproul's theological discussion of paradoxes in Christianity and God's self-existence.

Scientists, philosophers, and general readers should find this book helpful, but not technical.

*Reviewed by Dale Pleticha, Professor of Physics, Gordon College, Wenham, MA 01984.*

**STUDIES IN SCIENCE & THEOLOGY 1994: Origins, Time and Complexity (Part II)** by George V. Cogyne, Karl Schmitz-Moorman, Christoph Wassermann, Eds. Geneva, Switzerland: Labor Et Fides, S. A., 1994. 318 pages, index. Paperback.

The Fourth European Conference on Science and Theology was held near Rome on March 23-29, 1992, under the auspices of the Vatican Observatory, Vatican City State. To this observer, the setting for the meeting, the chance to visit the Vatican Observatory and meet people from many of the European nations plus a sprinkling from North America and Africa provided a memorable experience. The work of the conference was carried out in seven sections related to the themes of origins, time, and complexity. The official language for the meeting was English (with the exception of French speakers) and this approach was followed in publishing the papers. The 46 papers defy a simple description. They constitute a mélange of offerings from individuals trained in a wide diversity of disciplines in the humanities and sciences seasoned by a spectrum of theologies and traditions in treating science/religion themes.

This book will discourage readers who look for unity. Rather, it effectively serves as an international window on ways that those who follow some expression of Christianity come to grips with modern scientific culture. Patient readers will be rewarded with fresh insights on old problems.

*Reviewed by J. W. Haas, Jr., Professor of Chemistry, Gordon College, Wenham, MA 01984.*

**BETWEEN GOD AND GOLD: Protestant Evangelicalism and the Industrial Resolution, 1820-1914** by Robert A. Wauzzinski. Cranbury, NJ: Fairleigh Dickinson University Press, 1993. ISBN:0-8386-3481-8.

This ambitious book seeks to explore the "fusion of Evangelicalism and Industrialism" using an interdisciplinary ("theology, economics, church and world history, and philosophy") approach. The author's own theological-philosophical perspective is that of "the Amsterdam school of Christian philosophy" which is given a clear, articulate, if not thoroughly persuasive presentation. There is much talk in Christian liberal arts circles about the need to engage in interdisciplinary studies, and Wauzzinski deserves praise for his efforts in this regard. Unfortunately, in my view, the final product is less praiseworthy than the effort.

The main thesis of this book is that Evangelicalism and what the author calls "Industrialism" have, from the time of the Industrial Revolution, become allied through a common "religious commitment" to the idea of progress and to individualism. Evangelicals have often failed, says Wauzzinski, to recognize, much less respond to, the structural, systemic injustice wrought by Industrialism, being content to treat the results of injustice and preach the salvation of individual souls. Thus a form of dualism, or "compartmentalization of religion," which consigned Christianity to the realm of the spirit but not the flesh, emerged with Evangelicalism.

Evangelicalism, indeed the Church in general, surely goes wrong in adopting this truncated view of the proper domain of Christian thought and action. It also errs in aligning itself too closely with any secular ideology or "ism," be it capitalism, socialism, or "Industrialism" (a concept which I found rather difficult to pin down). Wauzzinski has performed a useful service in exposing the historical and theological roots of this dualism and unwarranted attachment of some evangelicals to capitalism. Yet clearly he has more in mind that making a point of purely historical interest. There is still a bond — or so he contends — between Evangelicalism and capitalism, and evangelicals may well be reaping the fruits of this bond. "Perhaps Evangelicals might want to consider the possibility that their fall from public grace, increasingly occurring during this century, maybe as much a result of God's judgment for their siding with capitalism as it is the result of the increasing realization of secular America that Evangelicalism has no unique socioeconomic insight to offer American identity." (213)

Putting aside the matters of whether Evangelicalism, as a movement, has "fallen from public grace," and the propriety of inferring God's judgment on this basis, there still remains the important question of whether "Evangelicalism had [any] unique socioeconomic insights to offer American identity." If Wauzzinski is seeking some comprehensive socioeconomic critique and alternative program, widely endorsed by Evangelical leaders, accepted by the rank and fie, and grounded in a distinctively evangelical theology, then he is bound to be disappointed. The decentralized character of the evangelical movement is enough to forestall such uniformity. Yet he seems totally unaware — or so it would seem by scanning his references — of the growing body of literature produced by Christian economists, to which evangelicals have been major contributors, which stands opposed both to the dualism and the close ideological attachment of which he is rightly critical. This omission calls into question his rather sweeping indictment of Evangelicalism. [I refer the interested reader to *With Liberty and Justice for Whom?* by Craig Gay, Eerdmans, 1991.]

Along with this failure to acknowledge, much less interact with the writings of Christian economists, I found equally troubling his limited and generally biased sources on matters of economic history. Knowingly or unknowingly, the author close to rely on the views of a very limited range or writer, often dated, and many of whom who are ideologically committed to an anti-market, anti-capitalist perspective. This led him to make some rather bold generalizations which are either misleading or, in some cases, flatly wrong. For example, he cites with approval the description of England during the Industrial Revolution given by J. L. and Barbara Hammond ("The towns had their profitable dirt, their profitable smoke, their profitable slums, their profitable disorder, their profitable ignorance, their profitable despair. The curse of Midas was on this society ..."), as if this were, in a sense, a summary, or at least a representative sample, of scholarly opinion of the subject. Given the abundance of recent, published work on the Industrial Revolution it is difficult to explain Wauzzinski's use of this source, though it was popular and influential in its time (early to mid-twentieth century). The question of what happened to living standards during the Industrial Revolution is still hotly debated by economic historians, yet the works of J. L. and Barbara Hammond scarcely figure in this debate. Open to similar criticisms are his references to Arnold Toynbee and John A. Hobson. Other examples of questionable claims include the assertion that the Industrial Revolution "widened the gap between the rich and poor" (117) and the claim that "modern Industrialism centers more upon industrial growth than it does on profit." (86)

It is perhaps owing to his use of questionable sources that Wauzzinski can make the following statement: "When poverty did not disappear, charities attempted to correct what the market had helped to cause" (121). This we find in the context of his criticism of early 19th century evangelicals for their failure to attack the roots of poverty (industrialization) and their insufficient response to a structural problem (charity). The statement leaves the impression that poverty — in the sense of people lacking sufficient income to live a life with human dignity — was an aberration in human history brought on by the market (or by capitalism, or by industrialization; these distinctions are often blurred in the book). But this has it exactly backwards. Taking the long view of human history, poverty was the norm, not the exception. And it was not until the Industrial Revolution that the common working person could look forward to anything but a marginal existence at best. What is needed is not so much an explanation of poverty as an explanation of why some

nations have been able to overcome what historically has been the almost universal state of human existence.

The book concludes with a discussion of proposed "reforms" to modern capitalism which build on the concept of "codetermination" (where decision-making authority is shared by labor and management) at the level of the individual firm. At the national level, economic policy would be formulated by "representatives of employers, unions, government, consumers, environmentalists, the disenfranchised, banking and the Federal Reserve System." Implicit here are two unsupported assumptions: that democratization will necessarily produce a more just economy; and, that democratic planning will produce tolerable economic results. Far too many questions remain unanswered. Would this system broaden or limit employment opportunities? Would government *mandate* the restructuring of corporate boards to include union members and consumer advocates (206)? What incentive (or coercion) would insure that "economic growth projects ... have a variety of social needs in mind at the moment of their initiation, not as a charitable afterthought? And how will government arbitrate disputes about "God-given callings"? ("...when power or opportunity reduces intercommunal or interindividual relationships, government must step into give all parties room to pursue their God-given callings" (207). Why should owner-managers "broaden their definitions of cost"? This list contains only a sample of the unanswered, and indeed unexplored questions that come to my mind.

Interdisciplinary scholarship is always risky since one faces potential criticism on several fronts. It is possible that a church historian or theologian would have given this book a more positive review. As an economist I am unable to do so.

*Reviewed by Bruce G. Webb, Professor of Economics, Gordon College, Wenham, MA 01984*

**WHAT IS TRUTH: A Course in Science and Religion** by Peter J. Brancazio. *Am. J. Phys.* 62, 893-899 (October 1994).

The author is a professor of physics at Brooklyn College, CUNY. This article describes a special topics course he taught in the Program in Studies in Religion, with the goal of clarifying the philosophical and historical differences between science and religion, and providing a framework for discussion of important issues and areas of conflict. With students drawn from a very wide range of religious and nonreligious backgrounds, the subject was approached from the "objective and nonjudgmental" viewpoint of an "alien sociologist."

It was concluded that fundamental conflicts lie between science and theology, not science and religion. The underlying metaphysical assumption of science is that of materialism, in contrast with most religions which believe in a supernatural world whose beings can interact with the material world. But, the class agreed that a scientist could also believe in a supernatural realm. Science and theology also differ in their sources of knowledge or truth: scientific data for science, sacred texts for theology. In considering the nature of truth, it is argued that the correspondence theory is most useful in science, while the coherence theory is more widely used in theology.

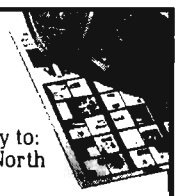
Thomas Kuhn's approach to the history of science, as a series of revolutions linked to paradigm shifts, was also applied to the history of religion. The author states, "It is noteworthy that while scientific revolutions are resolved largely by the testing of hypotheses, the weight of evidence, and community consensus, theological revolutions often seem to lead to censorship, repression, or even bloodshed."

