PERSPECTIVES on Science and Christian Faith

JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

In this issue . . .

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

VOLUME 43, NUMBER 1

MARCH 1991

Perspectives on Science and Christian Faith

MEMBER epa EVANGELICAL PRESS ASSOCIATION

MANUSCRIPT GUIDELINES

The pages of *Perspectives* are open to any contribution dealing with the interaction between science and Christian faith in a manner consistent with scientific and theological integrity. Papers published in *Perspectives* do not reflect any official position of the American Scientific Affiliation.

1. All manuscripts (except Book Reviews) should be addressed to the Editor, P.O. Box 668, Ipswich, MA 01938.
2. Authors of *Papers* and *Communications* must submit **3 copies** of their paper for review purposes (an original and two copies).
3. Regular Papers should be accompanied by an *Abstract* of not more than 100 words.
4. All manuscripts should be typed double-space on good quality 8 1/2 x 11 paper (computer copies should be printed letter-quality).
5. References and footnotes should be collected at the end.
6. Figures or diagrams should be clear, black and white, line ink drawings or glossy photographs *suitable for direct reproduction.* Captions should be provided separately.

REGULAR PAPERS are major treatments of a particular subject relating science and the Christian position. Such papers should be at least 10 manuscript pages in length, **but not more than 20 pages**. Publication for such papers should normally take 12 to 18 months from the time of acceptance.

COMMUNICATIONS are brief treatments of a wide range of subjects of interest to *Perspectives* readers. Communications *must not be longer than 9 manuscript pages.* Accepted Communications should normally be published in 9 to 12 months.

DIALOGUE offers the opportunity for brief and timely debate of relevant issues.

BOOK REVIEWS are an important part of *Perspectives*. They serve to alert the readership to books of interest and provide a valuable source for reference. Readers are encouraged to review books in their scientific fields which have implications for the Christian faith. To avoid duplication of reviews, prospective reviewers should notify the Book Review Editor as early as possible of their intentions. Guidelines for book reviewers are available from the Book Review Editor—it is suggested that one send for a set of guidelines before submitting a book review. *All reviews should be sent directly to the Book Review Editor.* The viewpoints expressed in the books reviewed, and in the reviews themselves, are those of the authors and reviewers respectively, and do not reflect an official position of the ASA.

LETTERS to the Editor concerning contents of *Perspectives* may be published unless marked not for publication. Any letter submitted for publication is subject to editorial review. Letters selected for publication will be published within 6 months.

ADVERTISING is accepted in *Perspectives*, subject to editorial approval. Please address inquiries for rates or further information to the Managing Editor. The ASA cannot take responsibility for any orders placed with advertisers in *Perspectives*.

PERSPECTIVES ON SCIENCE AND CHRISTIAN FAITH
(ISSN 0892-2675) is published quarterly for $25 per year by the American Scientific Affiliation, 55 Market Street, Ipswich, MA 01938. Telephone (508) 356-5656. Second class postage paid at Ipswich, MA and at additional mailing offices.
POSTMASTER: Send address changes to: *Perspectives on Science and Christian Faith*, THE AMERICAN SCIENTIFIC AFFILIATION, P.O. Box 668, Ipswich, MA 01938.

Putting Things Into Perspective

Christian scholarship is sometimes taken to task for downplaying biblical norms when seeking to understand the various disciplines in the light of a theistic world-view. I suspect that this criticism often arises from dissatisfaction over the biblical line taken by the author rather than neglect of scripture. Each of the papers in this issue offers a scriptural base when addressing its subject matter. The reader is invited to evaluate and respond to the author's thinking.

The place of scripture in the modern attempt to understand human origins has been a major issue for those who take both science and the Bible seriously. Roy Clouser argues that our insights on the essential nature of religious belief and the central theme and overall character of the Bible are basic in the understanding of Genesis. Clouser emphasizes the covenantal character of scripture and spells out the implications of this view for discussions of human origins and human nature.

* * * * *

Theologian Lee Wyatt and physicist Jim Neidhardt have teamed up to provide a closely reasoned discussion of ways in which reformed theology and scientific thought can productively interact. Drawing on the ideas of Michael Polanyi, Karl Barth and Thomas Torrance, the authors show how the two disciplines may provide fresh insights into such areas as the nature of their respective core beliefs, ways of thinking and epistemological structure.

Douglas Vickers takes a reflective look at economic theory in arguing that Christian thought must impose external norms on a discipline which has traditionally considered itself to be a closed causal system. Vickers addresses two issues. First, he considers biblical propositions which should undergird economic thought; then, he suggests how these propositions might be applied to current economic practice.

* * * * *

The interpretation of the role that astronomer Nicolaus Copernicus played in 16th and 17th century science-church relationships has seen recent revision. Rather than viewing his work and that of Galileo as part of a long-standing conflict between science and the church, the discussion has been framed in terms of the way that the Bible should be understood when it deals with nature and questions of ultimate authority. Physicist Joe Spradley revisits the Copernican period and provides his analysis of the basic issues.

* * * * *

Our UK counterpart, Christians in Science, has joined with the Victoria Institute in publishing the journal, *Science and Christian Belief*. The most recent issue contains articles by John Polkinghorne, David Wilkinson, David Livingstone, and Peter D. Moore. Their lively discussion of science-Christianity issues is a welcome complement to *Perspectives*. Subscription information may be obtained from Christians in Science, UCCF, 38 De Montfort Street, Leicester, LE1 7GP, UK.

JWH

Genesis on the Origin of the Human Race

ROY A. CLOUSER

Department of Philosophy and Religion
Trenton State College
Trenton, NJ 08650

It has long been suggested that Genesis and the sciences look at human origins from differing, but compatible, points of view. Nevertheless, it has generally been left disconcertingly vague as to just how the viewpoint of Genesis differs from that of the sciences. This article maintains that the key to clarifying the biblical view of human origins lies in the definition of "human" that is both taught and presupposed in Scripture. Since the Scriptural definition is that a human is essentially a religious being, the Genesis account is taken to refer primarily to the appearance of religious consciousness in beings who thereby become fully human. Seen in this way, the Genesis account is not only compatible with the idea of a biological evolution, but that idea turns out to be the best explanation of at least one part of the Genesis text.

As every schoolboy knows, one of the great obstacles to taking the Bible seriously is that it is supposed to conflict with modern science. The conflict, of course, mainly centers on the account of the origin of humans given in Genesis versus the account given by modern evolutionary theories. Boiled down to its essence, the heart of the alleged incompatibility between these accounts seems to center on two points: 1. evolutionary theory sees humans as the products of a long continuous process of biological development whereas Genesis sees a sudden appearance of humans as the immediate result of an act of God; 2. evolutionary theory sees both men and women as emerging from the same biological process whereas Genesis sees the existence of the first woman as derived from that of the first man.

In the century and a half that has passed since *The Origin of Species*, there have been three sorts of attempts by Jewish and Christian thinkers to resolve these apparent conflicts. One has been to interpret the Genesis text so as not to take seriously any of it that appears incompatible with whatever scientific theories are currently prevalent. Attempts of this sort have often produced highly allegorized readings of the text, proclaimed it to be myth, or tried to regard it as poetry. A second sort has been those which are largely associated today with Fundamentalists. These attempts regard the text as stating scientific truths of various kinds which are infallible because revealed by God. They then try to resolve the resulting conflicts by simply rejecting any findings of biology, geology, paleontology, genetics, etc., which do not appear compatible with the text construed as natural history. Ever since the Scopes trial, this sort of attempt has been popularly described as taking a "literal" interpretation of Genesis. The third sort of attempts at resolving the apparent conflicts are those which try to show that they are only apparent; that the text and the sciences are looking at the origins of humans from different—but mutually compatible—points of view.

In what follows I will offer an attempt of the third sort. I believe the text offers an account of human origins which is not the same as, but is compatible with, a variety of possible scientific accounts including that of a biological evolution. My attempt will center on ascertaining the viewpoint and in-

tent of the text itself, and will in that sense be primarily concerned with the literal meaning of the text. Pursuing this approach, I find that the Fundamentalist view is *not* that of the literal meaning of the text at all, so that the mistake of such views as "scientific creationism" is not that they take the text too literally but (partly) that they don't take it literally enough.

In order to set my interpretation of the text in its proper setting and spell out its assumptions, it is necessary that I first give a quick sketch of two background issues. The first is the essential nature of religious belief, the second is the central theme and overall structure of the Bible. In both cases my treatment of these issues is greatly abbreviated here for lack of space, so that most of the arguments which can be given for my conclusions must be omitted. At the very least, however, the statement and application of these conclusions will demonstrate that what one assumes about these issues regulates how Genesis is interpreted.[1]

What Is Religious Belief?

In my work on comparative religion, I have found that while religions differ widely on what they regard as divine, they nevertheless agree on what it means to be divine. The difference between these two is the same as the difference between an office and an office holder. A description of the office of President of the United States differs from a description of the President himself. Following this analogy, I have found that the various religions of the world disagree about who or what holds the office or status of divinity but agree on the description of the status itself. For no matter how widely they differ over the description of what is divine, they all agree that the divine is whatever does not depend for its existence on anything else, while all else depends on the divine for its existence. In short, the divine is whatever is "just there"; it is that which is utterly self-existent or nondependent. This is the only thing I find common to all religions.

For example, it is not only the case that Jews, Christians, and Muslims believe God alone to have this status, but Taoists attribute it to the Tao, Hindus affirm it of Brahman-Atman, and Buddhists ascribe it to the Dharmakaya or Void. In fact, I have not been able to find any exception to the recognition of self-existence as essential to divinity. So while religions differ radically over how many divinities there are, whether the divine is personal, and how people come to stand in proper relation to the divine, etc., none doubts that the divine is whatever it is everything else depends on.

Moreover, Scripture confirms that it is indeed this status which is essential to God's divinity. For Scripture begins with the teaching that God depends on nothing while he has created and sustains everything other than himself. This is assumed in all else that it teaches; it is always the Creator of "all things" who speaks in Scripture and is spoken about. In fact, the name "Yahweh" (יהוה), the proper name of God revealed to Moses and considered by Jews too sacred to pronounce, means "the one who causes to be."[2] And when St. Paul describes the nature of false religious beliefs, he says that they are those by which people have perverted the true idea of the Creator and instead mistakenly identified some part of creation as divine (Rom. 1:25). It is in this sense that Bible writers regard all people as having some religious belief; all people regard either God or some God-surrogate as the divinity on which all else depends.

In what follows, I will therefore presuppose that any belief in something as self-existent is a religious belief. This will be so even if the divine is thought to be impersonal, even if the belief issues in no worship, and even if it includes no ethical code. In short, a religious belief is one which accords divine status to something no matter how the something

Roy Clouser is Associate Professor of philosophy and religion at Trenton State College. He holds an A.B. in philosophy from Gordon College, a B.D. in theology from Reformed Episcopal Seminary, and both an M.A. and Ph.D. in philosophy from the University of Pennsylvania. En route to the Ph.D. he studied with Paul Tillich at Harvard and with the Dutch philosopher Herman Dooyeweerd in Amsterdam. He is the author of a book on the relation of religious belief to theories titled The Myth of Religious Neutrality, *to be published in the fall of 1991 by University of Notre Dame Press.*

is conceived. This means, for example, that a materialist who regards matter energy as "just there" has a religious belief every bit as much as a Jew or Christian. The materialist simply believes in a different divinity rather than having no religious belief at all.[3] According to the materialist religion, the divine is impersonal, worship is not appropriate, and human destiny ends with death.[4]

What is the Central Character of Scripture?

If you were asked to write a book report on the Bible which had to start with a short sentence stating the main theme of the whole book, what would you write? How one answers this question makes an enormous difference to the interpretation of Scripture. It is our assumption as to the nature of the whole Bible, which determines how we are inclined to interpret its parts. Of course, one can only garner an idea of the whole from reading all the parts, so these two mutually influence one another. But there are numerous indications within Scripture itself and within the whole Judeo-Christian tradition which I believe make the nature of the whole clear: the central theme of the entire canon is that of *covenant*. It is that, after all, which is the proper title of the book; "Testament" is our translation of the Hebrew and Greek words for "covenant" (ברית, διαθήκη). What we have in Scripture is the record of the main editions of the covenant God made with mankind: the editions with Adam, with Noah, with Abraham, with Moses, with David, and finally, with Christ. In each new edition there are additions and changes from the earlier editions, but these serve to develop the central covenantal themes which remain constant throughout.[5]

If you were asked to write a book report on the Bible which had to start with a short sentence stating the main theme of the whole book, what would you write?

Seen in this way, Scripture must be understood as having an essentially *religious* character. It is the inspired record of the covenant offered to mankind by the real Creator. It teaches truth about the covenant maker, God, and the covenant receiver, humans, and is centrally concerned with how the covenant receivers are to stand in proper relation to the covenant maker. Everything it teaches is governed by this purpose. So whether it records parts of history, or includes poetry, states geneologies, or speaks of the end of the world, its governing purpose remains that of teaching us how to stand in proper relation to the only true divinity, Yahweh.

The "encyclopedic assumption" ignores the Bible's own central theme and purpose, and tries to force the text to yield truths about matters which never crossed the minds of its authors.

In the previous paragraph, I briefly alluded to Scripture as the inspired word of God. This is of crucial importance to every Christian since it is by having an inspired record of the covenant that it is transmitted to mankind. Scripture is and always will be the primary source of the content of our Faith, and it is its message that is experienced by every believer as the truth from God about God. As Calvin once put it:

> As to the question "how shall we be persuaded that [Scripture] came from God...?" it is the same as if we were asked, "how shall we learn to distinguish light from darkness, white from black, sweet from bitter?" Scripture bears upon the face of it as clear evidence of its truth as white and black do of their color, sweet and bitter of their taste. (*Institutes* I, 7, 2.)

But having such an inspired record also carries with it a great temptation. The temptation goes like this: since God's covenant is inspired and preserved by Him, why not use it as a short cut way of finding out *other* things we want to know? We have questions about prehistory, biology, geology, astronomy, economics, etc. And these questions are ones there is no way—or no easy way—for us to answer. But suppose there are statements or hints about these matters in Scripture. Wouldn't these also have to be infallibly true? In fact, even if there are ways for us to investigate questions on non-religious matters, shouldn't a believer at least start by canvassing Scripture to see what it says on any given topic?

I call succumbing to this temptation the "encyclopedic assumption." It results from regarding the Bible as an encyclopedia in which we may look

for an answer to any sort of question we may have. The encyclopedic assumption may not go so far as to think that the answer to *every* question is in Scripture, but it does suppose Scripture to contain answers to all sorts of nonreligious questions. It ignores the Bible's own central theme and purpose, and instead of trying to ascertain the literal meaning of the text (where "literal" means the intent of the author), it tries to force the text to yield truths about matters which never crossed the minds of its author(s). This temptation has not been resisted successfully in the whole history of biblical interpretation. The Jewish Cabala, and the Talmudic attempts to extend general ethical principles into a vast set of rules for every conceivable circumstance, are examples of this assumption at work. So is the Canon Law of the Church developed throughout the middle ages, and so are the more recent attempts to obtain scientific truth from Scripture.