As the class considered the question of why science and religion have often appeared to be in conflict, some helpful perspectives emerged: science cannot answer basic questions of morality, ethics, or ultimate purpose; the big bang model does not give a scientific explanation of the origin of the universe, but rather of what took place after it began; one cannot use science to prove or disprove the existence of a Supreme Being. But some conclusions are likely to be challenged by thoughtful Christians, e.g., "Science has ... shown that humans are not the focal point of creation."

The author came away from this course "with a far more tolerant attitude toward religion [and] a greater respect for the limitations of science ..." This reviewer found the well-written article informative as a wide-ranging survey of contrasts and some similarities between science and religion, by a thoughtful observer who writes from outside of a commitment to Christian theism. It stimulated reflection on my own perspective on some issues, and helped me to understand some thought patterns of students and others with whom we want to engage in dialogue.

*Reviewed by Donald E. DeGraaf, Professor Emeritus of Physics, University of Michigan-Flint, Flint, MI 48502.*





# Letters

## On Battson and Clark

For me, neither Battson's article nor Clark's (*Perspectives*, December 1994) does much to illuminate the science-Christianity interface. Clark misapplies Kuhn's analysis of paradigm shifts within science to the founding assumptions on which science itself is based, and Battson (yet one more time) misidentifies evolutionary theory generally with Darwinian mechanisms. It is, however, the conclusion reached by them both that concerns me. They insist (I would agree absolutely correctly) that by utilizing only explanations cast in naturalistic terms, scientists are restricting or limiting themselves. What they fail to see is that it is precisely this restriction that makes science possible at all; and this restriction has turned science into the most successful and culturally-transcendent intellectual enterprise in human history.

Under the guise of increased openness, they propose a return to a god-of-the-gaps methodology which, they are convinced, will produce a science more compatible with Christian theism. Let us hope their advice is not taken, because the result instead will be much to their dismay a so-called science that, now freed from the "restraints" of naturalism, will have those gaps filled by every wind of doctrine that blows — be it religious, political, nationalistic, irrational, mystical, or you-name-it, and against which they will be powerless to argue consistently. In my opinion, the abandonment of the assumptions that both make a scientific view of the world possible and restrict it to its proper domain will produce a very dubious short-term gain and a very serious long-term loss, and should not be regarded as a viable way out of perceived present dilemmas.

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As a mathematician trained in probability (and also a Creationist!) I am somewhat bemused by the discussions on stasis and lack of transitional fossils, most recently exemplified by Battson's article in the December, 1994 issue of *Perspectives*. My perplexment (!) is that these facts seem to be put forth as somehow arguing against naturalistic evolution. In my own view, these features of living matter are what one would expect and are in themselves largely irrelevant to the argument.

The head picture that I form when I think of evolution is a vast N-dimensional space pockmarked with many sloughs reaching out, so to speak, to ensnare the hapless wanderer (or blind watchmaker). In quantum physics, these sloughs would be called potential wells. To oversimplify things for the purpose of illustration, the plot of a one dimensional slice through this space might appear as a graph with many narrow peaks of varying height separating valleys of varying depth and breadth. Let's say that the x-axis of this graph is DNA configurations and the y-axis is transition probability. (Let's be naive for now and not ask, "Transition to what?" In a realistic model, this probability would be an infinite vector with an entry for every possible target configuration.) A valley would represent the DNA variations corresponding to a particular species.

In this oversimplified picture, to say that a given species exhibits stasis means either that the transition probability (vector magnitude) is extremely low (so that the DNA has a high probability of faithful replication) or that the species valley is surrounded by very high walls so that most transitions to the "slopes" will tumble back in to the valley (Yes, I am mixing metaphors here, but when a mathematician pictures N-dimensional space, all constraints are off!). To say that there are few examples of transitional species means that the species are surrounded by peaks of high transition probability, so that if a DNA configuration on such a peak or slope occurs it will rapidly slip into a neighboring valley, leaving little residual trace. The improbable event is that the traveler will claw its way up the slope and down into the neighboring valley (a transition between species). Along the way there will be few stopping-off points to leave residue of the campfire.

Incidentally, once the traveler has arrived in the new valley, his descendants will tend to diversify within the confines of that valley. Thus one could *expect* to see the inversion that Battson cites; major changes followed by lesser changes — phyla first, then classes, then orders. One would *not* expect to see the fossil record creep gradually from one phylum or class to another by innumerable transitional changes. Personally I see this expectation of gradualism the result of a historical accident of science: that mathematics, the language of science, blossomed by contemplating continuous phenomena rather than discontinuous. Note that Darwin's day was long before the realization that the world of physics is not one of continuous but of discontinuous change.

Things are, of course, much more complex than implied in my simple head picture, and involve vast dimensions, but this is the essence of how I see the issue of stasis, lack of transitional forms, and the "inversion" of the fossil record. To expect transitional forms is somewhat like expecting to find intermediate states between elementary particles in physics.

The issue as I see it is not the lack of transitional forms or the remarkable stability of the species or the inversion

of the fossil record (I would expect all of these!), but the probability of transition between DNA configurations, and the viability (attainment of both self-sustaining and reproductive ability) of these configurations. The naturalistic evolutionists would argue that these are sufficiently high to account for the diversity of species that we see.

With the amazing advances in the understanding of the genetic code, and of the various mechanisms that support and propagate life, scientists in principle possess the tools to investigate these probabilities. The problem is that to date, no plausible mechanism have been discovered that would provide sufficiently high transition probabilities that would account for a viable path between significantly different species within the (severe!) time constraints since the big bang. And this leaves aside the issue of forming the first life from non-living material.

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## On Crenshaw's Second Letter

In his letter (*Perspectives* 46:3, p. 218), Robert E. Crenshaw demonstrates a comprehensive ignorance of the nature of the universe. Why then respond to him? The main reason is that, otherwise, people seeking understanding will think that publication of his letter in a recognized journal gives him credibility.

Crenshaw tries to force the universe into a Euclidean structure, though he gives no indication that he is aware of so doing. The last plausible attempt to do this was Whitehead's 1922 *The Principle of Relativity*. Whitehead was a brilliant geometer, arguably the greatest of all geometers, whose theory was soon found to be unacceptable. The only plausible structure today requires an incredibly complex modification of a four-dimensional Riemannian geometry.

What difference does the geometry make? A partial answer may be given without a course in advanced mathematical theory. Consider a ten-inch line. If it is straight, "What is the midpoint of the line?" can be answered fairly easily, depending on the level of accuracy required. But if the line is the circumference of a circle, the question cannot be answered, no matter the level of accuracy. One cannot reply that the circle has a center, for the question is not about the two-dimensional circle, but strictly about the closed line.

Now imagine 60 of these circles, evenly placed so that each passes through the same point, A. Properly, the number of circles should be infinite, much too much to imagine. Point A is clearly not the center of any of these circumferences. Now imagine 30 lines drawn through A and the points opposite to point A of each of the pairs of circles. Now, using each of these lines in turn as axes, rotate and duplicate the structure in 6° steps, though the number of steps should also be infinite. If we pick any of these many circles and move along it consistently from point A, we will eventually come back to point A. Is A, then, the center? Only of our illustration up to this point. To make things more nearly Riemannian, we need to specify that the opposite points, the ones forming the sphere-like surface of our imagined structure, are all the same point. In other words, what we have imagined as a surface is all tucked in, so that there is no outside. No one should feel chagrin at not being able to imagine this. On the other hand, no one may claim, "I'm on the outside," for he or she has not produced the completed structure. Further, no one may reject this, for it is a necessary logical consequence of the basic postulates of Riemannian geometry.

Unfortunately for any attempt to think in Riemannian terms, our imaginations are strictly Euclidean, for they are formed from our experience. We cannot detect the deviation from strict Euclidean parallelism produced by the earth's gravitational field. The much greater mass of the sun deflects the grazing light from distant stars approximately 0.0005°, about the angular width of a quarter viewed from a distance of two miles. The problem of the scientific description of the universe is further complicated by the need for four dimensions, whereas we are visually, tactually, and auditorially restricted to three sensory dimensions.

"Big Bang" was invented to poke fun at Gamow's theory. It remains because no one has come up with a better term. It is totally misleading if understood as an explosion, which has an origin and a spreading shock wave. Cosmologically, there was no explosion. Additionally, the effects of detonations develop within Euclidean parameters. But our spatio-temporal creation is Riemannian. So the expanding universe, from the minute originating ylem through the present enlargement to its distant future, has neither center nor boundary, making Crenshaw's description of a diameter reaching across it nonsense.

Clearly, Crenshaw's vision of the blessed dead proceeding to the Omega point is absurd, for there is no such Alpha/Omega point, except perhaps in the quixotic sense that every point in the universe has equal claim to being its center. Even if there could be a unique location remaining, there would be a monumental problem, for spatial movement is so restricted that transit time would be billions of years, a hope hardly blessed. Can one get out of this bind by claiming that the soul is not so restricted? Only if one can explain why and how a non-spatial soul has need of a spatial destination.

For all non-specialists trying to understand cosmology and related matters, the best simple introduction is George Gamow, *Mr. Tompkins in Wonderland*, reprinted in *Mr. Tompkins in Paperback*. The author was the brilliant theoretician who formally developed the Big Bang theory, and also wrote science fiction. The latter book has been repeatedly reprinted, most recently in 1993.

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# American Scientific Affiliation 1994 Annual Report

## Report from the Executive Director

What an exciting place to work — phones ringing, machines humming, computer keyboards clacking, piles of mail, and never a dull moment. I have the best workers that anyone could ask for — Carol Aiken, Patsy Ames, Lyn Berg, and Frances Polischuk. Patsy is now retired from our office and Lyn has become the Managing Editor. She has jumped into the task with enthusiasm and a lot of talent. The staff has been so helpful to me — even little things like where to get a birthday cake for my wife. I want to express my deep appreciation to each one of them.

I have been a traveling man this fall. It was good to see many ASA members at the Templeton/ASA lectures scattered around the country at nine key churches. I want to warmly thank Sir John Templeton for providing the financial support necessary for me to represent the ASA. It was good to experience the enthusiasm of the local sections and meet people whose names I had heard but whose faces I had never seen. I appreciate all the tremendous effort that the local coordinators expended to organize each lecture. They are the only ones who can fathom all the details that are necessary for such an undertaking.

Other exciting trips included the meeting of the Christian Environmental Council (CEC) at the Au Sable Institute in northern Michigan, the Boston Theological Institute (BTI) meetings in Weston, MA, and the New Era Philanthropy training sessions in Radnor, PA. First, let me say that New Era and New Age have no relationship. The New Era Philanthropy sessions were important for both our board and myself to learn how we can better serve you as a nonprofit organization. Fred Hickernell and David Wilcox attended with me. There were many well known Christian organizations at the sessions and much networking occurred. The CEC conference was spiritually, informationally, and environmentally uplifting to me. There were a score of ASA members in attendance as well as many other interesting people. Calvin De Witt and the staff of the Evangelical Environmental Network put together a masterful program and beautifully moved along the formation of the CEC. The BTI Conference was on Religion and Genetics with many important and interesting speakers. It was good to meet people near Ipswich who take both science and religion seriously. More about some of these meetings has appeared in my corner of the Newsletter.

We were privileged to have Dr. John F. Kilner as our featured speaker at the 1994 ASA Annual Meeting held at Bethel College (MN). His presentations were carefully prepared and well thought out. There were 33 papers and posters presented. It was a busy time for me as the brand new executive director, program chair, and retiring president of the Affiliation of Christian Biologists. Now I am back to one hat and that is sufficient. The personnel at the college could not have been nicer to us and we want to give them a large thank you. It is my hope that more of our members will make the effort to attend an annual meeting. Many come back year after year when they realize the wonderful Christian fellowship that occurs. Where else can you have questions debated among theologians, philosophers, social scientists, and natural scientists at the same meeting? Special thanks to Tim Shaw and Bob Kistler for their help with the local arrangements.

It was especially good to visit with some of our Canadian (CSCA) brothers and sisters in October at their annual meeting in Toronto. Good papers were presented and I had the privilege of attending their Council meeting and discussing plans for the 1996 Annual Meeting to be held in Canada.

Plans for the 1995 Annual Meeting at Montreat-Anderson College on July 22-25 are progressing well. Martin Price, program chair, is already lining up speakers. I am excited about his innovative ideas. I visited the Montreat area and made contact with Mike Sonnenberg, local arrangements coordinator, and talked with college officials to nail down the details. Now I am making final arrangements for places in 1997 through 2000. Then comes our sixtieth anniversary. Does anyone have suggestions for that? Let us think big.

I have made progress on setting up my cadre of ASA representatives in various Christian colleges around the country and now I will start with the secular colleges and universities. It appears that InterVarsity will help me. It is a big job but I believe that it will pay dividends for God's kingdom as we mentor graduate students. These representatives will also be my recruiters for new members in these locations and soon the rest of you will get a chance to be involved with that as well. I have begun work with the commissions and local section leaders to see which ones are active. Would you like to be active with a commission? Would you like to take charge of or start a local section? Let me know and we will see if we can put you to work. I am asking our local section leaders to nominate fellows for the organization.

Like most nonprofit organizations our finances have been tight but I am overwhelmed with how faithfully so many of you donate sacrificially. My heart is full of thanks for each donor. Frances and I filled out the application for the Evangelical Council for Financial Accountability (ECFA) this past fall and we are happy to announce that we have been accepted into their membership. The ECFA symbol will appear on our new stationery. It will help to assure you that your monies are being used with integrity. We are still struggling to lower the organizational deficit which started in 1993 but now with your help we are chipping away at it. The Lord being our helper, I would like to see it wiped out in the next year or two. Would you join our one percent of salary club or set aside a significant gift for this year? May God show you your part in this.

Finally, I would like to thank the Council for their support and good suggestions for the organization. All members are donors and show strong interest in our organization. We are fortunate to have such willing people who come from coast to coast. But ultimately this organization is the Lord's and I ask that you pray for it and us each day that His will is done in us and in this affiliation. I hope that you have been able to use the monthly prayer cards that were provided. The staff meets in the Ipswich office each Tuesday morning for devotions, prayer, and priority

setting. If you have special prayer requests, new ideas for the organization, or suggestions for improvement, please do not hesitate to let us know. May you experience a wonderful year of God's blessing.

Donald W. Munro
Executive Director
starting July 1, 1994

## Report from the Past Executive Director

This last year of my role as Executive Director began with the installation of new office computer equipment, a gift from Mr. Kenneth Olsen of Lincoln, Massachusetts. In March Betty and I went to New Zealand and Australia and I gave Templeton Lectures at the Universities of Auckland and Otago in New Zealand and at Queensland University in Australia. We managed a few days to see the albatross and yellow-eyed Penguin colonies in southern New Zealand and also a quick look at the Australian rain forest and the Great Barrier Reef. On our return I left immediately for Munich and managed to lead a workshop at the meeting of The European Society for Study of Science and Theology.

In April we were pleased to welcome Don and Joyce Munro as they began the hunt for a new home in Ipswich. At about this time we also received support for another year of Templeton Lectures, this time to be oriented around large churches in major population centers in the U.S. The idea was to involve local ASA sections in the planning of science-religion lectures in the churches, with the intent of building rapport and confidence and a joint effort to gather a good audience for the lectures. Lecturers were to be David Cook of Oxford, Owen Gingerich of Harvard, David Myers of Hope College, Dan Osmond of Toronto, Bob Russell of the Center for Theology & National Science at Berkeley, and Howard Van Till of Calvin College. Each lecturer was to give five lectures in one of ten churches, a total of thirty lectures-three in each church. Needless to say, making the arrangements was no easy task, and I worked quite hard through the summer and fall. If we do this again, I will ask for an administrator to handle the job. But kudos to the ASA members who worked so hard with the individual churches. We will be putting a detailed report together for the Foundation and I will see that you get a copy. Hopefully it will find its way into next year's Annual Report.

In June we had what we hope is a breakthrough in our search for funding for the TV Series. We were invited to submit an application to the Foundation for New Era Philanthropy in Philadelphia, an institution which makes grants and also provides guidance for religious non-profit organizations seeking support for their programs. A provision of this application was that our Executive Director and representative council members attend a two-day workshop,conducted by the Institute for Excellence at the Foundation for New Era Philanthropy, and our new Executive Director and two council members attended such a workshop in October in Radnor, PA. The application for 3.5 million dollars was submitted on September 1 and reviewed by their grant committee on September 26. Owen Gingerich and I met with Jack Bennett, President of The New Era Foundation, on November 22 and a $250,000 grant was extended.

In July, Betty and I traveled to Cambridge, England for the two-week long C.S. Lewis Summer Institute. We had a very stimulating time, as did a good number of other ASA members in attendance, many of whom were on the program. Then, in early August Betty and I attended the ASA Annual Meeting in Minneapolis and received a lovely inscribed platter and some very kind words from President Fred Hickernell and new Executive Director Don Munro.

As I leave the top administration of ASA, I want to express my thanks to God and to you all for some thirteen years of precious fellowship. We hope to keep in touch with many of you in the years ahead!

Robert L. Herrmann
Past Executive Director
January 1 - June 30, 1994

## Report from the President

It seems like only a brief moment in time since February of 1968 as I drove Dick Bube from Motorola to the Phoenix airport until now, November of 1994, as I write this message. Dick had finished a day of consulting at Motorola and as we rode he told me about a unique organization of scientists and evangelical Christians and promised to send me some information about the American Scientific Affiliation. The whole idea that an organization existed whose purpose was to be a witness to the truth of science and the scriptures sounded wonderful and exciting and I wanted to be a part of it. Shortly thereafter I joined, purchased all the back issues of the ASA journal, and later held a series of Wednesday night meetings in our church entitled "Science and Faith." The importance of the work of the ASA continued to grow in my mind and heart as I met other members, attended the annual conferences, read the journal articles, saw service and educational projects come to fruition, took some special overseas trips, and told others about the ASA. And now a very special part of the ASA experience has been to serve on the Executive Council these past four years and work with a dedicated office and publications staff and two Executive Directors.

This has been a busy year for the council. The first two months of the year were focused on finalizing the selection of a new Executive Director. This was accomplished through personal interviews, telephone interviews, talking to references, and much discussion and prayer. The Lord lead us to Don Munro, a faithful long time member, a person with a great love of God and a heart for the American Scientific Affiliation. Don accepted the call and was on the job in July. Our thanks went out to Bob Herrmann for his dedicated leadership over the years and his help in a smooth transition of the office of Executive Director. Bob continues to support ASA through his work with the Templeton Foundation and continued efforts to bring the television series to fruition. As the year progressed the council supported the Executive Director and the staff with decisions related to budget and administration to further strengthen the organization. We reviewed our mission statement and started some visioning and strategic planning for the future. The staff submitted the necessary paperwork for the ASA to become a member of the Evangelical Council for Financial Accountability. It has been a privilege to work with such a find group of council members dedicated to serving Christ, the ASA and their scientific disciplines.