At this point I want to emphasize that my objection to the encyclopedic assumption is not an exceptional hermeneutical point made especially for Scripture. Rather, it is a general point that applies to every text whatever. To interpret a text properly, we must understand as much as possible not only about its language, cultural setting, historical circumstances, and literary form, but also about the questions and concerns its author is addressing. It is the author's intents and concerns that must guide how we interpret any text, whether it be a novel, poetry, a textbook, a training manual, or sacred Scripture.[6] Thus it is *never* proper for us to assume that because we have a burning question or problem, that an author of Scripture (or any other book) must also have had it. Still less is it proper for us to assume that if we have a burning question God *must* have revealed an answer to it. The inspiration and preservation of Scripture are in order to vouchsafe to us the covenant of God, not to save us the time and effort of investigating the creation to find the answers to our questions. Scripture is not a shortcut on scientific work.

The Genesis Account

Following what has been said above, I contend that the creation account of Genesis should be understood—along with everything else in Scripture—as focally concerned with religion; that is, with the covenant by which we stand in proper relation to the only genuine divinity: God. Genesis' creation account cannot be correctly understood apart from its role as background to the editions of God's covenants with Adam, Noah, and Abraham which follow it. And these covenants themselves must be seen, in turn, as supplying background to the covenant with Moses.

Viewed as prologue to the covenant(s), the main purpose of the first part of the creation account is plainly to identify the covenant-maker. It distinguishes the God of Israel from the gods of Paganism by proclaiming Him to be the creator of everything other than Himself. It does not intend to tell us what we would have seen could we have been there to observe the universe in its early stages. This is evident from the way the text itself places its emphasis. In every case, it stresses God's total control, repeating again and again that everything comes about by His command. Before each creative episode we find, "And God said, 'Let there be ....' " At the same time the text shows little or no concern with the processes that were set in motion, or with how long they took. All the text says about what an observer would have seen is the repeated expression, "And it was so."

It is improper to raise such questions as whether the creative days are literal 24-hour periods or geological eras. They represent episodes of divine creativity which are stated in a literary framework. . .

If we press our examination of Genesis' account to include its literary structure, then the text looks even less like an encyclopedia, even less like an attempt to provide scientific information. For example, it speaks of "days" of creation as follows: Day 1: God separates light from darkness; Day 2: God separates sea from atmosphere; Day 3: God separates land from sea and creates plant life; Day 4: God creates sun, moon, and stars; Day 5: God creates sea life and birds; Day 6: God creates animals and humans. There is an obvious correspondence here between days 1, 2, and 3, with days 4, 5, and 6. Day 1 speaks of the difference between light and darkness as the plan which forms the precondition for the appearance of the sun, moon and stars on day 4. Day 2 offers the separation of atmosphere from sea as the precondition for the purpose of the creation of sea life and birds on day 5. And the formation of dry land and plants on day 3, is the precondition for the creation of animals and humans formed on day 6. This match-up of the first three

days with the last three days seems to be too prominent a feature of the account to have been accidental. But if it was not accidental, then it shows something very important. It shows that the intention of the text was to reveal a *teleological* order to the process of creation, which is not at all the same as either a scientific explanation or a description of what an observer would have seen.[7]

The intention of the text was to reveal a* teleological *order to the process of creation, which is not at all the same as either a scientific explanation or a description of what an observer would have seen.

For this reason, it is improper to raise such questions as whether the creative days are literal 24-hour periods or geological eras. They represent episodes of divine creativity which are stated in a literary framework which provides an account of the teleological order involved rather than the chronological or causal orders involved. By centering its attention on God's purposes, it is clear that the intent of the text is to teach truths about God rather than to answer questions about the early stages of the universe or the earth. Its main burden is to convey that there is no blind chance or fate involved in the origin of the universe, and to deny that God was limited by any other force or by the material he had to work with. The purposes are God's, as was the accomplishment of those purposes. But the text shows not the slightest hint of any concern with the processes by which God accomplished His purposes, or with how long the accomplishing took.

This stress on everything being subjected to God's control and purpose becomes more detailed as the account goes on. We are told that God's purpose for creating the universe was to create humans, and His purpose for creating humans was to enter into a covenant of love and fellowship with them. The main features of the prehistoric covenants with Adam and Noah are sketched so as to show how they led to the covenant with Abraham. And the main features of the covenant with Abraham are filled in so as to show that the Sinaitic covenant with Moses is a continuation of the covenant with Abraham. Viewed from the standpoint of its own internal organization and themes, therefore, there is simply no excuse for reading Genesis' creation account in isolation from what follows it. Nor is there any excuse for missing its teleological rather than chronological organization, or for overlooking its religious character as preamble to the history of the covenants. It is simply religious through and through, and attempting to read it so as to satisfy scientific curiousity is a blatant distortion which obscures its religious significance.

In sum, an examination of the biblical text shows that the Fundamentalist approach is one which attempts to force the text to address the questions and concerns of fundamentalists, rather than one which allows the text to tell us what *its* concerns and questions are. The concerns of the text are, generally stated, these: Which is the true God? How, in general, does the universe relate to Him? How, more specifically, do humans come to stand in right relation to Him? The text is not at all concerned with such questions as: By what processes was the earth formed? How long did that formation take? How old is the human race? By what natural processes did humans first appear on earth? The upshot, then, is that what Genesis offers is a birth announcement of the universe, especially of mankind. Moreover, it is a birth announcement which contains revelation of its Father's redemptive purposes.

The upshot, then, is that what Genesis offers is a birth announcement of the universe, especially of mankind.

But if the central theme of the first part of the account is to identify the covenant-maker, the central theme of the story of human creation is to identify the covenant-receiver. That is, first we are told about the self-existent status and the nature of God, then we are told about the dependent status and the nature of humans. But if this is really the case—if the theme here is the *nature* of humans—then the interpretive rule to be followed would be to read the accounts of the making of Adam and Eve as partly figurative. The element to be recognized as figurative would be the acts of "making," while the real import of the theme is to convey truth about human nature. Thus the interpretation of the biblical remark that God created Adam "from the dust of the ground" would not be that it is intended as a description of God's act, but as a comment on Adam's nature. To be sure, it is by God's creative activity that humans come into being. But on this interpretation the expression "from the dust of the

ground" should not be understood as a description of one causal deed in space and time by which a biologically human being came into existence, but as conveying the fact that part of human nature is that humans are made of the same stuff that the rest of the world is made of. Thus, humans never are, and never can be, more than creatures of God. They are not little bits of divinity stuffed into earthly bodies which are degraded as "the prison house of the soul." Nor can they have any existence but what is given them by God.

God says that he made humans of the stuff He called into being and from which He made everything else, and He can dissolve them into that stuff again.

This interpretation is supported by the way Genesis and other of the Scriptures (e.g., Psalms 22:15 & 29, 30: 9, 44:25, 103:14, 104:29; Ecclesiastes 3:20, 12:7; Isaiah 26:19; and Daniel 12:2) make use of the expression "the dust of the ground." The expression recurs in connection with the sentence of death being passed upon mankind for disobeying God: "From dust you came and to dust you shall return." Here it is clearly the dependent, mortal *nature* of humans which is the point. Their relation to God is not merely an extra added to their lives, but is what their lives ultimately depend upon. God says that he made humans of the stuff He called into being and from which He made everything else, and He can dissolve them into that stuff again.

It seems, therefore, that there is good textual reason to suppose that the remarks about God forming Adam from the dust of the ground are not intended to provide a description of a single event which *by itself* accounts for the coming-into-being of the first homo sapiens. That is, it is not to be understood as teaching that God made a mud model of a life form with no biological predecessors and blew on it with the result that it came alive, hopped up, and walked around. Yet it is something almost this crude that many fundamentalists seem to envision.

The same principle of interpreting formation language as conveying the nature of what is created rather than the process by which it appeared, can now also be applied to the understanding of the story of the formation of Eve from a rib of Adam. Once again, it should not be taken as a literal description of the single act by which the first woman appeared in the world, but is intended to teach that the woman shared the same human nature with the man. That this is the main point is clear from the words attributed to Adam in response to being given Eve: "she is bone of my bone and flesh of my flesh." That is, she is the same kind of creature as he is. The application of this interpretation to the story about Eve is also supported by the surrounding context. In the story, Adam's remark quoted above is preceded by the text's comment that although Adam named all the animals none of them were proper mates for him, and it is immediately followed by the assertion that it is because Eve was formed from Adam's rib that men and women are proper mates for one another: "For this reason a man leaves his father and mother and unites with his wife...." Thus the context shows that the rib represents the sharing of one common human nature.

The fundamental point of the story of Eve's origin, therefore, is that although it was only Adam who was earlier said to be formed of the created elements of which the rest of the world is formed (the "dust of the ground"), and to have been formed for the purpose of entering into a covenant relationship with God, what was formerly said only of Adam now applies equally to Eve. Women are said to have the same human nature as men, so that each has only the other as a proper mate among all living creatures ("her desire shall be toward her husband"). But above all, their common nature means that both are dependent upon God and have been created for covenant fellowship with God. This is clearly shown by the fact that Eve, too, is later held covenantally responsible for her disobedience despite the fact that God's command was originally directed to Adam.

The biblical account of the origin of humans does not focus upon the sorts of questions that a scientist would pose.

I conclude, therefore, that the biblical account of the origin of humans does not focus upon the sorts of questions that a scientist would pose. It is not concerned with the geological conditions, the biological processes, or the time they took, to play their role in bringing the race into existence. Thus there should be no reason for us to feel nonplussed by the discovery of these conditions, processes, and

the great time span over which they operated. To feel let down by the biblical account's omission of them, betrays the influence of the encyclopedic assumption. It shows we expected a *scientific* account from the text. Otherwise why should we feel let down that there is no hint of the vast time span involved, but not let down that there is no hint in the text of other equally startling discoveries? For example, we do not feel let down that Scripture gave us no indication of the vast space-span of the heavens, nor disappointed that there isn't the slightest warning that we are surrounded by trillions of invisible animals that every day attempt to invade our bodies and eat us.

Why should we feel let down that there is no hint in the text of the vast time span involved, but not let down that there is no hint of other equally startling discoveries?

Although I find the view of Genesis sketched above convincing in its general outline, it has so far been chiefly negative. I have tried to warn against the encyclopedic assumption and show what the text does *not* focus on. Furthermore, nothing said so far helps to resolve the two main parts of the traditional conflict with biological evolution mentioned at the outset: first, the text gives the strong impression that humans appeared suddenly; second, the text teaches that the human nature of the woman was somehow derived from that of the man. But using what has been outlined so far will now allow the construction of a more positive interpretation which can address both these points.

The Biblical View of Human Nature

In any discussion of the first appearance of humans, some definition of human nature must be assumed, since it is simply impossible to deal with the origin of humans without some idea of what counts as a human. This is especially true for the interpreting of specific data bearing on any hypotheses about human origins. If we are trying, for example, to interpret skeletal or artifact remains, our judgment as to whether they are human remains can't help but be controlled by our idea of what a human *is*.

Now I do not mean to suggest that anthropologists, biologists, and others who work with theories of human origins have never raised this issue. The question of how to define what counts as human is, indeed, one of the questions which has been raised often—and given various answers—in the history of such theories. But it is generally raised as merely one more interesting issue alongside many others. Its treatment in many scientific works on human evolution has been pretty ho-hum. It's often no more than: "Oh, yes—there's another question we can raise, and here are a few of the answers that have been proposed." But I contend that the acceptance of a definition of "human" *governs* any theory or interpretation of data bearing on human origins. As I see it, the true importance of this regulatory role of the definition of "human" for the question of human origins has yet to be fully appreciated.[8]

As a prime example of the pervasive control exercized by any such definition, consider the influence of the definition which has had the widest acceptance. This most influential of all definitions of "human" is the one proposed by the ancient Greeks, namely, that man is a "rational animal." According to this definition, humans are to be distinguished from other life forms by being animals, and they are to be distinguished from other animals by being rational. To apply this in a scientific way, however, one is forced to say exactly what "rational" means. And there have been quite a number of interpretations proposed.

It is simply impossible to deal with the origin of humans without some idea of what counts as a human.

One proposal was the view that human rationality appears with the use of tools. However, this view has become ever harder to maintain in the face of the evidence that many animals use tools in clever ways. In fact, it is not only the higher primates (such as chimpanzees) which do this, but such critters as ants, otters, and birds.[9] The allied proposal that man is the tool-*making* animal is almost equally as imprecise. To be sure, making tools is a higher accomplishment than simply using them. But there is simple tool making at least among chimps, and the selection of any one particular level of tool making as defining humans is going to be pretty arbitrary.

Another proposal was that the hallmark of human

rationality consists in the ability to use language. This seemed to be a pretty safe definition for a long time (it was held by the great rationalist philosophers of the 17th and 18th centuries), but a few years ago it became known that gorillas and chimpanzees were capable of being taught significant amounts of the deaf sign language. There is now a convincing body of evidence that these animals have been able to carry on elementary conversations with their human teachers, and even with one another![10]

From a biblical point of view, it is not necessary to sift through and wonder about all the different definitions of human nature. This is because a definition of what counts as a human is part of the biblical revelation.

Some rationalists appealed to the ability to do mathematics, rather than having a language, as the distinguishing characteristic of human rationality. And, to be sure, no animals have yet exhibited any ability to do math. There are, however, people who can't do math either.[11] Thus a hard-line rationalist would have to say that such persons are not really human. But other than a prejudice in favor of mathematical ability, there is no good reason to say that a young child or retarded person is not really human.

Besides these ideas of human nature which concentrate on the "rational" part of the traditional definition, there are others which are biological and concentrate on the "animal" side. For example, there is the definition that a human is any being who is bi-pedal, walks upright, and has a certain brain size in comparison to body size. Then again, there is the proposal that these biological characteristics in conjunction with certain cultural indications—such as tool making—are sufficient to define a human. But significant as such indicators may be for the work of the anthropologist, they are a long way from comprising an adequate *definition* of a human. Even the combination of skeletal similarities, similarities in brain size, and the presence of artifacts will not tell us conclusively what we really want to know when we investigate primitive remains: were the creatures who had these bodies and left these artifacts the same *kind* of creatures as ourselves? Were they human in essentially the same sense that we are?

From a biblical point of view, however, it is not necessary to sift through and wonder about all the different definitions of human nature. This is because a definition of what counts as a human is part of the biblical revelation. Indeed, it is part of the Genesis story! For it is clear in that account that what defines a human is being in the image of God, and that an essential part of that image is the capacity for fellowship with God. In short, humans are essentially *religious* beings. They are beings created for the very purpose of entering into covenant fellowship with their Divine Creator. Here we can refer back to our earlier definition of religious belief, and the clarity it lent to the fact that Bible writers never try to prove the existence of God but everywhere presuppose that all people have some religious belief or other. Our definition makes sense of this position by showing that it means all people are religious because even if they do not believe in the true God, they cannot help but have some substitute divinity. It is on that ground Bible writers admonish their readers to turn their faith from false gods to the one, true God.