The Annual Conference is always a highlight of the year's ASA experience. After the council meeting, the day before the start of the conference, we enjoyed a great program put together by Don Munro and fellowshipped in the beautiful setting of Bethel College. The banquet was especially meaningful with the well-wishes for Bob and Betty. A few days after the conference Thresa and I spent an evening with Dennis (our newsletter editor) and Dottie Feucht in their beautiful home in Pennsylvania. It is a spacious energy efficient home, office, laboratory, and library for the Feuchts, set in a rural farming community, seemingly

isolated from modern society. However, they are closely linked with the world through a variety of communication equipment. Dottie served a wonderful meal with fresh garden vegetables and we spent the evening in conversation.

In October, Don Munro, Dave Wilcox, and I represented the ASA at a two-day seminar in Radnor, Pennsylvania with the Foundation for New Era Philanthropy at their Institute for Excellence. We considered the mission and vision of the ASA and how to expand our resources through grant organizations. There was an emphasis on the role of council members in the successful accomplishment of our mission. This presented some good challenges for the council in support of the short term and longer term initiatives proposed by Don Munro. Our mission and vision statement are firmly in place, and strategic plans are being formulated to accomplish our objectives through the leading and guidance of the Holy Spirit.

In September, I sent out a "Dear Colleague" letter on behalf of the Executive Council asking for support in debt reduction. I appreciated the positive response by our membership to that letter and the financial assistance given. I especially appreciated reading the personal letters sent with the contributions expressing the importance which the ASA had been in the lives of our members. This affirmation, I am sure, is only a small sampling of the stories that many of you could tell.

Being president this year I felt an additional responsibility for getting the word out about the ASA whenever the opportunity presented itself. I have given materials and copies of *Perspectives* to a Baptist pastor, a seminary professor, a Russian scientist, a visiting scholar, my new boss, a consultant, and several colleagues. Most had not heard of ASA but showed an interest in the organization. Telling others about the ASA is not just a presidential prerogative, but something we all can enjoy doing. The American Scientific Affiliation may be one of the best kept secrets just waiting to be told to someone you meet. Make a resolution to tell more people about ASA.

The membership of the American Scientific Affiliation is diverse, representing a number of scientific disciplines, religious persuasions, and geographic locations. Our membership is not a cross-section of our society or economy. We have had the opportunity for a better education and standard of living than most. Our distinctive attributes are a love for truth in science and its application for good, and a personal relationship with our Lord and Saviour Jesus Christ with the imperative to share that good news with others. The membership has unlimited opportunities to serve as spokespersons for the importance and limits of science in peoples lives and the limitless goodness and love of God. At a time when interest in science is eroding, when the Bible is misapplied in the scientific realm, and when science is used as a tool to establish doubts in the minds of young and old regarding their faith in God, each ASA member has a special responsibility to speak out. Our ASA members do have a special influence on the lives of men and women that go far beyond our numbers and economic resources. That's how God's economy works.

It has been a special privilege to serve as your president this year and experience even more closely the heartbeat of the ASA.

Fred S. Hickernell
President, ASA Executive Council

## The Canadian Scientific and Christian Affiliation Annual Report

The Morrison's graciously hosted a winter retreat at their home, Saturday, January 19. Despite wind, snow and a few landing in the ditch of the farm lane, a cozy group met to share ideas and dreams for CSCA. Many topics were discussed, including clarification of our mandate, the need to keep in touch and support fellow Christians in an academic environment, and the important of sharing our faith and scientific knowledge with others, especially students. We even agreed to take advantage of the computer era, exchanging e-mail addresses, and initiating advertisement of our annual meeting on the computer bulletin board. The latter brought several new inquiries regarding CSCA and its purpose.

The Executive Council met in Toronto, June 28 for its customary annual meeting to carry out the work of CSCA. The membership list was reviewed, and as a result, a letter was sent to 170 previous members inviting them to renew their membership. Results are still pending. The activities of CSCA were reviewed, and plans for the Annual Meeting were set in place.

The Annual Meeting had a different look this year (rather than centered around guest speakers). At our winter retreat, we recognized the need for a wider forum to discuss issues concerning science and Christianity. A Call for Abstracts was sent out to invite participation in the Annual Meeting. The response was modest, but sufficient for a full program. A successful meeting, entitled "Encounters Between Christian Faith and Science," was held October 29. The papers were of good quality, and generated lively and thought-provoking discussion. The speakers were encouraged to submit their papers to the journal, *Perspectives on Science and Christian Faith*. The audited financial statement for the year ending December 31, 1993 was accepted.

At the local level, a little formal activity has occurred. Christian fellowship by members of CSCA has been maintained in Guelph, Ottawa, Toronto and Vancouver but often under the name of some other Christian organization. Energy and time always seems scarce, and we are often pulled in many directions to do the Lord's work.

Another winter retreat is planned for January as we look forward to another successful year.

Gary Partlow
President, CSCA

## The Report of the Editor *Perspectives On Science And Christian Faith*

This year has been both 'the best of times' and the 'worst of times.' There is an increasing number of good manuscripts being submitted dealing with current issues and enduring questions. There were five submissions in September and six in November. *PSCF* is said to be attractive in format and written with the reader in mind. Unfortunately the time between submission of a paper and publication is typically over two years, a delay which removes any sense of timeliness and hinders the opportunity for dialog. More than 240 manuscripts have been processed in my five years in the editor's office. Currently, the acceptance rate is approximately 40 percent. We are applying strict word count limits for papers and communications and are cutting the maximum book-review length by 100 words as a means of reducing the backlog. Prospective authors can help by trimming their rhetoric.

The production team has been working effectively and continues to seek new ways to use electronic means to enhance efficiency and reduce cost. Unfortunately, we have lost our managing editor of three years, Patsy Ames. Lyn Berg joined us in September and is hard at work learning the ropes. This year I have sought to solicit additional reviewers. This, for the most

part, has led to timely and well crafted reviews. The quality of our *Journal* depends on the unsung efforts of these workers.

I have sought to publicize *PSCF* on the Internet and will use the science/religion discussion groups to explore ways to more effectively accomplishing our mission. There are many science professionals interacting with the secular public and serving in their local churches. We need their input and assistance. ASA member, Bill Hamilton, helped publicize the Templeton/ASA lectures. Others are providing names of potential members.

J. W. Haas, Jr.
Editor

## ASA/CSCA Newsletter

This year marks the first anniversary of my role as *ASAN* editor and Walter Hearn's first year of retirement from it. The transition from Walt to myself has, as I see it, gone smoothly; Walt has been a tremendous help in making the transition uneventful and he continues to contribute news articles, fatherly advise, and a bigger, historical perspective on the *ASAN* and ASA.

Bimonthly issues continue to be published, though the date was slipped, beginning with the December 1993 issue, to align the 6 issues within the calendar year. Issues are received within the middle of the stated interval, but publication will be incrementally advanced so that issues arrive in the mail box nearer to the beginning of the interval instead.

Most *ASAN* news is derived from other sources. I have, however, pursued some news directly, such as discussion with Phil Johnson to clarify some of his controversial assertions, or Eugenie Scott of the National Center for Science Education, to avoid misrepresentation in the news coverage. The Annual Meeting, of course, is big ASA news, and I covered it directly. I am now receiving Walt's list of *ASAN*-relevant publications, which are important sources of news.

In my first issue, I requested "gatekeepers" who would provide me news source material from their reading. This has, I believe, helped to expand coverage of relevant news into areas outside my usual purview within the applied physical sciences. Gatekeepers have come forth, and more of them are desired.

I have also been mixing straight news coverage with commentary from ASA members, such as Jack McIntrye's "vision" (JUL/AUG 94 *ASAN*) or an occasional editorial from myself. Don Munro now has an "Executive Director Speaks" column so that members hear directly about where the ASA is going, from its operational leader. Contributed articles from others have also helped to break the monotony of a single editorial writing style.

Managing Editor Patsy Ames has contributed non-trivially to the improvement of my writing and has been easy and enjoyable to work with. She has contributed to *ASAN* grammatical clarity.

I am open to any comments, kudos, brickbats, brainstorms or mere suggestions the Executive Council or any ASA members, would have to say about the *Newsletter*. My long-term challenge as Editor is to maintain sight of its basic reason for existence among the mundane exigencies of getting it out every other month. I see the ASA now emerging as part of God's larger dynamic in science, education and technology. This is not only a glorious calling by our Lord but also as responsibility to represent Him accurately, intelligently and lovingly to other individuals and societal structures whom perhaps only scientifically knowledgeable Christians can reach and impact.

Dennis Feucht
Editor, ASA Newsletter (ASAN)

## Report of the Book Review Editor of *Perspectives on Science and Christian Faith*

During the past year, I requested 140 books from publishers for review. I received approximately 100 of these books. After I looked at these books, I eliminated some of them because their topics were not appropriate for review in *Perspectives on Science and Christian Faith*. In addition, publishers sometime send books which I do not request. Most of these unsolicited books are not reviewed because they are unrelated to science and faith.

Expenses for the year, mostly postage but some supplies, were $127.45. The four issues of *Perspectives* from September 1993 through June 1994 included 72 book reviews, an average of 18 book reviews per issue. This compares with 102 book reviews published during the same period the previous year.

Book reviews published in *Perspectives* continue to be the most current of any quarterly. Few book reviews published during the past year were older than two years, and many were in *Perspectives* the same year in which the books were published. There continue to be a decreasing number of *Perspectives* book reviews published only tangential to science or intended for the general public. A small number of reviews of these types of books will continue to appear, however, because they are written by members of ASA or they are uniquely relevant.

There are many people who should be thanked for the success of the book review section: the writers, the publishers, the publicists, the book reviewers, and the editor and managing editor of *Perspectives*. I am grateful to the Lord and to the American Scientific Affiliation for the privilege of serving as the book review editor. My love for books, science and theological perspectives makes this a most rewarding opportunity.