It is clear in the Genesis account that what defines a human is being in the image of God, and that an essential part of that image is the capacity for fellowship with God.

From the biblical point of view, then, the origin of the human race on earth is identical with the origin of what I shall call religious consciousness in living creatures. By "religious consciousness" I mean that core-constituent of the image of God which consists in the innate disposition to regard something as divine, and to model an understanding of human nature on whatever idea of divinity is accepted. Thus a being is not a human because it walks upright, forms concepts, makes tools, or has a language (though these—and other—abilities appear to be preconditions for the manifest exercise of religious consciousness).[12] Rather, a being is human only if it has an innate religious disposition to believe in something as divine, the normal manifestation of which is some actual religious belief. Seen from this angle, the biblical text deals with human nature in a manner consistent with its overall *religious* focus and perspective.[13] It is an account of human origins which acknowledges human nature as creaturely ("out of the dust of the ground"), but focusses on

its inbuilt relation to its real or pretended divine Creator ("in the image of God").

Thus it was precisely by responding to God's revelation that the possessor of that religious capacity became completely human, and was therefore the first human.

One result of this definition is that the designation "homo sapiens" is not fully synonymous with the term "human," even if the two expressions are extensionally isomorphic. This is because no biological or biological-cultural classification can capture what is truly essential and unique about human nature: the capacity for the consciousness of standing in relation to the divine Origin of all created reality. In fact, accustomed as we are to a particular biological form and cultural achievements as typical of humans, there is no reason to suppose either of these are inevitable. From a biblical point of view, we must say that the bodily shape and cultural accouterments of beings might be strangely different from what we have come to expect, while the beings possessing them be nevertheless human, provided they are *religious* beings.

Because of the essentially religious focus of the text, and the essentially religious nature of humans, I find the biblical account to be giving us an account of the origin of the human race in the sense of telling us about the initial appearance of religious consciousness in creatures. It is not interested in the time span or biological causes which preceded the capacity for religious belief, but only in the last step of the processes which produced humans. That last step was the one that actualized the religious capacity of the first being in which such capacity appeared, and Scripture indicates that this last step was *God's speaking to Adam and establishing His covenant with him.* Whatever physical and biological pre-conditions may have led to the development of the capacity for religious consciousness, it was the revelation of God which was the last condition needed to activate and actualize that capacity. *Thus it was precisely by responding to God's revelation that the possessor of that religious capacity became completely human, and was therefore the first human.* For this reason when the text says that God breathed into Adam the breath of life, it should not be understood to refer only to "breath" in the ordinary sense. The word for "breath" is the same as the word for "spirit" in Hebrew, so that there is a pun here in which both senses of the word are intended. It is by God's will that the man exists and breathes (is biologically alive), but it is also because of God's Spirit that man stands in proper covenantal relation to God (is alive in the full religious sense). All through Scripture, humans are said to stand in proper relation to God by receiving his Spirit, and thus to have received the gift of life.[14] For example, Jesus said that he came that we might receive life "more abundantly," that is, the fullness of human life, which is life everlasting in fellowship with God.

While there was not a single act which produced the biological species homo sapiens, there was a single act which produced the first truly human being by making him God's covenant-partner.

In this sense, there was indeed a single act in space and time which caused there to be human at one moment when there had been none the moment before. But that act was not God seeing to it that Adam was formed from the dust of the ground; it was God's revealing himself to Adam and putting him in covenant relation to himself so as to make him a fully human (religious) being. Thus while there was not a single act which produced the biological species homo sapiens, there was a single act which produced the first truly human being by making him God's covenant-partner. Notice that in the briefer synopsis of the origin of humans given in chapter 1, their creation is immediately followed by the statement that God blessed them and gave them responsibilities. These are both covenant relations. And in the more detailed exposition of chapter 2, the imparting to Adam of the "breath of life" is followed by information I take to be a commentary on the rest of what that means: God's binding upon Adam covenant obligations to Himself and to the specially protected environment in which Adam was placed. In other words, the essential part of making Adam a human included putting him in a special setting for his covenantal probation, which probation included both what he must do ("cultivate the garden and take care of it") and what he must not do ("you must not eat of the fruit of that tree") in order to stand in proper relation to God. All this covenant

information is, I contend, literally the last step in the origination of humans.

Genuinely human life necessarily includes an actualized capacity for religious belief, and full human life includes the covenant relation to the true, rather than a pretended, Creator.

It is thus a central teaching of the text that it is not the case that humans came into existence at one time and at a later time had the covenant added to their lives. Genuinely human life necessarily includes an actualized capacity for religious belief, and full human life includes the covenant relation to the true, rather than a pretended, Creator. We hear this point echoed again and again in Scripture. It appears in Jesus' remark in Matthew 4:4 (which he took from Deuteronomy 8:3) that human life does not consist of only biological sustenance (bread), but also in religious relation to God (God's word). Moreover, it cannot fail to be significant that Jesus makes this comment in the midst of his temptation by Satan. His remark comes at the point of a new start for the human race which (religiously) begins over again with his defeat of Satan by complete covenant obedience.

If this interpretation is correct so far, it resolves the first part of the supposed conflict of Genesis with biological evolution, for it shows how the possibility of a long evolutionary process for humans is compatible with their also appearing suddenly. But more than that, I believe it also provides the basis for showing how the second difficulty—about the humanity of the woman being derived from the man—is to be resolved.

For if the final step in becoming human is to have an activated religious consciousness, and that step is accomplished by entering a covenant relation with God, then the woman's humanity was derived from the man's in the sense that she did not receive the covenant directly from God but from her husband. Thus the story of the rib transplant is figurative in the same way as is the story of forming Adam of the dust of the ground. Each account expresses truth about human nature in terms of a body-formation story. In each, it is the covenant relation to God by which religious consciousness is initiated and a truly *human* being is created. But whereas Adam received the covenant directly from God, Eve received it from Adam. In that way her becoming fully human was dependent on his already being human.

Replies To Objections

Now it might be objected that if some version of biological evolution is a correct account of the biological processes and preconditions for the rise of beings with a capacity for religion, then we would not expect that capacity to appear only in a solitary individual. Instead we would expect it to have appeared in many individuals at very nearly the same time.

The religious capacity could very well have appeared in many people at **about** *the same time, and there yet be a particular individual who was the first in which it appeared and was actualized.*

In reply to this criticism, I have two arguments. The first is that my interpretation of the biblical account and what we're told by evolutionary theory compliment one another. The religious capacity could very well have appeared in many people at *about* the same time, and there yet be a particular individual who was the first in which it appeared and was actualized. There is no incompatibility here. The second argument is that my interpretation does more than show there is no necessary incompatibility, but also provides a way to explain the puzzling remark in the text that the children of Adam and Eve went to other locations and married from among the people there. This is such a jarring and unexpected thing to be told, that virtually every child who hears it for the first time asks: "If Adam and Eve were the first people, where did those other people come from?" But if the view I'm suggesting were correct, this is just what we would expect; we would expect that there would be others in whom the religious capacity would have arisen at nearly the same time (but just after) that of Adam and Eve, and been actualized by coming in contact with God's covenant. This would not in the least count against what Scripture teaches about Adam. It would still be true that Adam was the *religious* head of the human race in virtue of his

being the first human, in virtue of his having been the first to be put on probation with respect to obeying the covenant, and in virtue of his being the universal instantiation of us all in failing that probation.

The view I'm proposing would, however, contravene an old tradition in theology which regards Adam as the *biological* progenetor of all humans as well as the religious head of the race. My replies to this objection are, first, that despite the long standing theological tradition to the contrary, there is no explicit biblical assertion that all humans descended from Adam. His being the first religious head of humanity (receiver of the covenant) is never equated with, or made to depend upon, his being the biological progenitor of all people. Nor is there any reason why Adam's special office respecting the covenant in relation to the rest of the human race couldn't be the same as that which was proposed for his relation to Eve's humanity. That is, the covenant which actualized the humanity of all people spread from him and Eve to the others. In that sense they are the parents of the common religious root of the human race.[15]

Adam's being the first religious head of humanity (receiver of the covenant) is never equated with his being the biological progenitor of all people.

Finally, the New Testament says there is a direct parallel between Adam's being the first religious head of the race, who failed to keep the covenant, and Jesus' being the new head of the race who perfectly kept the covenant on behalf of the rest of fallen humanity (e.g., Romans 5:12-21, I Corinthians 15:22). But this parallel supports my point rather than creates difficulties for it. For if Adam's failed headship of the race is the same as the headship at which Jesus succeeded, then surely neither man's covenant leadership depended upon his being the biological ancestor of anyone.

Summary

Humans undeniably have a biological aspect, and the idea of a long, continuous evolution of life forms is, I think, a convincing hypothesis about that aspect of humans. It is a theory whose explanatory power and supporting evidence have not only grown significantly, but it is a theory against which no one has been able to propose any plausible alternative for almost two centuries. But even if any of our present versions of it are in fact correct, evolutionary theory itself still could not tell us what a human essentially *is*. That is a belief which any thinker *brings to* the enterprise of theorizing, and which is a reflection of his or her own religious belief. For the Jew or Christian, this can be nothing other than the essentially religious character of human nature, reflecting faith in the personal Creator. It is this faith which both requires and provides a distinctive interpretation of the role of evolution in human origins.

In the matter of the origin of the human race, then, it appears that the theory that life forms gradually evolved does not need to be rejected from a biblical point of view.

I find, then, that many traditional understandings of the supposed conflict between Genesis and evolutionary theory have been seriously askew. They have approached the text with the encyclopedic assumption, and thus found a conflict of their own making. Even the interpretations which regard Genesis as myth, or poetry, or which allegorize it, are ones which started by assuming that its literal meaning does conflict with science. It is that assumption which prompted those interpretations, and they were designed precisely to avoid such conflict. They have thus failed to appreciate the specifically *religious* character of the text, and thus missed the rich store of information it gives us about the origin of humans as religious beings. If, on the other hand, the encyclopedic assumption is given up, we find the literal meaning of Genesis (the intent of its author) is able to give us reliable truth about the nature of both the covenant-maker and the covenant-receivers. This truth is essential not only to the correct interpretation of human nature, but is such that it must guide any theory we accept about human origins including the specific interpretation we should take of the evolutionary processes involved in those origins.

In the matter of the origin of the human race, then, it appears that the theory that life forms gradually evolved does not need to be rejected from a biblical point of view. This is not to make a final

judgment about the merits of the theory relative to its physical, paleontological, biological, or other scientific evidence. But it is to say that so far as the biblical account goes, no Jew or Christian need reject it on *religious* grounds. By the same token, however, it means that no one who rejects biblical religion is entitled to do so for the reason that its account of human origins conflicts with that highly confirmed theory. ✱

NOTES

[1]My conclusions on these issues have been argued more extensively in chapters 2 & 4 of my book, *The Myth of Religious Neutrality* to be published in the fall of 1991 by Notre Dame University Press.

[2]See *From the Stone Age to Christianity.*, W.F. Albright. Doubleday Co., Garden City, 1957, pp. 15 -16.

[3]In order to have no religious belief at all, one would have to claim to believe there is nothing that is self-existent or "just there." But that is a claim with no coherent interpretation. For even if each and every thing were believed to depend on something else, the entire array of all things—whether finite or infinite—would still be something that does not depend on anything. This is because, ex hypothesi, there would be nothing else for it to depend on.

[4]It is thus not necessary for someone to believe in a god in order to have a religious belief. Since a god is thought to be a personal being, many people are literally atheists (don't believe in any god) but still have a religion because they still regard *something* as divine. In fact, there are forms of Hinduism and Buddhism which do not believe there are any gods. And in many forms of paganism, no god is thought to be divine as I have defined that term. Instead, the gods are thought of as beings who depend on whatever is divine, but who are more like the divine than humans are.

[5]This approach to the interpretation of Scripture was developed by Prof. Geerhardus Vos of Princeton, in his classic work *Biblical Theology* (Eerdmans Pub. Co., Grand Rapids, 1948).

[6]It should be noticed that as I have defined "literal," it is not in opposition to "figurative" and should not be confused with "literalistic." The literal meaning, as I have defined it, is the intent of the author as opposed to allegorizing extentions of the text's meaning in order to meet an externally imposed program or concern.

[7]See, e.g., N. H. Ridderbos in *Is There a Conflict Between Genesis I and Natural Science?*, (Eerdmans Pub. Co., Grand Rapids, 1957); also C. Vanderwaal in *Search the Scriptures*, vol. 1. (Paideia Press, St. Catharines, Canada, 1978. pp. 53 ff).

[8]There are indications that this is changing. For some of the more widespread definitions of "human" and their influence on the interpretation of evolutionary theory, see Roger Lewin's *Human Evolution*, W.H. Freeman Co., NY, 1984, pp. 24-28, 98 ff. Lewin reports that currently the most popular idea of human nature is that it is essentially *ethical*. From a biblical point of view this is headed in the right direction, but does not go far enough. Interestingly, he cites the ability to ask the question "Why are we here?" as a prime example of "ethical" consciousness (pp. 24 & 99). But clearly such a question goes beyond matters of good and evil to truly religious issues of origin and purpose.

[9]Besides the well known case of the Darwin finches on the Galapagos islands, there are other tool using birds. See "Tool Using Bird: The Egyptian Vulture," *National Geographic*, May, 1968.

[10]"Conversations with a Gorilla," Francine Patterson. *National Geographic*, Oct., 1978.

[11]Here too, the issue is *how much* mathematical ability should count as defining human rationality. All normal humans have a number sense and can count. But some animals also exhibit a limited number sense. See T. Dantzig, *Number the Language of Science*. Doubleday & Co., Garden City, 1954, p. 1-6.

[12]Human logical, social, linguistic, and other functions are here called preconditions for the *exercise* of religious consciousness so as not to give the impression that religious consciousness originates or emerges from them. The biblical teaching about the human heart or soul makes clear that the heart is not only something more than all the ways humans function and can exist apart from them after the death of the body, but is actually that which controls their manifest exercise in bodily life. Thus the image of God—the very center of human self-identity which is the root of the innate religious disposition—cannot itself be accounted for evolutionarily or by any other scientific theory. In this connection, there are two excellent recent studies which are helpful: John Cooper's *Body, Soul, & Life Everlasting* (Eerdmans Pub. Co., Grand Rapids, 1989) and Richard Swinburne's *The Evolution of the Soul* (Clarendon Press, Oxford, 1986). Of course, the classic work on the biblical doctrine of the heart is still H. Dooyeweerd's *A New Critique of Theoretical Thought* (Presbyterian & Reformed Pub. Co., Phila., 1955).

[13]The way the Bible downplays the biological aspect of human origin in favor of its religious side has a parallel with the way Scripture deals with history. In recording historical events, Bible writers take the same specifically *religious* perspective that they do when dealing with human origins. For this reason they often downplay or omit economic, political, and other components of the events they record in order to emphasize their religious side. From the view of a modern historian, this is sloppy historiography. But they do this because they see the religious element as the most important of all. So while they do not think there are two histories—one religious and one secular—they do see the religious issue in history as the key to understanding *all* history. Kingdoms and civilizations may rise and fall, but the central issue is always whether people are covenant keepers or covenant breakers.

[14]For example: Genesis 41:38; Judges 6:34, 14:6; I Samuel 10:10; Job 27:3; Acts 2:17; Romans 8:9-11, 15, 23; I Corinthians 15: 45; Galatians 6:8; Revelations 11:11.

[15]The closest any Scripture text comes to saying all humans biologically descended from Adam, is Adam's own remark (Genesis 3:20) referring to Eve as "the mother of all living." It is far from clear that this lone remark settles the doctrine of universal Adamic (or Eveian) descent, however. It seems much more likely that it is to be taken as a comment on God's immediately preceding prediction that a descendent of Eve's will defeat the devil (represented by the snake) and overcome the curse of death thus restoring the lost promise of life to the human race.

Judeo-Christian Theology and Natural Science: Analogies—An Agenda for Future Research

LEE WYATT
Harvey Browne Memorial Presbyterian Church
311 Browns Lane
Louisville, KY 40207

W. JIM NEIDHARDT
Physics Department
New Jersey Institute of Technology
Newark NJ 07102

Theology and natural science ask very different questions and use different procedures to explore the Universe. Nevertheless, both human activities are grounded epistemologically in "faith seeking understanding" as the theologian Karl Barth and the physical chemist Michael Polanyi have independently pointed out. It is therefore not surprising that congruences in conceptual structure have developed, for common epistemological problems have challenged both the theologian and natural scientist. Some basic analogies between the two disciplines are discussed with emphasis on the similarities contained within the differences for each analogy, the differences helping one to grasp conceptually the real similarities.

Introduction

In both theology and natural science, the human knower interacts with the discipline's unique object, God or physical reality, resulting in a spatio-temporal experience of these realities. This interaction evokes an intuitive apprehension of basic ultimate convictions concerning the object investigated by each discipline. Examples of such ultimate presuppositions can be found in each discipline. In theology, God is Love characterized by utter faithfulness in all his dealings with humankind; and in natural science, the physical universe possesses a contingent order (theologically a consequence of God's utter faithfulness toward humankind in providing a habitat, the physical universe, "fit" for human life. Such "fitness" is based upon the physical universe's stable structure and pattern which allows the possibility of adaptive development). These ultimate beliefs motivate the knower to explore more fully their implications by examining the details of the actual interaction with each discipline's object. The resulting exploration leads to the affirmation and/or modification of specific implications arising from the discipline's ultimate convictions. Such strengthened and/or altered implications, in turn, generate new insights which "trigger" further exploration. Basic beliefs, intuitively apprehended through experience of God or physical reality (as mediated through the church and scientific communities), thus motivate the theologian or natural scientist to investigate critically the specific concrete implications of ultimate convictions. The resulting clarification and widening of insight enables the theologian or natural scientist to arrive at a comprehensive understanding of the complex intelligibility, transcendent or contingent, disclosed through the interaction of God or physical reality and human knowers. Hence, the ability and effort to acquire knowledge in both theology and science is grounded in "faith seeking understanding" even though their methodologies differ in accordance with the nature of their respective objects, the living God and physical reality.

Finally, the role of faith in theology and natural science is two-fold. It both *grounds* and *guides* each discipline. By faith one is able to apprehend and

articulate the ultimate presuppositions necessary to get either endeavor started. Faith also molds the active search for knowledge in many significant ways, two representative ways being the selection of lines of inquiry consistent with each discipline's core beliefs and the encouragement of theologians and scientists alike to continue their efforts when progress is slow, tentative results being partial, even contradictory. Both these results, in themselves, and the faith that guides one toward them are ultimately controlled by each discipline's respective object as disclosed in the knower-object interaction.

It is therefore not surprising that congruences in conceptual structures have developed, for common epistemological problems have challenged the theologian and natural scientist as they both explore reality. Some basic analogies between the two disciplines are discussed with emphasis on the similarities contained within the differences for each analogy. In an ultimate sense theologically, analogy is a God-created *correspondence existing between*: a. a human thought structure representing a particular object or relationship of reality, i.e., an epistemological structure, and an object or relationship of reality; b. two different epistemological structures representing reality; or c. different objects or relationships of reality. This essay concerns itself with the first two types of analogy. In this context, analogy is defined as a similarity in dissimilarity based upon a commonality of some aspects of the entities being compared. An analogy thus represents a partial likeness or reflection which is true but not exhaustive.

The analogies discussed are *across* logical levels; they are heuristic in character, each establishing a *disclosure* relationship between entities at different logical levels. This contrasts with the kind of analogy that establishes a purely formal correspondence between entities at the same logical level. For this essay, an analogy, with its capacity for *disclosure*, represents a heuristic *pointing beyond* occurring between similar aspects of two different epistemological structures or similar aspects of an epistemological structure and an object or relationship of reality; thus an analogy is across logical levels. Additionally, a disclosure analogy (of type a, b, c) as a whole *points beyond itself* to the epistemological and/or ontological commonality that is its source and ground.

The discussion is intended to be provocative and suggestive, hopefully providing a catalyst for further refinement and extension of the analogies treated here. The analogies are:

A. The *primary standard* used in theology and natural science.

B. The role of intuitive *instinct* in theology and natural science.

C. *Discovery* as *encounter* in theology and natural science—three related aspects.

D. *Scientific method* in theology and natural science.

E. The *epistemological realism* of theology and quantum physics.

Analogy A: The *primary standard* used in theology and natural science.

Theology

Holy Scripture (or more precisely the statements of Holy Scripture) is the *primary standard* that the church and community (in the Reformed Tradition) uses in testing its understanding of God's nature and activity (Church Doctrine). It witnesses to the revelation of God in Jesus Christ and is his chosen means of encountering his creatures. As we probe the Scriptures we find present there the Word in the words and through the illumination of the Holy Spirit we are lead to an ever more adequate understanding of God and his ways among us. Thus the Holy Scripture is the result of the Holy Spirit's integration (binding together) of divine and human activity. As such, Holy Scripture is a *given* for the theological task both as it witnesses to the normative deeds of redemption of the God who acts in the freedom of his love and by its palpable existence as a witness to us of the continuity of the ways of God and his accessibility to us in Christ through the Word.

Natural Science

Data (or more precisely data statements) is the *primary standard* that the scientific community uses in testing theoretical structures (*theory*). All data results from the human probing of reality which makes itself accessible to such probing by the power of its intrinsic order and contingent intelligibility which grasp and beckon the inquirer. Thus data, too, stands as a *given* for the scientific enterprise. From a Judeo-Christian perspective data may be looked upon as resulting from the Holy Spirit's integration (binding together) of physical reality's intrinsic contingent intelligibility and human intelligence. All scientific data is the result of some human process (even supposedly "haphazardly"-taken data) which may be seen as "guided" or inspired by the activity of the Holy Spirit. *The Westminster Confession of Faith* possibly points toward such a role for the Holy Spirit in *Chapter IX—of the Holy Spirit*, paragraph 2, where it states:

"He is Lord and Giver of life, everywhere present, and is the source of all *good thoughts* and holy counsels in men."

In understanding this analogy, note that both data and Holy Scripture are characterized by an openness allowing genuine novelty of interpretation. Therefore it is possible for scientific theories and theological doctrine respectively based upon data and Holy Scripture to undergo development. In this context, development is change fully continuous with what is trustworthy (a faithful representation of reality) in former formulations.

Analogy B: The role of intuitive *instinct* in theology and natural science.

Theology		*Natural Science*
Holy Scripture		Data
↓	TI	↓ SI
Doctrine		Theory

TI: Theologians formulate doctrine from their understanding of Holy Scripture through *Theological instinct* guided by the activity of the Holy Spirit. *Theological instinct* may be defined in terms of Polanyi's concept of *indwelling*: As theologians *indwell* the scripture by becoming deeply immersed in the prayerful study of scripture——→ They are reciprocally *indwelt* by the living Word of God, whose transcendent, loving intelligibility is faithfully, uniquely and authoritatively witnessed to in Scripture.

In other words, a mutual reciprocity takes place as the object we as theologians become immersed in, the Holy Scripture, becomes a subject, an active initiating agent, the living Word of God himself who now indwells us. In short *theological instinct* arises from theological reflection guided by the activity of the Holy Spirit and flashes of insight inspired by the Holy Spirit. Thus the living God who *bounds* and *indwells* Scripture makes himself known to theologians creating an impetus (or movement) to articulation which results in doctrine. Such doctrinal formulation may be looked upon as a consequence of the remarkable *correlation* between thought patterns intrinsic to the theologian's mind and dynamic covenantal structures pointed to in Holy Scripture which are a manifestation of the loving, transcendent intelligibility of the living God. The *epistemological fidelity* that this remarkable correlation represents is discussed more fully in analogy B'.

SI: Scientists formulate theory from their understanding of data through *Scientific instinct* (which from a theological perspective could be looked upon as guided by the activity of the Holy Spirit). *Scientific instinct* in natural science may also be defined in terms of Polanyi's concept of *indwelling*: As scientists personally experience the concrete objects and events of physical reality, they indwell physical reality through their deep immersion in the collection and study of the data ——→ They are reciprocally *indwelt* by the contingent intelligibility embodied in physical reality. Thus the "reality" which *bounds* and *indwells* the data makes itself known (through the data) to scientists creating a movement to articulation resulting in theory. It should be noted that God's *bounding* and *indwelling* the Scriptures has a much more intimate personal dimensionality than "reality's" *bounding* and *indwelling* the data.

In other words, a mutual reciprocity takes place as the object we as scientists indwell, the data, becomes a subject, an active initiating agent, whose activity allows the intelligibility indwelling it to now indwell us. Such theory formulation may be looked upon as a consequence of the remarkable correlation between thought patterns intrinsic to the scientist's mind and law-structures associated with

Lee A. Wyatt is an Associate Pastor at Harvey Browne Memorial Presbyterian Church in Louisville, Kentucky. He holds the M.A. from Columbia Theological Seminary and the Master of Divinity degree from Louisville Presbyterian Theological Seminary. He is particularly interested in methodological and epistemological issues at the boundary of theology and natural science. He is active publishing on this issue as well as at work on a book dealing with God and warfare in the Old Testament.

the contingent intelligibility embodied in physical reality. The *epistemological fidelity* that this remarkable correlation represents is discussed more fully in analogy B'. It is interesting to note that the remarkable correlations which make theological and scientific instincts possible may be illumined by the following analogy which widens the context of the physicist Eugene Wigner's comments on the unusual appropriateness of mathematics in physical science. The analogy is as follows.

Theology

The strange power of agape love (a manifestation of Grace in the joy and the tragedy of human life) as perceived by the human mind in odd, sometimes poetic forms to disclose the dynamic covenantal structures pointed to in Holy Scripture: The Creator-creation relationship as supremely manifest in the nature of the incarnate Jesus Christ. Note that love is experience, and the language which describes it, itself a structure of the human mind, is also a form of human experience.

Natural science

The unreasonable effectiveness of mathematics to disclose the contingent intelligibility embodied in physical reality. Note that mathematics, a structure of the human mind, is a language which is also a form of human experience.

Analogy B': Epistemological fidelity

(Suggested by Bruce Hedman, Dept. of Mathematics-Undergraduate school, University of Connecticut, 85 Lawler Rd, West Hartford, Connecticut 06117-2697.)

Theological science

Revelation expresses itself in *word intelligibility* (Torrance) which is knowable to the human mind; that is, there is a faithful correspondence between verbal meanings as they really occur in revelation and as we apprehend them.

Natural Science

The contingent order expresses itself in *number intelligibility* (Torrance) which is knowable to the human mind; that is, there is a faithful correspondence between mathematical structures as they really occur in nature and as we apprehend them.

Epistemological intelligibility

The following discussion is intended to clarify what is meant by *epistemological intelligibility* in the context of Thomas F. Torrance's theological perspective. Both theology and natural science may be looked upon as activities where a reality beyond human observers is *disclosed* to those observers. In theology, God's supreme self-revelation in the incarnation in spatial-temporal reality of Jesus Christ discloses a transcendent intelligibility of love that undergirds and provides meaning to all of creation. This disclosure was uniquely manifest as God revealed his all-encompassing love through concrete events experienced by the Old and New Testament witnesses; the disclosure continues to manifest itself today in the lives of believers through the ongoing *presence* of the living God, i.e., the Holy Spirit. Revelation is the terminology used for the disclosure of the nature of the living God where God always takes the initiative whether human inquirers are actively seeking him or not.

In natural science, physical reality (God's Creation) discloses a contingent intelligibility as human inquirers observe and pose questions, often of a quantitative nature, and employ physical manipulation in order to elicit repeatable responses, i.e., experimentation. This disclosure process is called discovery. It is guided by an intuition of order, pattern embedded in the concrete objects of physical

W. Jim Neidhardt is Associate Professor of Physics at New Jersey Institute of Technology. His professional interests are in quantum physics; systems theory; and the integration of scientific and Judeo-Christian theological perspectives. He is a member of the American Physical Society, American Association of Physics Teachers, Sigma Xi, and a Fellow of the American Scientific Affiliation. He has published forty-eight professional papers. He is also interested in the problems of educationally deprived college-bound students and has taught a college-level integrated physics-calculus course for Newark high school seniors. Dr. and Mrs. Neidhardt and their family (all J's) reside in Randolph, N.J.

reality being studied. Such discovery takes place primarily through the initiative of the human inquirer, but is controlled by the nature of the object under investigation. In the process of discovery the human observer's initiative can be altered toward entirely new types of questioning as a result of unexpected responses to specific questions directed at the physical reality in question. Thus disclosure, whether in the form of revelation (theology) or discovery (natural science) is always ultimately controlled or molded by the nature of the object encountered, God or physical reality.

Disclosure, whether in the form of revelation (theology) or discovery (natural science) is always ultimately controlled or molded by the nature of the object encountered, God or physical reality.

In both forms of disclosure, theological and scientific, specific patterns and invariant structures manifest in God's historical dealings with humankind or in the concrete objects of physical reality, awaken the human inquirer to an intelligibility (transcendent or contingent) "dwelling in" the respective realities that are encountered. It is only by means of verbal communication, i.e., words, that theologians and scientists can refer the specific patterns and invariant structures they discover to the intrinsic intelligibilty (transcendent and contingent) "dwelling in" the specific objects of theology's and natural science's attention, i.e., God's self-revelation to us in Jesus Christ and physical reality respectively.

Word-number interaction in theology and natural science

Thomas F. Torrance has denoted by number the specific patterns and invariant structures from which theology and natural science build their respective understandings. Number is intended to emphasize that these patterns and invariant structures are susceptible to formal analysis; criteria of coherence, logical and historical consistency, ... are applicable. The specific details of number are different in theology and natural science for these details must be appropriate to the contexts of the distinctive objects with which theological and scientific discourse are concerned. In natural science the specific patterns and invariant structures characterized as number are quantitative so they are represented by actual numerical expressions. On the other hand, theology's formalizable aspects are often of a qualitative nature so they are represented by words which are functionally numberlike; i.e., they establish orderings of historical events, invariances of historical patterns or human (God's) nature, etc. Similarly, Torrance has denoted as *word* those aspects of verbal communication needed to refer number, theological and scientific, to the rational order "dwelling in" the unique objects of scientific and theological investigation. In both natural science and theology Torrance intends that *word* designate the referential ability of verbal communication, oral or written, to establish a relationship of meaning between each discipline's formalizable component (number) and the intrinsic intelligibilty of the discipline's object. Such referential ability is always expressed in actual words functioning in a wordlike way thereby fulfilling this referential role. Torrance suggests that the intelligibilities that theology and natural science respectively are pointing to emerge from the interaction of these two epistemological levels, word and number.