Richard Ruble
Perspectives, Book Review Editor

## Committee for Integrity in Science Education

In 1994 the Committee continued its efforts to implement ASA's December 1991 resolution on "Teaching Evolution **as Science**." The difficulties of getting that message across to the educational establishment were brought home to the Committee in the latter part of last year by the treatment of our 1993 version of *Teaching Science in a Climate of Controversy* in the National Science Teachers Association publication, NSTA Reports! An account of the so-called review and the Committee's response has been published by the Committee chair (John L. Wiester, "Distorting for Darwinism: NSTA Reports! Reviews ASA's *Teaching Science," Perspectives on Science and Christian Faith*, Vol. 46, No. 2, pp. 128-132, June 1994).

Through correspondence, the Committee continued to bring the ASA resolution to the attention of officers of such organizations as NSTA and AAAS. We have also begun developing strategies to implement the resolution at the local level. To that end, philosopher Stephen Meyer of Whitworth College has worked with the Committee on a draft of a paper entitled "Guidelines for Teaching Evolution." A school board can use the guidelines to counsel science teachers on how to teach evolution while keeping

both "creationism" and "evolutionism" out of the classroom. *Teaching Science's* emphases on distinguishing between evidence and inference and on leaving open questions in science genuinely open are generally welcomed where the atmosphere has not been poisoned by emotional polemics. ASA's moderating position on the teaching of evolution is slowly gaining respect.

Progress on the manuscript *On Being a Christian in Science*, a guidebook for graduate students and other young scientists, has resumed after a hiatus in which the author, Walter Hearn, underwent cardiac bypass surgery. The possibility of some sort of co-publishing arrangement between ASA and InterVarsity Press is under discussion for 1995.

As the 1994 Annual Meeting in St. Paul, the Committee again sponsored a symposium, this time on evidence for the creative power of natural selection acting on random mutations. Paleontologist Keith Miller used the fossil record to argue for the efficacy of the new-Darwinian mechanism; from the same record John Wiester argued for its limitations. At the molecular level, biochemists Michael Behe and Terry Gray also took opposing positions: Behe presented evidence for an irreducible complexity unlikely to have been produced by the neo-Darwinian increase in complexity. In the Sept/Oct 1994 Newsletter of ASA/CSCA, editor Dennis Feucht commended all four speakers for being "truth-driven and free of rancor."

For the second year, the Committee offered "Caring Research Awards" for exemplary empirical papers given at the Annual Meeting. A small cash award of $100 went to an investigator in each of three categories. The winners were:

**Caring for Creation**: Marvin W. Meyer of the Biology Department of Eastern College, St. Davids, Pennsylvania, for an investigation of "The Moss Scopelophila and Heavy Metal Contamination: Analysis of Genetic Variation."

**Caring for People:** George V. Kinoti and colleagues at the African Institute for Scientific Research, Education & Development, Nairobi, Kenya, for a study of "Naturally Occurring Plant Pesticides for Tick and Mosquito Control." The paper was presented by Ken Dormer of the AISRED Board.

**Caring for Science:** James N. Behnke of the Chemistry Department of Asbury College, Wilmore, Kentucky, for design and testing of the new course described in his paper, "Teaching 'Ethical Issues in Science' at Asbury College."

A press release for generating local publicity was prepared and send to each Caring Research Award winner.

Walter R. Hearn
for the Committee
John Wiester, David Price

## ASA Computer Applications Committee

The year 1994 may well be called "the year that the Internet was discovered." All the major news publications featured articles on this network of networks that has been used for two decades by scientists, but recently has been gaining thousands of new users worldwide. This year I used CompuServe as a gateway to communicate with a missionary in Siberia! Truly the "global village" is here to stay. We all need to think about how this inexpensive, easy-to-use technology is going to influence our work, and the Lord's work in the world.

The ASA on-line subject index has recently been updated and converted to a Macintosh (File Maker) format, as well as the DOS format. Copies are available from headquarters. But his database only contains the citations, not the text of ASA's articles. Therefore I have been in discussion with some people about the possibility of creating or modifying brief articles on many of the topics discussed in the Journal, to provide some good reading material that may be uploaded to CompuServe, an Internet server and other such systems for widespread distribution. These articles would have to be public domain, free of copyright restrictions. I think those of us who are interested in spreading the Gospel and offering some clear-headed discussion of ASA ideas would be motivated to produce such material. If you want to do this, please let me know.

We are looking for a server or bulletin-board system on which to place ASA-related material. Perhaps your college library would make some space available for this purpose. Please let me know.

CD-ROMs have gotten much less expensive to produce lately, and this is another possibility for the future distribution of ASA literature. However, I think the on-line approach has more potential. Imagine the help it might be to my missionary friend in Siberia to be able to download a referenced article to specifically answer a technical or theological question — in Russian! It's coming, one way or another. I urge each one of you to learn how to use e-mail, at least, and then an easy-to-use Internet program such as Mosaic. Experience the delight of getting access to vast amounts of information at your fingertips!

Please write to me at arveson@oasys.dt.navy.mil.

Paul Arveson
Chair

## Association of Christian Biologists (ACB)

Once again the torch is passed as ACB president Don Munro moves up to Executive Director of the ASA. The ACB has been a dream come true for me — after years of saying it should be, it actually exists with a history of five years to its credit. In an age of rampant individualism, we desperately need one another — for counsel, for accountability, for our walk with our Lord.

My vision for the ACB involves networking through the Internet, telephone, national biological meetings and annual ASA meetings of Christian biologists in industry, research universities/medical schools, Christian colleges and secondary education.

Fragmentation seems to be the order of the day even among Christian professionals — there are already organizations for physicians, environmentalists, and psychologists. What we need is an organization to bring us together — hence the ACB.

As we mature, we need to encourage Christian young people to follow us onto the highways and byways of professional biology. Could this be our high calling as the ACB? I think that it might well be so. Pray that the Lord of the Harvest will give us as ACB members a vision for service that will sow seeds that can reap benefits of eternal consequence in the years ahead.

Gerald D. Hess
President

## Affiliation of Christian Geologists (ACG)

Activities of the Affiliation of Christian Geologists continued to focus on our communication and fellowship in 1994. Members and other friends were kept in touch through the organization's

newsletter, which is published twice annually. Unofficial E-mail connections are also becoming a popular means of sharing ideas.

The ACG met for over an hour at the ASA's Annual Meeting in St. Paul (Bethel College). Unfortunately there was a very low attendance by earth scientists. At the October meeting of the Geological Society of America in Seattle, a much larger group convened for our now traditional "event," in this instance to discuss the Gaia hypothesis and its ethical, scientific and theological implications. As always, the ACG hopes that the GSA gatherings will provide good publicity for the integration of faith and academics.

The second three-year term of office holders is complete in 1994. Members are asked to submit nominations for the next term. Future concerns include ASA themes, membership expansion, church outreach and cooperative projects.

Jeff Greenberg
ACG President

## Global Resources and Environment Commission

For the past couple of years, the goal of the Global Resources and Environment Commission has been to produce a publishable manuscript on Christian environmental stewardship which could be used by church laity. To that end, four members of the commission have contributed to such a manuscript, "Redeeming the Creation: The Bible and Environmental Stewardship," which is scheduled for publication in early 1995 by Starsong Press of Nashville. This book is authored by Drs. Fred Van Dyke of Northwestern College, Dave Mahan of Au Sable Institute, Joe Sheldon of Messiah College, and Ray Brand of Wheaton College, with Fred bearing the largest share of writing and editing.

Another goal of the commission has been to raise issues of environmental stewardship, especially from a Christian perspective, among individual members of ASA. This task was reaffirmed at a recent meeting of the Christian Environmental Council, an evangelical arm of the National Religious Partnership on the Environment. Commission members will be seeking ways to raise awareness and activity among our organization on these issues, and we welcome input from interested members.

David Mahan
Chair

## ASA Archives at Wheaton College

Accessions: *Perspectives on Science and Christian Faith*, 45:3, 46:1-2; Newsletter 36:3; 25" of administrative records, and one copy of F. Alton Everest's *Hidden Treasures*, 1951.

Arrangement: Copies of a revised Series Guide are available at the ASA office, and at Wheaton College.

Reference: The ASA Archives are housed in the Special Collections, Buswell Memorial Library on the campus of Wheaton College (IL). Immediate service is available in the Special Collections Reading Room; prior notice of a visit and materials wanted is much appreciated. (708) 752-5855. Hours Monday - Friday, 9:00 - 5:00 P.M., Saturday 9:00 - 12:00 noon. Buswell Memorial Library follows an academic calendar.