Word intelligibility in theology and number intelligibility in natural science

In natural science, the primary emphasis of its participants is on the "seeing" of numerical invariant patterns associated with concrete things and structures of physical reality. Physical meaning emerges when it is recognized that the association of mathematical forms of order with specific objects and relationships of physical reality points to a basic unitary order undergirding physical reality. It is human verbal communication (word) which imparts physical meaning to these numerical patterns and invariances (number) by referring them to the intrinsic order embodied in all concrete manifestations of physical reality. Accordingly, Torrance views natural science as an unfolding of number intelligibility from the interaction of word and number appropriate to the object of natural science's discourse, the concrete things and invariant structures of physical reality.

In theology, on the other hand, the primary emphasis is on the "saving" (reconciling and redeeming) meaning of the invariant patterns of God's dealing with humankind as manifest in unique historical events. This "saving" meaning comes to us as we "listen" for God's word manifest in the "numerical" details of God's revelation through his-

tory. We "hear" God's word speak to us through historical events as we are open to their deeper significance which calls into question all our finite, sinful preconceptions concerning God's revealing acts. Since human verbal communication (word) is essential to convey "saving" meaning with respect to the numerical structures and patterns (number) of God's revelation in concrete historical events, Torrance views theology as an unfolding of word intelligibility from the interaction of word and number associated with the object of theological discourse, the self-revelation of the living God manifest in the incarnation in space and time of Jesus Christ.

Torrance views theology as an unfolding of word intelligibility from the interaction of word and number associated with the object of theological discourse.

In theology's word intelligibility and natural science's number intelligibility the mutual reciprocity of the word-number interaction is differential in character. The respective word-number interactions may be perceived in terms of an asymmetric relationship consisting of two reciprocal relations: The *controlling or molding* of number by word and, reciprocally, the *responsive dependence* of number on word. This asymmetric or differential relationship between word and number aspects for each discipline enables number details to be referred to their intrinsic meaning expressible only by means of words. Out of much interplay a *disclosure* results from the transcendent and contingent intelligibilities manifest in the objects of each discipline, God's revelation to humankind and physical reality.

For a more complete discussion of theology's word intelligibility and natural science's number intelligibility the reader is referred to Torrance's essay *Word and Number* where it is suggested that the two intelligibilities point to an underlying epistemological unity intrinsic to Christian theology and scientific inquiry. The epistemological fidelity that theology's word intelligibility and natural science's number intelligibility faithfully represent is schematically portrayed by the differential integrative relationship analogies (DIRA) of figure 1. The following discussion briefly summarizes what is meant by a differential integrative relationship analogy in the context of theology's word intelligibility and science's number intelligibility.

The differential structure of theology and natural science

Both word intelligibility in theology and number intelligibility in natural science may be represented as a hierarchical correlation of two different epistemological levels, word and number. The two levels, word and number, form the poles of a bipolar-relational structure (model) that captures the "complex unity" of theology's word intelligibilty and science's number intelligibility. Accordingly, there is more than one epistemological level associated with each intelligibility's "complex epistemological unity" and in each bipolar-relational structure the higher level provides the integrative meaning of the lower level. For each bipolar-relational structure, the word and number poles are distinct yet reciprocally related.

In other words, in each intelligibility there is an interplay and the word and number poles affect each other. The lower (number) pole has a meaning in and of itself in terms of the formalizable details and quantitative invariant patterns appropriate to the respective disciplines. But the lower pole can only be *fully* understood in relation to the higher (word) pole which exerts a controlling function (Michael Polanyi's principle of marginal control) as it refers the lower pole's formalizable and quantitative meaning to the distinctive rational orders "dwelling in" the unique objects of the two disciplines. Thus the higher (word) pole's own distinct meaning comes about through molding the formalizable and quantitative aspects of the lower pole by selecting, defining and emphasizing those aspects in the context of the intrinsic intelligibility associated with each discipline's object. In this sense the higher pole provides the integrative meaning of the lower pole.

For each bipolar-relational structure, the word and number poles are distinct yet reciprocally related.

Lastly, note that for the two bipolar-relational structures which represent word intelligibility and number intelligibility respectively, word and number levels are defined with differing emphases to take into account the distinctive contexts of theology and natural science.

Differential integrative relationship analogies

A differential integrative relationship analogy (DIRA) may be used to represent the "complex unity" of both intelligibilities, word and number, understood as bipolar-relational unitary structures. A DIRA is an asymmetric relationship analogy where differences in reciprocal relations of the relationship bind two poles together to form a unitary structure that maintains the distinctiveness of the poles. The relationship is *differential* in that the distinction between the poles is highlighted. On the other hand, it is *integrative* in that it brings the poles together into a unity. The DIRA's of figure 1 are properly understood in the following (six point) context:

1. ⇓↑ represent the asymmetric relations of the (differential) relationship between the two poles of a complex bipolar-relational unity.
2. The word and number poles of the bipolar-relational unity exist at the different epistemological levels.
3. Theologically all relationships ultimately may be thought of as a consequence of the creative-redeeming activity of the Holy Spirit who binds together in relationship the different levels to form dynamic unitary structures.
4. In the DIRA's bipolar-relational structure a mutual reciprocity exists between the two poles: word implies number and number implies word. There is a hierarchical aspect to this mutual reciprocity in that the two poles are regulated by a principle of marginal control resulting from the asymmetric nature of the relationship.
5. It is also possible to perceive the DIRA's two poles and relations between them as forming a "circular" feedback loop. This "circular" feedback loop is an interaction between levels in which the top level "reaches" downward toward the bottom level and influences it, while at the same time responding to the bottom level. Out of the dynamic character of the two poles and the asymmetric relations between them that constitute the "circular" feedback dynamic, differentiated unitary structure emerges. In other words, the ongoing activity of such "circular" feedback results in the emergence of human knowledge as expressed by word intelligibility and number intelligibility.
6. The DIRA's two levels and two relations, taken together as holistic totality, constitute an analogical pattern of a mutually reciprocal (one pole implies the other), asymmetric, dynamic, bipolar-relational unity.

A different concrete example may clarify what is meant by a DIRA. We would suggest that the essence of a Christian theologian's productive life may be represented analogically as a "complex unity" of bipolar-relational character, *prayer* being the less visible (tacitly known), higher pole which actively molds the more visible (explicitly known), lower

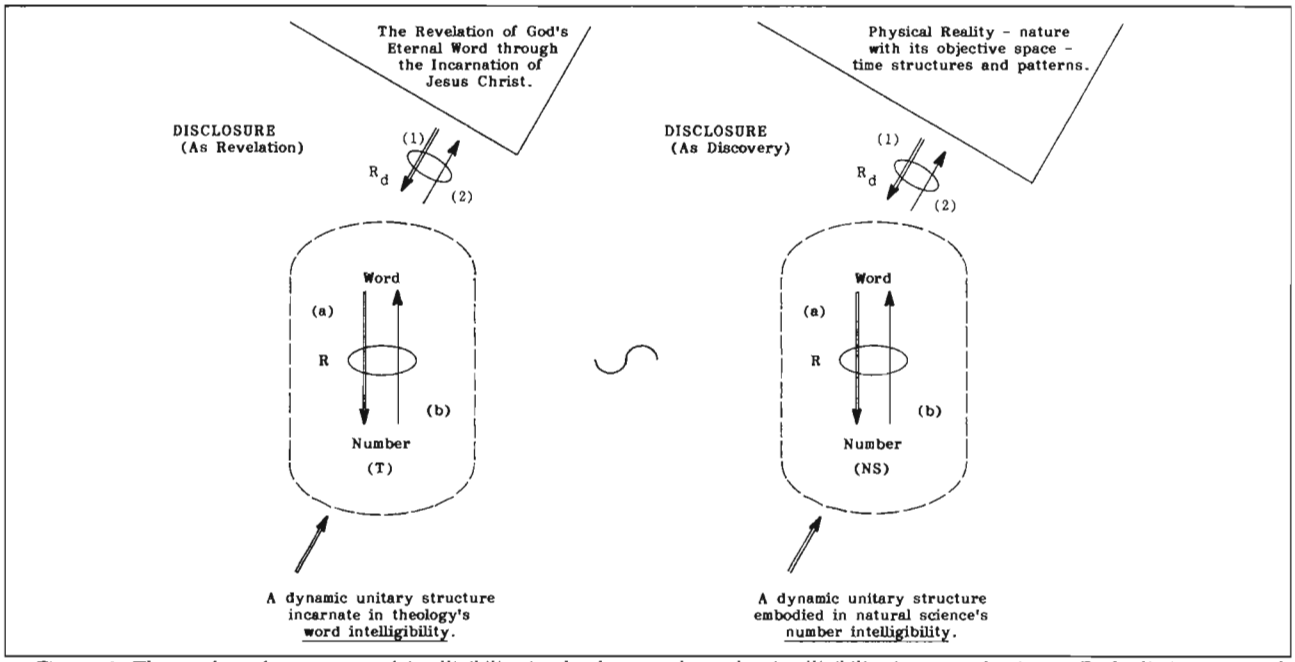


Figure 1. The analogy between *word intelligibility* in theology and *number intelligibility* in natural science. Both distinctive intelligibilities are consequences of the unique forms of disclosure appropriate to theology and natural science, i.e., revelation and discovery.

pole of prolonged, careful *study*. Prayer and reflective study, distinctive components of a good theologian's working life, can be perceived as poles whose subtle interaction creates a bipolar-relational unity that faithfully represents the essence of theological productivity.

Prayer and reflective study, distinctive components of a good theologian's working life, can be perceived as poles whose subtle interaction creates a bipolar-relational unity that faithfully represents the essence of theological productivity.

In this hierarchical interplay the theologian's active prayer life *controls* or *molds* all his or her careful study of the activity of the living God as witnessed to, primarily, in Holy Scripture and, secondarily, in human experience. Yet, at the same time, such careful study causes the theologian to appreciate more fully the beautiful yet complex character of God's love expressed through creative care toward all the Creation. This careful study thus brings about a relation of *dependence upon* or *openness to* a new sense of awe and wonder of God's love that results in a maturing of the theologian's prayerful responses to God's Grace. This more mature prayer, in turn, guides or controls further careful theological study and reflection. The interplay of *control* and *responsive dependence* represent the asymmetric relations of a differential relationship which bind together the distinct poles of prayer and study to form a bipolar-relational unity. This bipolar-relational structure, a dynamic unity of prayer and study bound together by a hierarchical relationship of control and responsive dependence constitutes a DIRA that analogically embodies the core or essence of a Christian theologian's productive life. Either analogy of figure 1 schematically represents this DIRA if the upper pole is denoted as prayer and the lower pole denoted as reflective study.

Nomenclature

Number intelligibility in Natural Science

Number (NS)—Quantitative, formalizable mathematical patterns, operations, invariant structures, ... Characterized as non-individualistic, inter-subjective (subject to communal criterion of consistency), determinant, immanent, ... Formalization implies that criteria of coherence, logical consistency, ... are applicable.

Word—speech, language establishes meaning referentially. That is, by referring mathematical operations, structures, patterns, ... to objective patterns and structures found in physical reality-nature. This referential aspect of language can never be completely explicated; there is always an informal tacit component to verbal communications. Such a personal, tacit component emerges in the context of the complex interpersonal interactions of the community of scientists. The referential character of language was already present in the decisions as to what experiments to do, its tacit presence widens as it becomes an essential aspect of the words chosen to convey the possible meaning of experimental results in the context of developing physical theory. Verbal communications, word, opens up to us some limited recognition and understanding of the contingent intelligibility indwelling physical reality-nature.

This referential aspect of language can never be completely explicated; there is always an informal tacit component to verbal communications.

Rd - the disclosure relationship (asymmetric).

Relations of the relationship: 1. creates, sustains, grounds; 2. points to, responsive to.

R - Number and word relationship (asymmetric), interaction.

Relations of the relationship: a. molds; b. points to, responsive to.

Word intelligibility in theology

Number (T)—The many quantitative, formalizable details associated with explication of God's acting and speaking through historical events: dates, places, specific details (the Red Sea was, in some physical way, parted so that the Exodus from Egypt took place; the encounter of the disciples and the others with the resurrected Christ; and so forth).

Characterized as non-individualistic, inter-subjective (subject to communal criteria of consistency), determinant, immanent, ...

Formalization implies that criteria of coherence, logical and historical consistency (as an example, the congruence of the Gospel portraits of Jesus with his historical reality), ... are applicable.

Word—speech, language establishes meaning referentially. That is, by referring quantitative, formal statements about specific factual (historical) events both toward themselves and away from themselves to a transcendent objectivity found in God's divine self-revelation to humankind. God's divine self-revelation is revealed to humankind yesterday in the spatial-temporal life of the incarnate Word of God and today through the presence of the risen Lord in his church—the community of worship. The risen Lord's presence is also manifest today through the ongoing, creative activity of the Holy Spirit in sustaining the created Universe and inspiring creative exploratory activity by human scientists, artists, poets, ...

This referential aspect of theological verbal expression is deeply personal, being rooted in tacit, informal activity of the worshipping community. It opens up to humankind some limited recognition and understanding of the transcendent intelligibility of the living God—The Eternal Word.

The revelation of God's eternal Word—The person of Jesus Christ—as he is witnessed to indirectly (secondarily) by the totality of Old Testament words concerning heroes, prophets, and servants and directly (primarily) by the New Testament words concerning his incarnate spatial-temporal presence in the life, death, and resurrection of Jesus Christ. Or, equivalently, the Revealed Word, the reality of God who in his freedom of love unveils and makes known his creative, reconciling and redeeming purpose toward humankind. The revelation of God has its central locus in a single personal history, of Jesus the Christ (foreshadowed in the *Old Testament*, witnessed to in the *New Testament*) who is self-disclosing, the self-giving, and the self-evidencing of the Triune God.

$\smile$ denotes an analogy of faith, *analogia fidei*, a form of disclosure correspondence perceived through "the ears and eyes of faith."

Analogy C: *Discovery as encounter* in theology and natural science—three related aspects

1. *Theology*: The Holy Scriptures are necessary to Theological Science but not sufficient in themselves —the revelatory activity of the Holy Spirit through inspiration and/or illumination is needed to guide and awaken the theologian.

Natural Science: The Data are necessary to Natural Science but not sufficient in themselves—inspira-

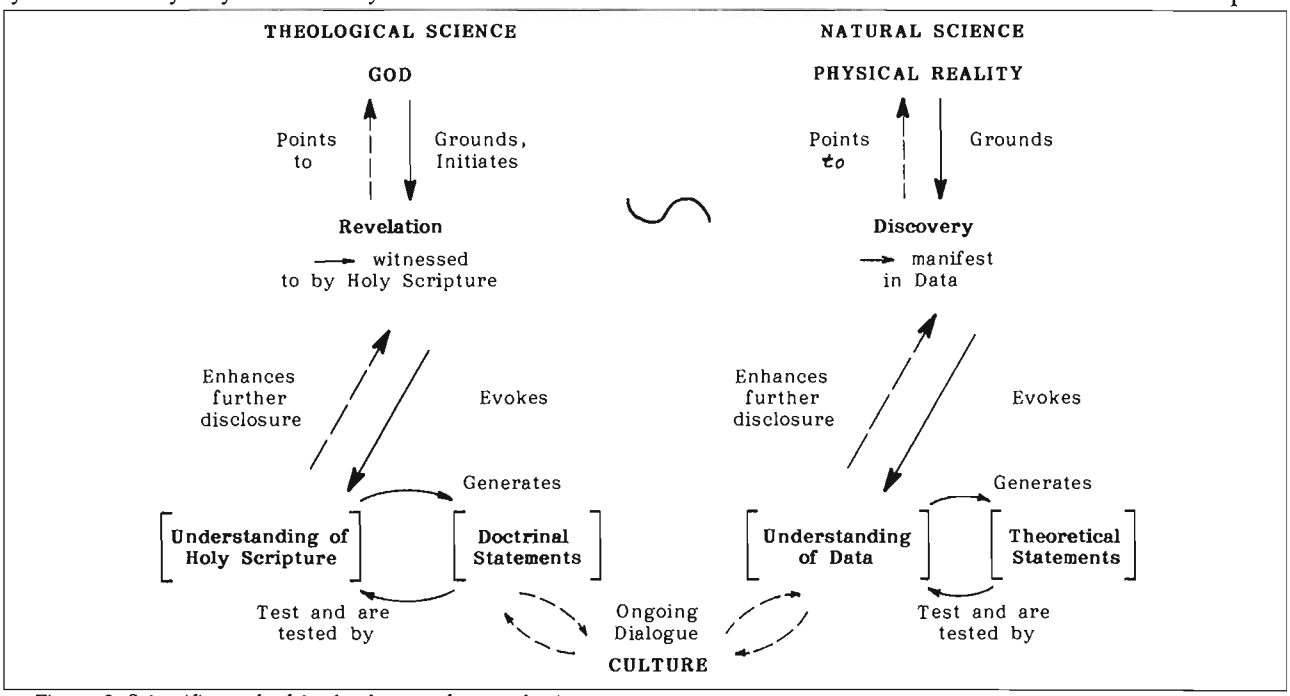


Figure 2. Scientific method in theology and natural science.

SEARCH

Scientists Who Serve God

From Atom Smashing to Nuclear Medicine

John A. McIntyre's research career in physics has spanned forty years. For roughly the first half he worked with several different kinds of particle accelerators, huge machines that probe the tiniest details of matter by hurling highly energized subatomic particles at atoms or other particles. His work with an electron accelerator at Stanford and a heavy-ion accelerator at Yale led to his present position as professor of physics at Texas A&M University in College Station. He moved to Texas in 1963 to help get A&M's brand new cyclotron operating. Studying collisions with it eventually led to the second phase of his career: applied medical physics. Pure research is fun, he says, but "this kind of physics can do ordinary people some good." Besides, it may open up new jobs for his physics students.

Being in the Right Place at the Right Time

It's not hard for "Jack" McIntyre to see the hand of God guiding his life. He was born in 1920 in Seattle, where his father was a mechanical engineering professor at the U. of Washington (and head of the university committee on athletics). Jack, the oldest of three boys, was too slight for football but loved playing basketball in a city youth league. In 1943 he received a B.S. in E.E. from U.W. with high academic honors. World War II disrupted many plans at the time, including his. After a year teaching electrical engineering at Carnegie Tech in Pittsburgh he began working on airborne radar for Westinghouse Corporation in Baltimore.

With the end of the war in 1945, the radar project was cancelled and Jack found an engineering research job at Princeton University. He thus "fell into one of the best physics departments in the world," when top-notch scientists were trying to understand the physics behind the atomic bomb. Shelving his plans to go to M.I.T., Jack stayed on as a grad student and met Madeleine Forsman, a teacher of French and English at Princeton High School. He married her in 1947 and received his Ph.D. in 1950. The couple moved to California, where Jack's Princeton professor had accepted a job at Stanford University.

After seven years of postdoctoral research at Stanford's High Energy Physics Laboratory, McIntyre was offered a physics position at Yale as assistant professor (1957-60), then associate professor (1960-63). From Yale he went to his present full professorship at Texas A&M. From 1965 through 1970 he was also associate director for research at A&M's Cyclotron Institute.

Acting on a Theory that Makes Sense

Jack McIntyre became a Christian some years after becoming a full-fledged physicist, approaching those two major life commitments in a similar way. In "The Appeal of Christianity to a Scientist" (*Christianity Today*, 15 Mar 1968; first published as "A Physicist Believes," *His* magazine, June 1961), he wrote that faith became real to him only after years of trying to make sense out of what he heard from various pulpits. His eyes were opened in a home Bible class "where the Bible was studied in the same critical manner that I was accustomed to in my daily work in physics. The class assumed the Bible to be consistent and understandable, just as the scientist considers nature to be consistent and understandable."

As in learning to swim, though, preliminary investigation can take one only part of the way. After "plunging in" to trust Christ, Jack McIntyre found new understanding, when "the most wonderful theory he could ever imagine" was "validated completely in the laboratory of life." Ω

Scientific Investigation

One Thing Leads to Another

What's a high-energy physicist doing trying to peer inside the human brain? To hear how Jack McIntyre got into medical instrumentation is to follow a trail of "one thing leading to another" with little hint of where the trail might end. Yet the groundwork for his current work on positron emission tomography (PET; see sidebar on "Brain Scans") was being laid all along.

For one thing, his PET work is now in an "engineering phase" and his first degree was in electrical engineering. At Princeton he did graduate work in physics under the late Robert Hofstadter. Jack had found optical theory hard to understand until he took Hofstadter's graduate course on optics; now he's making use of optical fiber technology. Further, in his Ph.D. research he used some of the first gamma-ray scintillation detectors, now at the heart of all PET instruments.

The young Ph.D. accompanied Hofstadter to Stanford in the first of Jack's three career moves to universities with newly built accelerators. Hofstadter used high-energy electrons from the Stanford accelerator to probe the size and shape of atomic nuclei, winning the 1961 Nobel Prize in physics for that work. McIntyre's research publications with a Nobelist were no doubt a boost to his own academic career in high-energy physics.

An End and a Beginning

With Texas A&M's cyclotron, McIntyre studied proton-deuteron collisions, which send particles off in all directions. To account for all of them required a large number of expensive detectors. While thinking of ways to simplify that system, Jack was also wondering how long pure research on nuclear structure could absorb young Ph.D.s interested in nuclear physics.

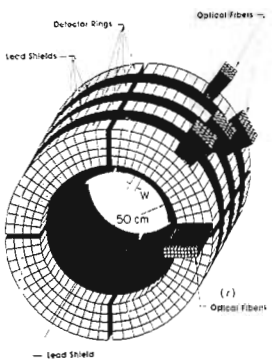
Realizing that more precise measurement of nuclear radiations inside the human brain could have great medical benefits, McIntyre thought of using optical fibers to sharpen PET images with less expensive and less cumbersome equipment. He improved detection of positron collisions by utilizing cheaper plastic scintillators to convert gamma rays into optical signals. His optical-fiber encoding system feeds the signals into a smaller number of photomultipliers than in presently available tomographs.

Tenacity—and Tenure

After a grant from the National Institutes of Health in 1976 enabled McIntyre to build a small prototype machine, new technology made that first project obsolete before it could be tested. Jack hung on, pouring what he had learned into an improved design, under a major grant from the American Cancer Society in 1980. After that, Texas A&M continued to support the project. By then his academic tenure was almost as important as financial support, with years going into exploratory design work with little opportunity to publish.

At last a series of papers on John A. McIntyre's design for an "80-Ring Optical-Fiber PET" is flowing from his lab into the *Journal of Computer Assisted Tomography, IEEE Transactions on Nuclear Science,* and other technical journals. Using less than a 300th the number of expensive photomultipliers, the A&M tomograph design should yield PET images as sharp as those from CAT scans, with little increase in cost.

Ω



Left: General layout of the A&M Positron Emission Tomograph. Each quarter ring contains over eight miles of plastic fiber optics. For a brain scan, the patient's head fits into the center aperture.
Below: CAT scan of mouse aperture.

BRAIN SCANS

Most people have heard of the CAT scan (Computer Assisted Tomography), a special kind of X-ray photograph. A CAT scan shows structures in a single layer or "slice" of a living human brain without interference from structures in nearby layers. Removing those extraneous images is what the computer assists in doing. The word *tomography* comes from the same Greek root for "cutting off a slice" as does the word *atom.* (An "atom" is the smallest piece into which an element can be divided.)

PET (for Positron Emission Tomography) is based not on X-rays but on gamma rays generated *inside* living tissue by positron collisions. Positrons are positively charged "anti-electrons" emitted when certain radioisotopes (such as carbon-11) decay. A normal body chemical tagged with C-11, say, is injected into the patient. Emitted positrons immediately collide with electrons abundant in body chemicals. Each collision produces two gamma rays, detectable when they penetrate to the outside of the body. Gamma rays are slightly more penetrating than X-rays. With the rapidly decaying isotopes used, there is no more radiation damage to tissue than when X-rays are used.

Unlike CAT scans, a PET scan can measure biochemical activity going on in a brain. Clinicians expect the new technique to foster breakthroughs in various brain disorders: schizophrenia, epilepsy, Huntington's chorea, and Parkinson's and Alzheimer's diseases. PET may also aid research on such circulatory disorders as ischemic heart disease and stroke.

Theological Reflection

Rekindling the Reformation

Mild-mannered Professor McIntyre can express himself quite strongly about issues he really cares about. One such issue is the failure of the Christian community to counsel its brightest young people into scholarly pursuits.

An invitation to a banquet honoring "the 48 American Jews who have won a Nobel Prize in science" made him realize that he couldn't think of even *one* evangelical Christian who had won a Nobel Prize in any field. American evangelicals, who may outnumber American Jews by as many as four or five times in the general population, have accomplished far less in science.

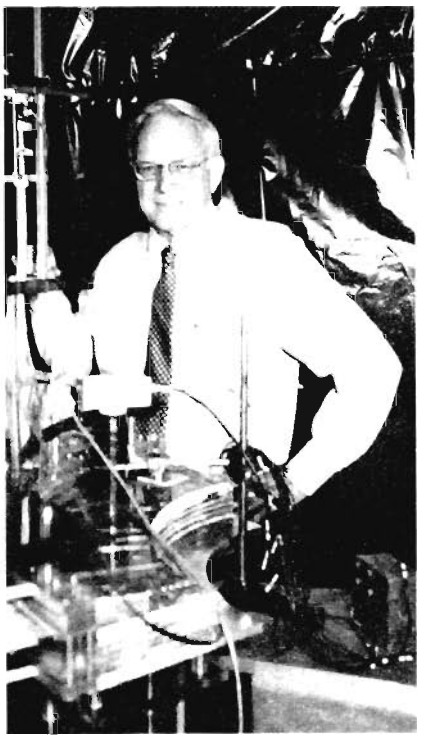
The Evangelical "Seal of Approval"

In "Calls of Ivy" (*Christianity Today*, 5 Nov 1990), John McIntyre expressed concern that although there are plenty of bright Christian students, most are diverted from going on to graduate school to become the professors and researchers of the future. Why? Despite talk of "redeeming the secular world," evangelicals still place a far higher value on "full-time Christian service" (i.e., as pastors and missionaries) than on training to enter the academic professions.

One price paid for such restriction has been a diminished Christian influence in the universities and consequently in American culture as a whole. Ironically, after praying for the gospel to bear fruit in China, Christians now find U.S. universities inundated by over 40,000 Chinese scholars. Such scholars have not heard that science developed in a Christian culture, or that it is reasonable for a scientist to have a mature faith in Christ. How many Christian professors will they encounter?

A Physicist Prescribes a Cure

The evangelical church may show symptoms of anti-intellectualism, but the prognosis need not be grim. If the disease is "a tradition that some works are better than others," McIntyre suggests that the cure lies "in a return to the insights of the Protestant Reformation," which should have broken down distinctions between clergy and laity. With the Reformation's rediscovery of salvation by faith, consecrated Christians became free to devote their lives to any lawful pursuit and find satisfaction in it. Science in particular was enriched by the new Christian freedom. Johann Kepler (1571-1630) regarded his astronomical work as unfolding "the admirable wisdom of God."



Jack McIntyre in his Texas A&M University laboratory, running tests on his "PET Project." Foreground: Quarter ring of the scanner designed and constructed in the lab. (Read his lips: "This thing is going to work!")

McIntyre quotes that phrase from John Calvin's comments on astronomy. The Reformer regarded the study of astronomy as a pleasing and important pursuit: "Wherefore, as ingenious men are to be honored who have expended useful labor on this subject, so they who have leisure and capacity ought not to neglect this kind of exercise."

Of his own Christian vocation, McIntyre says, "I am immersed in physics because I am fascinated by the insights that physics has obtained about God's world. I find in physics an esthetic appeal that enriches human existence and gives the same kind of satisfaction that is experienced by hearing great music or viewing unspoiled nature." He recalls that he became a Christian because he saw the same aesthetically satisfying patterns in Scripture. Ω

BRAIN SCANDAL?

Dr. McIntyre is not alone in recognizing that evangelicals have often "betrayed the Reformation" by failing to utilize our brains in wholehearted academic pursuits. This little publication, SEARCH, is one effort to remind the church and the world at large that *some* Christians are already reversing the trend. Some have done outstanding scientific work. One or two have even come close to that prestigious Nobel Prize.

The year 1991 marks the 50th anniversary of the founding of the American Scientific Affiliation (ASA), which now numbers over 2,500 men and women who consider science their Christian vocation. Other societies have sprung up since 1941 to stimulate evangelical scholarship and encourage Christians in secular academic fields. The Affiliation of Christian Geologists and Affiliation of Christian Biologists are two ASA-related groups in specialized fields of science. Such groups often meet in conjunction with national scientific meetings.

Para-church groups serving college and university students, such as Campus Crusade for Christ and InterVarsity Christian Fellowship, have begun to extend their ministry to include graduate students and faculty. IVCF, for example, has provided financial support for a new quarterly journal produced for and by graduate students: *The Crucible* ($8/yr, c/o David Lines, Dept of Computer Science, U. of North Carolina, Chapel Hill, NC 27599-3175).

Thoughtful Worship

Thinking and Tinkering

Jack McIntyre is very much an experimental physicist, though as a boy he was more of a reader than a "tinkerer." What one needs in order to do good experimental work, he says, is a basic understanding of the subject and a lot of common sense. Common sense and the interplay of theory and practice seem to be important characteristics of scientific work.