Larry Thompson, Head of Special Services
Buswell Memorial Library

## 1994 ASA Approved Budget: Summary Form

| | |
|---|---|
| **Income:** | |
| *Operating Income:* | |
| Dues | 80,000 |
| Subscriptions | 20,000 |
| Member Contributions | 104,000 |
| General Sales, Annual Meeting, Misc. | 68,380 |
| Project Overhead | 20,500 |
| **Total Operating Income:** | 292,880 |
| **Expenses:** | |
| *Operating Expense:* | |
| General Office & Salaries | 184,596 |
| Budgeted Program Expense | 97,530 |
| **Total Operating Expenses:** | 282,126 |
| **Special Projects Income:** | |
| T.V. Series | 25,711 |
| Lecture Series: | |
| * Templeton Foundation Year 3 | 25,273 |
| * Templeton Foundation Year 4 | 78,000 |
| Book Project: *On Being a Christian in Science* | 32,500 |
| *Teaching Science:* Distribution & Market. | 5,182 |
| Endowment Fund | 11,400 |
| Stratford Foundation Equipment | 35,045 |
| ASA Press Project | 5,225 |
| Neo Darwinian Symposium | 0 |
| **Total Projects Income:** | 218,336 |
| **Special Projects Expenses:** | |
| T.V. Series | 25,711 |
| Lecture Series: | |
| * Templeton Foundation Year 3 | 25,273 |
| * Templeton Foundation Year 4 | 78,000 |
| Book Project: *On Being a Christian in Science* | 32,500 |
| *Teaching Science:* Distribution & Market. | 5,182 |
| Endowment Fund | 1000 |
| Stratford Foundation Equipment | 35,045 |
| *ASA Press Project* | 1,347 |
| Ad-Hoc Meeting | 0 |
| **Total Projects Expenses:** | 204,058 |

**Frances Polischuk**
**Financial Manager**

# American Scientific Affiliation Financial Statements
## December 31, 1993

### *Balance Sheet: December 31, 1993*
*(With Comparative Totals for 1992)*

**Assets**

| | 1993 | | | 1992 |
|---|---|---|---|---|
| **Current Assets** | **Operating Fund** | **Endowment Fund** | **Total** | **Total** |
| Cash | $325,633 | $ 1,400 | $327,033 | $177,594 |
| Accounts Receivable | 6,420 | — | 6,420 | 115 |
| Investments | 2,553 | — | 2,553 | 2,612 |
| Publication Inventories, at Cost | 9,300 | — | 9,300 | 4,520 |
| Supplies | 1,500 | — | 1,500 | 1,620 |
| Total Current Assets | 345,406 | 1,400 | 346,806 | 186,461 |
| **Property and Equipment, Net** | 19,522 | — | 19,522 | 3,757 |
| **Other Asset** | | | | |
| Security Deposit: Rent | 400 | — | 400 | 400 |
| **Total** | $365,328 | $ 1,400 | $366,728 | $190,618 |

**Liabilities and Fund Balances**

| | | | | |
|---|---|---|---|---|
| **Liabilities** | | | | |
| Accounts Payable, Accrued Expenses | $ 21,425 | $ — | $ 21,425 | $ 4,783 |
| Restricted Deferred Revenue | 261,225 | — | 261,225 | 175,081 |
| Total Liabilities | 282,650 | — | 282,650 | 179,864 |
| **Fund Balances** | 82,678 | 1,400 | 84,078 | 10,754 |
| **Total** | $365,328 | $ 1,400 | $366,728 | $190,618 |

*The accompanying notes are an integral part of these financial statements.*

### *Statement of Revenues, Expenses, and Changes in Fund Balance: Year Ended December 31, 1993*
*(With Comparative Totals for 1992)*

| | 1993 | | | | 1992 |
|---|---|---|---|---|---|
| | Operating Fund | | Endowment | | |
| | Unrestricted | Restricted | Fund | Total | Total |
| **Revenues** | | | | | |
| Contributions | $ 151,944 | $313,461 | — | $465,405 | $275,447 |
| Dues | 79,775 | — | — | 79,775 | 77,549 |

## *Independent Auditor's Report*

February 25, 1994

Board of Directors
American Scientific Affiliation

We have audited the balance sheet of the **American Scientific Affiliation** (A Non-Profit Organization) as of December 31, 1993, and the related statements of revenues, expenses and changes in fund balance, and cash flows for the year then ended. These financial statements are the responsibility of the Organization's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of American Scientific Affiliation as of December 31, 1993, and the results of its operations and its cash flows for the year then ended in conformity with generally accepted accounting principles.

*Vance, Cronin & Stephenson, P.C.*
*Boston, Massachusetts*

## *Notes to Financial Statements December 31, 1993*

### Note 1 — Summary Description of the Organization

The American Scientific Affiliation is a Christian organization founded in 1941. The stated purposes of the Organization are to "investigate any area relating Christian faith to science" and "to make known the results of the investigations for comment and criticism by the Christian community and by the scientific community."

| | | | | | |
|---|---|---|---|---|---|
| Subscriptions | 16,776 | — | — | 16,776 | 19,064 |
| Conferences and Meetings | 66,841 | — | — | 66,841 | 46,804 |
| Sales of Publications | 6,010 | — | — | 6,010 | 7,940 |
| Advertising and Royalties | 622 | — | — | 622 | 1,484 |
| Investment Income | 6,541 | — | — | 6,541 | 5,612 |
| Gain (Loss) on Securities | 18 | — | — | 18 | (654) |
| Miscellaneous Income | 6,278 | — | — | 6,278 | 1,233 |
| Total | 334,805 | 313,461 | — | 648,266 | 434,479 |
| **Expenses** | | | | | |
| General Administrative Expenses | 145,636 | 49,953 | — | $195,589 | 186,018 |
| Program Service Expenses | 115,845 | 263,508 | — | 379,353 | 240,269 |
| Total | 261,481 | 313,461 | — | 574,942 | 426,287 |
| **Excess of Revenues Over Expenses** | 73,324 | — | — | 73,324 | 8,192 |
| **Fund Balance, Beginning of Year** | 9,354 | — | 1,400 | 10,754 | 2,562 |
| **Fund Balance, End of Year** | $82,678 | $ — | $1,400 | $84,078 | $ 10,754 |

*The accompanying notes are an integral part of these financial statements.*

## *Statement of Cash Flows: Year Ended December 31, 1993*

***(With Comparative Totals for 1992)***

| | 1993 | | | 1992 |
|---|---|---|---|---|
| | Operating Fund | Endowment Fund | Total | Total |
| **Cash Flows from Operating Activities** | | | | |
| Excess of Revenues Over Expenses | $73,324 | $ — | $73,324 | $8,192 |
| Adjustments to Reconcile Excess of Revenues Over Expenses to Net Cash Provided by (Used for) Operating Activities: | | | | |
| Gifts of Stock (Stated at Fair Market Value) | (3,267) | — | (3,267) | (5,005) |
| (Gain) Loss on Securities | (18) | — | (18) | 654 |
| Depreciation | 2,930 | — | 2,930 | 5,334 |
| (Increase) Decrease in Assets: | | | | |
| Accounts Receivable | (6,305) | — | (6,305) | 326 |
| Publication Inventory | (4,780) | — | (4,780) | (1,170) |
| Prepaid Expenses | (200) | — | (200) | (120) |

### Note 2 — Summary of Significant Accounting Policies

The significant accounting policies followed are described below to enhance the usefulness of the financial statements to the reader.

#### Fund Accounting

To ensure observance of limitations and restrictions placed on the use of resources available to the Organization, the accounts of the Organization are maintained in accordance with the principles of fund accounting. This is the procedure by which resources for various purposes are classified for accounting and reporting purposes into funds established according to their nature and purposes. Separate accounts are maintained for each fund; however, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups. Accordingly, all financial transactions have been recorded and reported by fund group.

The assets, liabilities, and fund balance of the Organization are reported in two self-balancing funds as follows:

**Operating funds:** which include unrestricted and restricted resources, represent the portion of expendable funds that is available for support of organization operations.

**Endowment Fund:** This fund represents gifts to the Organization which are to be held in perpituity, with the income only to be used for current purposes.

#### Expendable Restricted Resources

Operating funds restricted by the donor, grantor or other outside party for particular operating purposes are deemed to be earned and reported as revenues of operating funds, when the organization has incurred expenditures in compliance with the specific restrictions. Such amounts received but not yet earned are reported as restricted deferred amounts.

#### Property and Equipment and Depreciation

Property and equipment are stated as follows:

| | |
|---|---|
| Cost | $64,844 |
| Less: Accumulated Depreciation | 45,322 |
| Net Property & Equipment | $19,522 |

Depreciation of equipment is provided over the estimated useful lives of the respective assets on a straight-line basis.

#### Tax Exemption

The American Scientific Affiliation is a not-for-profit organization and is exempt from income taxes under section 501(c)(3) of the internal revenue code.

| | | | | |
|---|---|---|---|---|
| Increase (Decrease) in Liabilities: | | | | |
| Accounts Payable | 14,014 | — | 14,014 | (161) |
| Taxes Withheld | 2,628 | — | 2,628 | — |
| Restricted Deferred Revenue | 86,144 | — | 86,144 | 47,609 |
| Net Cash Provided by Operating Activities | 164,470 | — | 164,470 | 55,659 |
| **Cash Flows from Investing Activities** | | | | |
| Purchase of Property and Equipment | (18,696) | — | (18,696) | (434) |
| Proceeds from Sale of Stock | 3,665 | — | 3,665 | 3,840 |
| Net Cash Provided by Investing Activities | (15,031) | — | (15,031) | 3,406 |
| **Net Increase in Cash** | 149,439 | — | 149,439 | 59,065 |
| **Cash at Beginning of Year** | 176,194 | $1,400 | 177,594 | 118,529 |
| **Cash at End of Year** | $325,633 | $1,400 | $327,033 | $177,594 |

*The accompanying notes are an integral part of these financial statements.*

## *Operating Fund General Administrative Expenses: Year Ended December 31, 1993*

*(With Comparative Totals for 1992)*

| | 1993 | | | 1992 |
|---|---|---|---|---|
| | Unrestricted | Restricted | Total | Total |
| Bad Debts | $ 70 | $ — | $ 70 | $ 120 |
| Depreciation | 2.930 | — | 2.930 | 5,334 |
| Employee Benefits | 16,200 | — | 16,200 | 16,200 |
| Equipment Maintenance | 8,001 | — | 8,001 | 6,906 |
| Insurance | 1,292 | — | 1,292 | 500 |
| Office Supplies and Expense | 3,964 | — | 3,964 | 2,691 |
| Overhead Allocation - Restricted Funds | (49,953) | 49,953 | — | — |
| Payroll Taxes | 10,348 | — | 10,348 | 10,267 |
| Payroll Services | 683 | — | 683 | 584 |
| Postage and Shipping | 6,727 | — | 6,727 | 7,638 |
| Printing | 2,175 | — | 2,175 | 3,573 |
| Professional Fees | 5,730 | — | 5,730 | 2,725 |
| Rent | 10,800 | — | 10,800 | 10,838 |
| Salaries | 121,751 | — | 121,751 | 115,245 |
| Telephone | 4,918 | — | 4,918 | 3,397 |
| Total | $145,636 | $49,953 | $195,589 | $186,018 |

### Other Matters

All gains and losses arising from the sale, collection, or other disposition of investments and other noncash assets are accounted for in the fund that owned the assets. Ordinary income from investments, receivables, and the like is accounted for in the fund owning the assets.

Legally enforceable pledges less an allowance for uncollectible amounts are recorded as receivables in the year made. Pledges for support of current operations are recorded as operating fund support. Pledges for support of future operations and plan acquisitions are recorded as deferred amounts in the respective funds to which they apply.

### Note 3 — Cash Flow Information

American Scientific Affiliation has adopted Statement of Financial Accounting Standards No. 95 which replaces the statement of changes in financial position with the statement of cash flows. Although this change is not required of non-profit organizations the Affiliation has adopted the change for its financial statements.

### Supplemental Disclosures of Non-Cash Financing Activities

During the year ended December 31, 1993 American Scientific Affiliation received gifts of stock valued at $3,367.

### Note 4 — Investments

Investments are presented in the financial statements at the lower of cost or market. Cost of investments at December 31, 1993 was $2,553.

### Note 5 — Concentration of Credit Risk

The Organization maintains two accounts under the same name at the same bank. As such, the combined balances in the accounts at times exceed the federally insured limits.

### Note 6 — Subsequent Event

The Organization has transferred certain project funds to the care of Gordon College, a private Christian Liberal Arts College in Wenham, MA. These funds will now be dispersed and managed according to their respective projects under the supervision of officials of Gordon College. These funds were transferred to the College on January 24, 1994, which amounts are shown below according to their respective projects.

| Project | Amount |
|---|---|
| Templeton Newsletter . . . . . | $ 4,927 |
| Who's Who Project . . . . . | 27,875 |
| Call for Papers on Humility Theology . . . . . | 125,498 |
| Model Course Project . . . . . | 9,893 |
| Total | $168,193 |

The effect on the above transfer is a reduction in cash of $168,193 and a corresponding reduction to the deferred revenue account.

## *Operating Fund General Program Service Expenses: Operating Fund: Program Service Expenses Year Ended December 31, 1993*

*(With Comparative Totals for 1992)*

| | 1993 | | | 1992 |
|---|---|---|---|---|
| | Unrestricted | Restricted | Total | Total |
| Annual Meeting Expense | $56,386 | $ — | $56,386 | $45,311 |
| Editor Stipend and Expense | 12,735 | — | 12,735 | 5,075 |
| Executive Council | 3,102 | — | 3,102 | 1,190 |
| Geology and Biology Divisions | 661 | — | 661 | 1,202 |
| Mailing Costs | 5,150 | — | 5,150 | 5,144 |
| Public Relations | 636 | — | 636 | 10,538 |
| Publicity and Advertising | 1,019 | — | 1,019 | 1,069 |
| Printing | 31,156 | — | 31,156 | 26,562 |
| **Special Projects** | | | | |
| Various Conferences | 5,000 | | 5,000 | 2,685 |
| Lectureship Foundation | — | 53,541 | 53,541 | 52,175 |
| London Lectures | — | 48,219 | 48,219 | 19,889 |
| Printing - "TS" Project | — | 20,367 | 20,367 | 369 |
| TV Series | — | 42,890 | 42,890 | 20,060 |
| Walter Hearn Project | — | — | — | 11,250 |
| Humility Theology Project | — | 38,669 | 38,669 | 37,760 |
| Africa Project | — | 1,287 | 1,287 | — |
| Who's Who Project | — | 16,014 | 16,014 | — |
| Humility Theology Call for Papers | — | 26,501 | 26,501 | — |
| Model Course | — | 16,020 | 16,020 | — |
| Total | $ 115,845 | $263,508 | $379,353 | $240,269 |

*The accompanying notes are an integral part of these financial statements.*

## Independent Auditor's Report on Additional Information

February 25, 1994

Board of Directors
American Scientific Affiliation

Our report on our audit of the basic financial statements of American Scientific Affiliation for 1993 begins on page 74. We conducted our audit in accordance with generally accepted auditing standards for the purpose of forming an opinion on the basic financial statements taken as a whole. The schedules of expenses are presented for purposes of additional analysis and are not a required part of the basic financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and, in our opinion, is fairly stated in all material respects in relation to the basic financial statements taken as whole.

*Vance, Cronin & Stephenson, P.C.*
*Boston, Massachusetts*

The editors welcome contributions of poetry or cartoons (camera ready) relevant to *Perspectives on Science and Christian Faith.*

Please send all contributions to:

***Perspectives on Science and Christian Faith***

**P.O. Box 668**

**Ipswich, MA 01938-0668**

UNITED STATES POSTAL SERVICE

## Statement of Ownership, Management, and Circulation

(Required by 39 U.S.C. 3685)

| 1. Publication Title | 2. Publication No. | 3. Filing Date |
|---|---|---|
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P.O.Box 668 Ipswich, MA 01938-0668

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American Scientific Affiliation, P.O.Box 668 Ipswich, MA 01938-0668

Editor (Name and Complete Mailing Address)

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Managing Editor (Name and Complete Mailing Address)

Lyn Berg American Scientific Affiliation P.O.Box 668 Ipswich, MA 01938-0668

10. Owner (If owned by a corporation, its name and address must be stated and also immediately thereafter the names and addresses of stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address as well as that of each individual must be given. If the publication is published by a nonprofit organization, its name and address must be stated.) (Do Not Leave Blank.)

| Full Name | Complete Mailing Address |
|---|---|
| American Scientific Affiliation | P.O.Box 668<br>Ipswich, MA 01938-0668 |

11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities. If none, check here. ☐ None

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|---|---|
| None | |

12. For completion by nonprofit organizations authorized to mail at special rates. The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes: (Check one)

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☐ Has Changed During Preceding 12 Months (If changed, publisher must submit explanation of change with this statement)

PS Form 3526, October 1994 (See Instructions on Reverse)

| 13. Publication Name: Perspectives on Science and Christian Faith | 14. Issue Date for Circulation Data Below: September 94, Volume 46 #3 | |
|---|---|---|
| 15. Extent and Nature of Circulation | Average No. Copies Each Issue During Preceding 12 Months | Actual No. Copies of Single Issue Published Nearest to Filing Date |
| a. Total No. Copies (Net Press Run) | 3091 | 2980 |
| b. Paid and/or Requested Circulation (1) Sales Through Dealers and Carriers, Street Vendors, and Counter Sales (Not Mailed) | 0 | 0 |
| (2) Paid or Requested Mail Subscriptions (Include Advertisers' Proof Copies/Exchange Copies) | 2522 | 2460 |
| c. Total Paid and/or Requested Circulation (Sum of 15b(1) and 15b(2)) | 2522 | 2460 |
| d. Free Distribution by Mail (Samples, Complimentary, and Other Free) | 247 | 302 |
| e. Free Distribution Outside the Mail (Carriers or Other Means) | 0 | 0 |
| f. Total Free Distribution (Sum of 15d and 15e) | 247 | 302 |
| g. Total Distribution (Sum of 15c and 15f) | 2769 | 2762 |
| h. Copies Not Distributed (1) Office Use, Leftovers, Spoiled | 322 | 218 |
| (2) Return from News Agents | 0 | 0 |
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| Percent Paid and/or Requested Circulation (15c / 15g x 100) | | |

16. This Statement of Ownership will be printed in the March 95 issue of this publication. ☐ Check box if not required to publish.

17. Signature and Title of Editor, Publisher, Business Manager, or Owner — Date

Frances C. Poliechuk Fin/Lic Manager 10/24/94

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including multiple damages and civil penalties).

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2. Include in items 10 and 11, in cases where the stockholder or security holder is a trustee, the name of the person or corporation for wh the trustee is acting. Also include the names and addresses of individuals who are stockholders who own or hold 1 percent or more of total amount of bonds, mortgages, or other securities of the publishing corporation. In item 11, if none, check box. Use blank sheets if more space is required.
3. Be sure to furnish all information called for in item 15, regarding circulation. Free circulation must be shown in items 15d, e, and f.
4. If the publication had second-class authorization as a general or requester publication, this Statement of Ownership, Management, a Circulation must be published; it must be printed in any issue in October or the first printed issue after October. If the publication is not published during October.
5. In item 16, indicate date of the issue in which this Statement of Ownership will be printed.
6. Item 17 must be signed.

Failure to file or publish a statement of ownership may lead to suspension of second-class authorization.

## HOW DO I JOIN THE ASA?

Anyone interested in the objectives of the Affiliation may have a part in the ASA.

Full, voting membership is open to all persons with at least a bachelor's degree in science who can give assent to our statement of faith. Science is interpreted broadly to include anthropology, archeology, economics, engineering, history, medicine, psychology, and sociology as well as the generally recognized science disciplines. Philosophers and theologians who are interested in science are very welcome.