Many Christian writers have stressed the importance of both *orthodoxy* (teaching what is right) and *orthopraxis* (doing what is right). Maybe it is the common-sense aspect that is most commonly neglected in the Christian life.

Adventures in Physics and the Christian Life

Jack McIntyre's calling as a physicist has included teaching the subject to over 5,000 students and engaging in both pure and applied research. He has published over 50 scientific papers and holds eight patents. (He's one scientist who should already know how to say "Thank you very much" in the appropriate language if ever handed the Nobel Prize. Both his wife Madeleine and their adopted son John F., in construction engineering, were born in Sweden.)

Jack & Madeleine McIntyre

The McIntyres have wanted their Christian witness to make sense in the context of their surroundings. Madeleine has published articles in Texas *Tempo* magazine about two of their adventures. One described their 1965 trip to the Soviet Union, where Jack was a guest lecturer for ten days at the Institute for Nuclear Research in Dubna, and their return trip in 1968. Stressing the friendly openness that made Russians seem very much like Texans, she mentioned befriending their official guide and later sending him his first copy of the New Testament.

Trying an Experiment; Pressing On Toward the Prize

In a 1970 *Tempo* article ("Experiment in Black and White") Madeleine told how Jack's meeting with a black high school physics teacher led the McIntyres (active in a Presbyterian church) to make a series of visits to the African Methodist Episcopal Church in still highly segregated Bryan, Texas. Everyone was a little tense at first, but once the McIntyres' motives were recognized as a sincere desire to worship with fellow believers, color didn't seem to matter.

When the outcome of an experiment is uncertain, it's important to put in a lot of thought beforehand. But if one is absolutely sure how something will turn out, Jack says, it's no longer an experiment. He'd like to see more Christians tinkering with new patterns—not recklessly, but with careful thinking about goals. That seems to be the route to "the prize":

> *. . . I press on to make it my own, because Christ Jesus has made me his own. Beloved, I do not consider that I have made it my own; but this one thing I do: forgetting what lies behind and straining forward to what lies ahead, I press on toward the goal for the prize of the heavenly call of God in Christ Jesus. Let those of us then who are mature be of the same mind; and if you think differently about anything, this too God will reveal to you. Only let us hold fast to what we have attained.*
>
> (Philippians 3:12-16) Ω

SEARCH

This issue of SEARCH (No. 12) was prepared by Walter R. Hearn of Berkeley, California. Design by Nancy C. Hanger; layout by ASA managing editor Rebecca Petersen. Opinions expressed in SEARCH are those of individuals and may not be representative of the entire ASA membership. Scripture quotations are from the New Revised Standard Version (1989) unless otherwise noted.

SEARCH brings scientific questions to the attention of pastors and the Christian public by focusing on the work of Christians in science. SEARCH is an occasional publication of the American Scientific Affiliation (ASA), Robert L. Herrmann, executive director. To obtain a free single copy, send stamped, self-addressed envelope to: ASA, P.O. Box 668, Ipswich, MA 01938. Be sure to state the number of the issue being requested. Multiple copies to one address: 15 cents/copy plus $1.50 postage and handling charge; prepaid orders only, please.

The 1989 version of ASA's 48-page guidebook, *Teaching Science in a Climate of Controversy,* helps teachers cope with questions of science and religion. It is available postpaid from ASA at $6 for one copy, $5 each for 2-9 copies, $4 each for 10 or more copies.

For information on ASA Annual Meetings, other ASA publications, or how to become a **Member**, **Associate**, or **Friend** of ASA, write to: **ASA, P.O. Box 668, Ipswich, MA 01938.**

tion, insight is needed to awaken and guide the scientist.

2. *Theology*
REVELATION: The *self-disclosing* (unveiling, revealing) *of God in Jesus Christ* who in his freedom of love encounters us through the witness of Holy Scripture——→ Opening us up to begin to apprehend, in part, what is always beyond our finite and sinful comprehension, the intrinsic, transcendent intelligibility of his being and action. Such "opening up" is through the work of the Holy Spirit.

Natural Science
DISCOVERY: The concrete objects of physical reality encounter us through the accumulation of data ——→ Opening us up to apprehend glimpses of the intrinsic, contingent intelligibility of their structures. This discovery process can be seen, from the Judeo-Christian perspective, as the work of the Holy Spirit.

3. *Theology* is based upon God's faithfulness in all his dealings with humankind (as manifest in Israel and in the self-revelation of Jesus Christ) where Yahweh freely reveals himself in always new and unexpected ways that are inexhaustible in scope (adapted from Karl Barth).

Science is based upon reality's stability of structure and pattern which has the capacity to reveal itself in always new and unexpected ways that are inexhaustible in scope (adapted from Michael Polanyi). Note that theologically the second component of this analogy is a consequence of the first as a parenthetical remark of the introduction suggests.

Analogy D. *Scientific Method* in theology and natural science

Both sciences are three component endeavors, uniquely human activities rooted in "faith in search of understanding" where one's commitments (ultimate and working) are formulated in response to the distinctive character of the realities that encounter both disciplines. The dialogical process which represents the core of scientific method in theology and natural science, indicated in figure 2, should be understood in this context. It is a form of "circular feedback" composed of ongoing alternating movements between the understanding of the discipline's standard (Holy Scripture and data respectively) and theory statements (doctrinal statements and theoretical statements respectively). The understanding of the standard *generates* theory statements which, in turn, *test and are tested* by understanding of the standard; the cycle, then repeating itself as scientific knowledge develops.

The process of "circular feedback" common to both theological science and natural science should be understood in this context. This analogy is properly understood as a heuristic representation of the developmental character of *scientific method* in theology and natural science. All three interacting components of this *scientific method* take place within a community of theologians or scientists whose social (often tacit) interactions are an extremely important part of the respective developmental structures in figure 2.

It is through the ongoing dialogue of both theology and natural science with their respective cultures as a whole that the presuppositions and findings of one discipline influence (often in very subtle ways) the other.

The social interactions with the larger culture in which the theological and scientific communities are embedded may also play a major role in the developmental structures of the *scientific method* in theology and natural science. Accordingly, this heuristic analogy for *scientific method* in theology and natural science should be understood as deeply rooted in social-community activity; theology and natural science are, after all, uniquely human endeavors. It is through the ongoing dialogue of both theology and natural science with their respective cultures as a whole that the presuppositions and findings of one discipline influence (often in very subtle ways) the other.

Theological Science: The self-revelation of God in Jesus Christ as witnessed to in *Holy Scripture* is the reality sought after by theological science. In its function as this witness, Holy Scripture is an embodiment of God's transcendent, loving intelligibility. Insight into this revelation by the work of the Holy Spirit creates a movement to articulation culminating in *doctrine* which is to be understood as the process by which the revelation witnessed to in Holy Scripture comes to expression in human intellectual structures, which necessarily

are then subjected to the authority of the revelation as to their adequacy. This process can be likened to an ongoing "circular feedback" loop in which both the understanding of Scripture and the Doctrinal statements generated from it are mutually in *dialogue*, testing and being tested by each other.

Discovery, guided by insight or intuitive grasp, expresses itself in the articulation of theory, which is then tested by understanding of the data. . .

Natural Science: Physical reality, in its intrinsic contingent intelligibility, comes to expression through discovery by the human observer of that intelligibility as manifest in *data*. Data is thus an embodiment of physical reality's contingent intelligibility. Discovery, guided by insight or intuitive grasp, expresses itself in the articulation of theory, which is then tested by understanding of the data in a process analogous to the "circular feedback" loop mentioned above.

It is appropriate to note that from a theological perspective the discovery of contingent intelligibility embedded in the space-time structures of creation may become a secondary form of revelation of the Creator God-Father, Son and Holy Spirit, if the observer has a sense of awe awakened by the beckoning call of the Holy Spirit through the inspiration that nature, i.e., physical reality, provides.

Scientific method—a three stage structure

Figure 2 illustrates in detail the analogous structure of scientific method in theology and natural science as composed of three interacting components—the source of intelligibility, the form of disclosure characteristic of the source, and the ongoing spiral-like process of "circular feedback" that leads to theoretical understanding for both disciplines. In figure 2, the two sources of intelligibility for each discipline, God and reality, are parallel to each other. The corresponding forms of disclosure of each source's nature, revelation and discovery, are both dynamic and parallel. It must be noted here that though there is real parallelism between these forms of disclosure there is a different accentuation to each of them. Revelation is wholly God's act and though it embraces the human partner through the illumination of that partner by the Spirit, the focus is clearly on God as the initiator and effector of revelation. In discovery, however, the human partner (observer) plays a major role through the process of data-gathering, hypothesizing and experimentation, in short, by intensively probing physical reality to discover its secrets.

Physical reality, though, remains a real, even controlling partner in dialogue with the discoverer. This can be argued in two ways. First, the contingent order and rationality of physical reality, in its vast compass and dazzling intricacy, serves to lure investigators by stimulating their own rationality and inspiring them to the arduous labor required for genuine scientific understanding. Secondly, physical reality answers only those questions properly focused and posed. We cannot compel it to answer our questions. We can only humbly strive to order and frame our queries in such a fashion that they seek the real order and rationality already there in nature.

Such testing and being tested by, which completes the "circular feedback," is an ongoing process that includes the elements of deductive prediction and falsifibility.

The understanding of Holy Scripture, i.e., the exegetical data and syntheses built upon them, emerging from the encounter of the theologian with God or the parallel understanding of data, i.e., including experimental data, tables, charts, graphs, etc., emerging from the encounter of the natural scientist with physical reality "generates" both doctrinal and theoretical statements. This process of "generation" involves elements of imagination, induction, abduction, and intuitive insight. These doctrinal and theoretical statements then "loopback" to the understanding of Holy Scripture and data respectively asking both about the adequacy of that understanding itself and about its own adequacy as a formal unfolding of the understanding involved.

Such testing and being tested by, which completes the "circular feedback," is an ongoing process that includes the elements of deductive prediction and falsifibility. The resulting overall cycle's time development may be likened to a spiral, that is, it is open-ended. Through these cyclical movements theologians and natural scientists place their

rationality under the larger, more comprehensive rationality of God and physical reality. The integrity of these processes in both natural science and theology becomes the measure of these disciplines' accountability to the reality they seek to know.

Analogy E. The *epistemological realism* of theology and quantum physics

In rigorous scientific methodology we must allow the object of our knowledge to determine the way we know things, the way we think about things, and the way we express our thoughts. Rigorous theology and rigorous natural science have come to acknowledge that there are appropriate ways set by God (or the world) in order to gain understanding of God (the world). Quantum physics has emphasized in new ways this aspect of "scientific objectivity." Such a "scientific objectivity" is always to be understood as resulting from the efforts of finite (and sinful) human creatures; it is properly understood as an approximation that points beyond itself to a truth whose openness will always surprise us.

Perceptual circular complementarity in theology

The very manner by which the incarnate Word, Jesus Christ, reveals his Godness to us excludes simultaneous comprehension (perception, awareness) of knowledge concerning his human nature and vice-versa. As the incarnate deity is "listened to" knowledge of his humanity fades out; it is only known indirectly, in the inner recesses of memory. By dialogically "circling" back and forth between both poles of the revelation a limited comprehension emerges of the inexhaustible knowledge revealed in the person of Jesus Christ; where human nature is known only as we know the divine nature and vice-versa, the two natures being distinct yet always bound together in inseparable unity.

Accordingly we must allow God to determine how he reveals himself to us ——→ The way we come to observe God is determined by God. God as Object of our learning and discovery is simultaneously Subject, the active personal initiator of all our relationships to him. Thus God remains "indissolubly Subject" even when he is the Object of our human inquiries and as such determines the appropriate way to come to him: We must truly believe in order to know him, such belief being grounded in his first knowing us.

Complementarity in natural science

To observe light, a quantum "object," as a stream of particles will preclude simultaneous knowledge

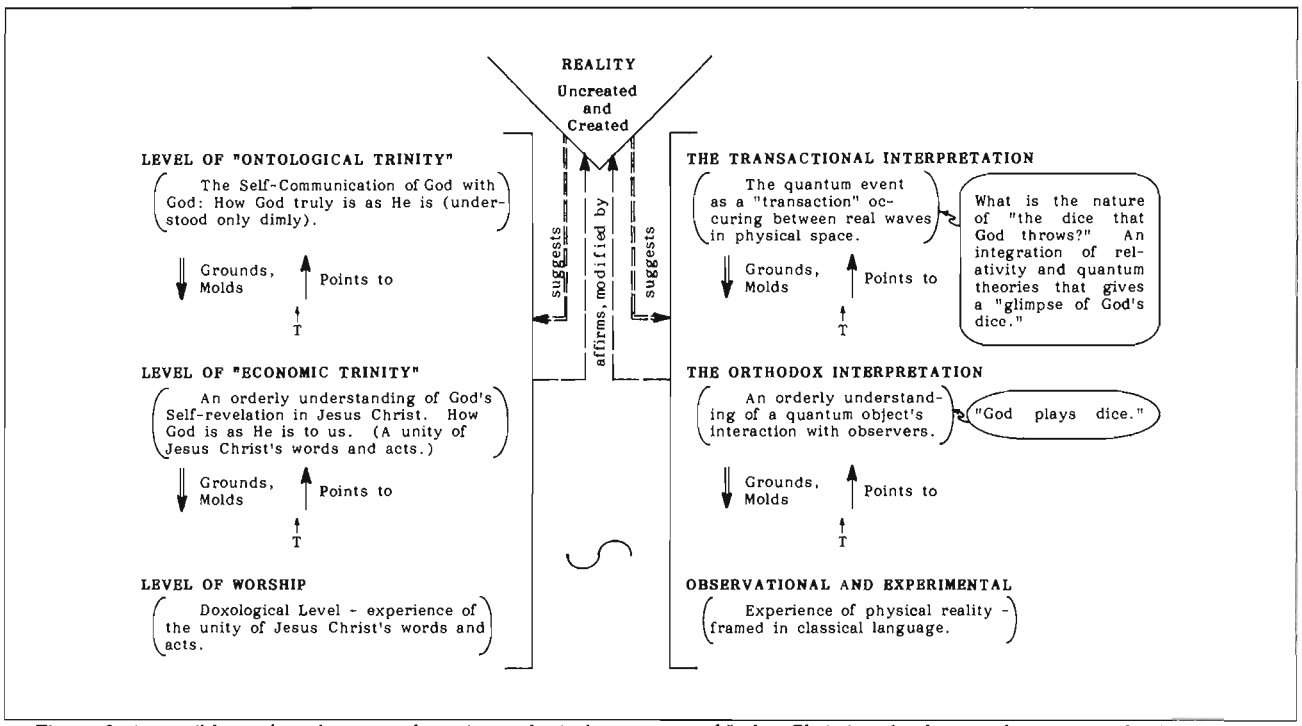


Figure 3. A possible analogy between the epistemological structures of Judeo-Christian theology and quantum physics.

of its wave character and vice-versa. As a particlelike aspect of a quantum "object" is observed, knowledge of the conjugate wavelike property fades out; the wavelike property is known only indirectly, i.e., by memory. By dialogically "circling" back and forth between wave and particle aspects, comprehensive knowledge emerges of the quantum "object" as a unitary structure where unity is disclosed in the mutually exclusive wave and particle contexts. Accordingly we must allow the quantum "object" to tell us how it is to be looked at ——→ The appropriate way of observing the quantum "object" will be determined by the quantum "object" itself. This appropriateness is manifest in the recognition that the human observer's selection of the quantum "object's" observational environment, wavelike or particlelike, determines what can be known with respect to the quantum "object"—the way we observe a quantum "object" limits our knowledge of it.