Associate membership is available to interested nonscientists who can give assent to our statement of faith. Associates receive all member benefits and publications and take part in all the affairs of the ASA except voting and holding office.

Full-time students may join as Student Members (science majors) with voting privileges or as Student Associates (non-science majors) with no voting privileges. Retired individuals and spouses qualify for a reduced rate. Full-time overseas missionaries are entitled to complimentary Associate membership in the ASA.

An individual wishing to participate in the ASA without joining as a member or giving assent to our statement of faith, may become a Friend of the ASA. Friends receive all member benefits and publications and take part in all the affairs of the ASA except voting and holding office.

## Membership Categories and Rates

| Category | Rate |
|---|---|
| Full Member | $55 |
| Friend of the ASA | $55 |
| Associate Member | $45 |
| Student Member | $20 |
| Student Associate | $20 |
| Retired Member | $35 |
| Spouse | $10 |

Subscriptions to our journal, *Perspectives on Science & Christian Faith,* are available at $30/year (individuals), $45/year (institutions) and $20/year (students). The journal comes automatically with your membership.

**MEMBERSHIP/FRIEND OF ASA APPLICATION/SUBSCRIPTION FORM**

(Subscribers complete items 1 & 2 only)

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1) Name (please print) _____ Date _____

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_____ Zip _____

Office address _____

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**Please leave blank any numbers you do not wish published.**

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I would prefer ASA mailings sent to: ❑ home ❑ office

3) Sex _____

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Institution Degree Year Major

_____

_____

_____

_____

Major field of study _____

Area of concentration within the field (2 word limit) _____

Briefly describe what your present or expected vocation is _____

_____

_____

_____

Please complete back of this form ☞

## AS A MEMBER YOU RECEIVE:

**Publications.** As a member, you receive ASA's quarterly journal, *Perspectives on Science & Christian Faith*, and bimonthly Newsletter. The journal of the American Scientific Affiliation has become the outstanding forum for discussion of key issues at the interface of science and Christian thought. It also contains news of current trends in science and reviews of important books on science/faith issues. The Newsletter brings you news of the scientific work and Christian witness of ASA members, reports of ASA activities, and other items of current interest. It also carries notices of ASA members seeking employment and of positions open to Christians trained in science.

**Books**. ASA titles such as *Teaching Science in a Climate of Controversy* and the *Membership Directory* are sent to all new members when available. From time to time other books and resources are available for purchase through the home office.

One book which can be purchased is *Contemporary Issues on Science and Christian Faith: An Annotated Bibliography*, which offers an expansive book list, as well as a Speaker's Bureau listing, book service information and other science/faith resources.

**Fellowship.** The spiritual and intellectual stimulation of ASA meetings is a distinctive feature of ASA membership highly valued by those who participate. An Annual Meeting, which usually includes three days of symposia, papers, field trips, and worship together, is held each year (since 1946) in late July or early August. For the convenience of members, the location moves across the country on a regular cycle. Local and regional meetings are held throughout the country each year. Members keep in contact with each other through the Newsletter, Internet, and at ASA get-togethers at national scientific meetings.

Church Affiliation _____

How did you learn about the ASA? _____

If you are an active overseas missionary, please give the name and address of your mission board or organization to qualify for complimentary membership.

Name _____

Street _____

City _____ State _____ Zip _____

I am interested in the goals of the American Scientific Affiliation. Upon the basis of the data herewith submitted and my signature affixed to the ASA Statement below, please process my application for membership.

**Statement of Faith**

I hereby subscribe to the Doctrinal Statement as required by the ASA Constitution:

1. We accept the divine inspiration, trustworthiness and authority of the Bible in matters of faith and conduct.
2. We confess the Triune God affirmed in the Nicene and Apostle's creeds which we accept as brief, faithful statements of Christian doctrine based upon Scripture.
3. We believe that in creating and preserving the universe God has endowed it with contingent order and intelligibility, the basis of scientific investigation.
4. We recognize our responsibility, as stewards of God's creation, to use science and technology for the good of humanity and the whole world.

Signature _____ Date _____
(required for Member, Associate Member, Student member status)

I have enclosed (Please check one):

____ $55, Full Member ____ $55, Friend of the ASA ____ $45, Associate Member

____ $20, Student Member ____ $20, Student Associate ____ $35, Retired Member

____ $10, Spouse

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**Opportunities for Service.** The ASA sponsors and encourages individual and group efforts to serve both the Christian community and the scientific community. Major efforts are made to clear up misunderstandings of one group by the other, but speaking and writing are not the only forms of ASA ministry. We seek opportunities to witness as a body of people with a grasp of biblical truth wherever that witness is needed.

**Affiliations and Commissions.** Each member is asked to choose a primary and secondary affiliation or commission from the list below. Affiliations are autonomous but usually meet in conjunction with the ASA Annual Meeting. Commissions help plan Annual Meetings, report to the membership through the Newsletter, and have a chair with four to five other members as a steering committee. Each of the commissions is asked to relate its discipline toward science.

**a. Affiliations**

Affiliation of Christian Biologists
Affiliation of Christian Geologists

**b. Commissions**

| | |
|---|---|
| Bioethics | Industrial |
| Communications | Philosophy and Theology |
| Creation | Physical Sciences |
| Global Resources and Environment | Science Education |
| History of Science | Social Sciences |

The ASA is a member of The Evangelical Council for Financial Accountability.

## WHAT EXACTLY IS THE AMERICAN SCIENTIFIC AFFILIATION?

The American Scientific Affiliation (ASA) is a fellowship of men and women of science and disciplines that can relate to science who share a common fidelity to the Word of God and a commitment to integrity in the practice of science. ASA was founded in 1941 and has grown significantly since that time. The stated purposes of the ASA are "to investigate any area relating Christian faith and science" and "to make known the results of such investigations for comment and criticism by the Christian community and by the scientific community."

Science has brought about enormous changes in our world. Christians have often reacted as though science threatened the very foundations of Christian faith. ASA's unique mission is to integrate, communicate, and facilitate properly researched science and biblical theology in service to the Church and the scientific community. ASA members have confidence that such integration is not only possible but necessary to an adequate understanding of God and His creation. Our total allegiance is to our Creator. We acknowledge our debt to Him for the whole natural order and for the development of science as a way of knowing that order in detail. We also acknowledge our debt to Him for the Scriptures, which give us "the wisdom that leads to salvation through faith in Jesus Christ." We believe that honest and open study of God's dual revelation, in nature and in the Bible, must eventually lead to understanding of its inherent harmony.

The ASA is also committed to the equally important task of providing advice and direction to the Church and society in how best to use the results of science and technology while preserving the integrity of God's creation. It is the only organization where scientists, social scientists, philosophers, and theologians can interact together and help shape Christian views of science. The vision of the ASA is to have science and theology interacting and affecting one another in a positive light.

American Scientific Affiliation
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e-mail: asa@newl.com

## The American Scientific Affiliation

Founded in 1941 out of a concern for the relationship between science and Christian faith, the American Scientific Affiliation is an association of men and women who have made a personal commitment of themselves and their lives to Jesus Christ as Lord and Savior, and who have made a personal commitment of themselves and their lives to a scientific description of the world. The purpose of the Affiliation is to explore any and every area relating Christian faith and science. *Perspectives* is one of the means by which the results of such exploration are made known for the benefit and criticism of the Christian community and of the scientific community.



## Canadian Scientific & Christian Affiliation

A closely affiliated organization, the Canadian Scientific and Christian Affiliation, was formed in 1973 with a distinctively Canadian orientation. The CSCA and the ASA share publications (*Perspectives on Science & Christian Faith* and the *ASA/CSCA Newsletter*). The CSCA subscribes to the same statement of faith as the ASA, and has the same general structure; however, it has its own governing body with a separate annual meeting in Canada.



## LOCAL SECTIONS

of the ASA and the CSCA have been organized to hold meetings and provide an interchange of ideas at the regional level. Membership application forms, publications, and other information may be obtained by writing to: American Scientific Affiliation, P.O. Box 668, Ipswich, MA 01938-0668, USA or Canadian Scientific & Christian Affiliation, P.O. Box 386, Fergus, ONT N1M 3E2, CANADA.

| | | | | |
|---|---|---|---|---|
| Chicago-Wheaton | D.C.-Baltimore | Guelph, ONT | Indiana-Ohio | Los Angeles |
| New York-New Jersey | North Central | Oregon | Ottawa, ONT | Pittsburgh |
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| | | | | | |
|---|---|---|---|---|---|
| Vol. 1-15 | (1949-1963), | Journal ASA | 15, | 126-132 | (1963); |
| Vol. 16-19 | (1964-1967), | Journal ASA | 19, | 126-128 | (1967); |
| Vol. 20-22 | (1968-1970), | Journal ASA | 22, | 157-160 | (1970); |
| Vol. 23-25 | (1971-1973), | Journal ASA | 25, | 173-176 | (1973); |
| Vol. 26-28 | (1974-1976), | Journal ASA | 28, | 189-192 | (1976); |
| Vol. 29-32 | (1977-1980), | Journal ASA | 32, | 250-255 | (1980); |
| Vol. 33-35 | (1981-1983), | Journal ASA | 35, | 252-255 | (1983); |
| Vol. 36-38 | (1984-1986), | Journal ASA | 38, | 284-288 | (1986); |
| Vol. 39-41 | (1987-1989), | Perspectives | 42, | 65-72 | (1990); |
| Vol. 42-44 | (1990-1992), | Perspectives | 44, | 282-288 | (1992). |

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*"Upholding the Universe by His Word of Power"* — Hebrews 1:3




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