Differences between theological and scientific perceptual complementarities

It is important to recognize the distinctive character of the dissimilarity in similarity with respect to the analogy between these two perceptual complementarities, theological and scientific. Both complementarities are a consequence of the nature of the relatedness between the observer and the object (or Object-Subject for theology) observed. The relatedness between the observer and the observed associated with quantum "objects" is a reality in which the observer's "questions" condition what can be know of the observed whereas the relatedness between the believer and Jesus Christ is a reality in which Jesus Christ's active presence as Subject of subjects (in the Holy Spirit) may "turn around" the believer's questions so that the believer is compelled to reconsider and alter all that he or she believes to be authentic in his or her relationship with the Lord of the Universe.

The theological complementarity, a possible consequence of the differential unity intrinsic in the person of Jesus Christ, focuses us on a much deeper and unique personal relatedness between the believer and Jesus Christ than that of the relatedness of the observer and observed manifest in the complementarity between wave and particle modes of a quantum "object." Karl Barth has stressed that God remains "indissolubly Subject," an active, personal initiating agent in all his dealings with humankind, even when he is the Object of our learning and discovery.

Thus certain aspects of knowledge acquisition in theology and in natural science may be represented by complementarity relationships as a consequence of the unique characteristics of the respective interactions between the human observer and the object (or object-subject) observed.

Karl Barth has stressed that God remains "indissolubly Subject," an active, personal initiating agent in all his dealings with humankind, even when he is the Object of our learning and discovery.

Theological and biblical complementarities represent a helpful insight into the richness, distinctiveness and particularity intrinsic to the ways that God and physical reality have revealed their unique transcendent and contingent intelligibilities. As human understanding develops in both fields, these complementarities may be replaced by richer epistemological structures that resolve the apparent paradoxes in a new unity endowed with novel conceptual features. Nevertheless these respective complementarities should continue to function as limiting descriptions within a new conceptual framework. Indeed both complementarities, theological and scientific, may possess enduring validity for they arise out of the requirement that descriptions appropriate to theology and natural science are framed in language contexts which cannot be separated from the realm of human, everyday experience.

Possible epistemological structure beyond complementarity

It should be noted that epistemological structures of greater unity than the current understanding of quantum physics are being actively pursued. J.C. Cramer's recent work in developing a transactional interpretation of quantum physics integrates relativity and quantum theories by providing a transactional model of quantum events in terms of the exchange of real waves physically present in space, rather than as "mathematical representation of knowledge" as in the orthodox or Copenhagen interpretation.

This work leads in a natural way to justification of the Heisenberg uncertainty principle and the

Born probability law, basic elements of the Copenhagen interpretation. The orthodox interpretation of quantum mechanics stresses that all statements concerning reality are observer conditioned, i.e., they are statements about the observer's interaction with the quantum "object," not about the object in itself; the existence of an external reality beyond us is not denied, but it is recognized that the nature of this reality is intimately bound up in our observation of it. Cramer's transactional interpretation provides a model of quantum events as existing beyond us that explains why our understanding of such events (as formulated in terms of observables associated with classical physics) is always in terms of the observer's interaction with the quantum "object" in itself. The orthodox interpretation of quantum reality is framed in terms of "God playing dice." Cramer's meta-interpretation of the Copenhagen quantum framework provides a model of a quantum event in terms of a "transaction" between real waves thereby answering the question: "What is the nature of the dice that God throws ?"

The orthodox interpretation of quantum mechanics stresses that all statements concerning reality are observer conditioned, i.e., they are statements about the observer's interaction with the quantum "object," not about the object itself.

Thus this interpretation of quantum physics attempts to provide a deeper insight into the nature of physical reality's space-time structures, i.e., mass-energy structures. From the standpoint of Judeo-Christian theology, Cramer's transactional interpretation of quantum physics is analogous to the ontological understanding of the Trinity that deals with the nature of the triune God as he truly exists in communion with himself. This ontological understanding has developed from the economic understanding of the Trinity that elaborates how God is as he is in relation to worshipers as revealed by God's self-revelation in Jesus Christ. Such a development of human conceptualization concerning God arises through theological *instinct* as suggested by Analogy B. As a person encounters the revelation of God's Word—the person of Jesus Christ—as he is witnessed to by the biblical words, both Old and New Testament, a relationship is actualized in which one is said to be "in Christ" and that Christ indwells believers. Through such a relationship, the believer is given an intuitive apprehension of God's nature as he is, a unitary community of love.

In an analogous manner (Analogy B's scientific *instinct*), as the scientist encounters the contingent intelligibility witnessed to in quantum events, a relationship is actualized in which one intuitively indwells and is indwelt by the contingent intelligibility undergirding quantum phenomenon. Through such a relationship a scientist such as Cramer is given an intuitive apprehension of more comprehensive interpretation with respect to quantum reality.

The suggested analogy between the development of deeper insights into respective intelligibilities, transcendent and contingent, that are intrinsic to theology and quantum physics is schematically represented in Figure 3.

Nomenclature

T—A transformation from one epistemological level to a new level takes place as the "specifics" of the lower level are *indwelt* by the knower-learner and the intelligibility that grounds the lower levels, i.e., the upper level then, in turn, *indwells* the knower-learner. Such a *natural reciprocity* of *indwelling* constitutes the epistemological transformation process resulting from our experience of revelation and discovery. It begins at the bottom level and moves upward as shown. See the discussion of theological and scientific instincts in Analogy B. ✱

Acknowledgements

The authors wish to thank James E. Loder, Harold P. Nebelsick, Parker Rossman, Russell Stannard, and Thomas F. Torrance for the numerous stimulating suggestions with respect to this essay. Any misunderstandings contained within are, of course, our sole responsibility and not theirs. The authors would like to dedicate this essay to Harold P. Nebelsick, Professor of Doctrinal Theology at Louisville Presbyterian Theological Seminary from 1968 until his death on Easter Sunday, 1989. Harold was a good friend and mentor whose reflections concerning the integration of theology and science inspired much of what is written here.

Selected Bibliography

Analogy A.

Barth, Karl. *Dogmatics in Outline*. New York: Harper & Row, Publisher, Incorporated, 1959.

———."Chapter I. The Word of God as the Criterion of Dogmatics," *Church Dogmatics I,1: The Doctrine of the Word of God*. eds. G.W. Bromiley and T.F. Torrance. Edinburgh : T & T. Clark, 1975, pp. 47-292.

———. "Chapter III. Holy Scripture." *Church Dogmatics I,2 : The Doctrine of the Word of God*. eds. G.W. Bromiley and T.F. Torrance. Edinburgh : T & T. Clark, 1975, pp. 457-740.

Holton, Gerald. "Einstein's Model for Constructing a Scientific Theory," *The Advancement of Science and its Burdens*. New York : Cambridge University Press, 1986, pp. 28-56.

Johnston, Robert K. editor. *The Use of the Bible in Theology—Evangelical Options*. Atlanta : John Knox Press, 1985.

Mohr, H. "The Scientific Approach: (1) Terminology and language; (2) Data, Hypotheses and theories; (3) Laws, Prediction, Explanation," *Structure and Significance of Science*. New York: Springer-Verlag, 1977, pp. 29-75.

Thorson, Walter R. *Toward a Biblical Understanding of Human Knowledge* (in particular "Appendix B: Divine revelation"). Paper presented at the conference "Christian Faith in Science in Society" (Joint Meeting of the American Scientific Affiliation, Canadian Scientific and Christian Affiliation and Research Scientists' Christian Fellowship), July 26-29, 1985, St. Catherine's College, Oxford, England. For further information write author: Walter R. Thorson, Dept. of Chemistry, The University of Alberta, Edmonton, Canada T6G-2G2.

Analogy B.

Loder, James E. "Knowing as Transforming Event," *The Transforming Moment*. New York : Harper & Row, Publishers, 1981, pp. 29-63.

Polanyi, Michael. *Personal Knowledge*. Chicago : The University of Chicago Press, 1962.

———. *The Tacit Dimension*. New York : Doubleday & Company, Inc., 1966.

Puddefoot, John C. "Indwelling: Formal and Non-Formal Elements in Faith and Life," *Belief in Science and in Christian Life*, ed. Thomas F. Torrance. Edinburgh : The Handsel Press Ltd., 1980 pp. 28-48.

Torrance Thomas F. "The Framework of Belief" & "Notes on Terms and Concepts." *Belief in Science and in Christian Life*. ed. Thomas F. Torrance. Edinburgh : The Handsel Press Ltd., 1980, pp. 1-27, pp. 133-147.

———. "Word and Number," *Christian Theology & Scientific Culture*. Thomas F. Torrance. New York : Oxford University Press, 1981, pp. 109-144.

———. "The Place of Michael Polanyi in the Modern Philosophy of Science," *Transformation & Convergence in the Frame of Knowledge*. Grand Rapids : Wm. B. Eerdmans Publishing Company, 1984, pp. 107-173.

Wigner, Eugene P. "The Unreasonable Effectiveness of Mathematics in the Natural Sciences," *Symmetry and Reflections*. Cambridge (Massachusetts) : The M.I.T. Press, 1967, pp. 222 -237.

Analogy C.

Barth. *Dogmatics in Outline*.

Polanyi. *Knowing and Being—Essays by Michael Polanyi*, edited by Marjorie Grene. Chicago : The University of Chicago Press, 1969.

Analogy D.

Barth. *Dogmatics in Outline*.

———. "The Task of Dogmatics," *Church Dogmatics I,1*. pp. 3-24.

Holton, Gerald.

Mohr, H.

Nebelsick, Harold P. "Karl Barth's Understanding of Science," *Theology Beyond Christendom*. ed. John Thompson. Allison Park (PA) : Pickwick Publications, 1986, pp. 165-214.

———. *Theology and Science in Mutual Modification*. New York : Oxford University Press, 1981.

Oldroyd, David. *The Arch of Knowledge—An Introductory Study of the History of the Philosophy and Methodology of Science*. New York : Methuen, 1986.

Ratzsch, Del. *Philosophy of Science*. Downers Grove (IL) : Inter-Varsity Press, 1986.

Torrance. *Reality and Scientific Theology*. Edinburgh : Scottish Academic Press, 1985.

Analogy E.

Barth. "The Speech of God as the Mystery of God." *Church Dogmatics I,1*. pp. 162-186.

Cramer, John G. "The Transactional Interpretation of Quantum Mechanics." *Reviews of Modern Physics*, Vol. 58 (1986), No. 3, pp. 647-687. The Scope of this new interpretation of quantum physics is indicated by its abstract: "The interpretational problems of quantum physics are considered. The way in which the standard Copenhagen interpretation of quantum mechanics deals with these problems is reviewed. A new interpretation of the formalism of quantum mechanics, The *transactional interpretation* is presented. The basic element of this interpretation is the *transaction* describing a quantum event as an exchange of advanced and retarded waves as implied by the work of Wheeler and Feynman, Dirac, and others. The transactional interpretation is explicitly nonlocal and thereby consistent with recent tests of the Bell inequality, yet it is relativistically invariant and fully casual. A detailed comparison of the transactional interpretation and Copenhagen interpretations is made in the context of well-known *Gedanken experimente* and 'paradoxes.' The transactional interpretation permits quantum-mechanical wave functions to be interpreted as real waves physically present in space rather than as 'mathematical representations of knowledge' as in the Copenhagen interpretation. The transactional interpretation is shown to provide insight into the complex character of the quantum-mechanical state vector and the mechanism associated with its 'collapse.' It also leads in a natural way to justification of the Heisenberg uncertainty principle and the Born probability law ($P = \Psi\Psi^t$), basic elements of the Copenhagen interpretation."

Kaiser, Christopher B. *The Logic of Complementarity in Science and in Theology*. Ph.D. Thesis. The University of Edinburgh, 1974. Available on microfilm from the University of Chicago, The Joseph Regenstein Library, Dept. of Photo Duplication, 1100 East 57th St., Chicago, Il. 60637.

———. "Christology and Complementarity," *Religious Studies* 12 (1976), pp. 37-48.

Stannard, Russell. *Science and Renewal of Belief*. London : SCM Ltd., 1982.

Torrance. *Reality and Scientific Theology*.

———. *The Ground and Grammar of Theology*. Charlottesville: The University of Virginia Press, 1980.

Theology and the Last of the Economists

DOUGLAS VICKERS

Department of Economics
University of Massachusetts
Amherst, MA 01003

Economics as an intellectual discipline has set out to establish a value-free enquiry into relevant aspects of human affairs. To the extent that it has been methodologically self-conscious it has drawn what this paper argues is an unsustainable and irrelevant distinction between normative and positive arguments. The "Theology" in the title of the paper addresses the relevance to economic enquiry of the being, knowledge, and covenantal purpose of God. The "Last" of the economists refers to the essential structure of the economist's thought system, as seen in its current posture and its historical development.

The question is addressed as to whether economic thought should exclude all consideration of theological orientation and the relevance of externally provided, notably biblical, norms. The realities of sin and the fallenness of society, together with the ignorance in which finitude bounds the human condition, throw their light on the scope of economic thought and the potential for economic policy.

The logical structure of our intellectual disciplines, the questions we ask, the forms of analysis we adopt, and the empirical relevance we achieve demand, for an understanding of their significance and mutual relationships, an awareness of what establishes their methodological integrity. In addressing what I have referred to as "Theology and the Last of the Economists" my observations will fall under that general heading of methodology.

But in the intellectual discipline of economics "methodology" is not an especially popular term. Economists do not generally take time to be, or to think as, methodologists. Practitioners in economics generally get on with doing what they are doing and don't argue over much about the methodological justification of it. They are not, in general, the kind of scholars to whom I would refer as being methodologically self-conscious. To the extent that economists do speak of their method, they fall to arguing whether there exists an epistemological or methodological parity between the natural and the social sciences. In that, they most usually argue for some kind of positivist methodology, imagining thereby that they are being "scientific," when, as we know, the scientific community has by this time recognized the death of positivism and has moved to other justifications of its enterprise.

On another level economists, even some "Christian" economists, speak of the distinction between so-called normative and positive economics. The positive, it is said, has to do with what is, and the normative with what ought to be. I shall argue that such a distinction is confusing at best, and is grossly dangerous at worst, for those scholars who wish to make their work captive to the Word of God.

For the burden of my argument will be that it

An earlier version of this paper was presented at the Gordon College Faculty Forum in November, 1989.

is not possible for the Christian thinker to proceed, as his unregenerate counterpart might do, as though the "what is" is a structure of brute or uninterpreted facts that are somehow there to be observed and corralled and interpreted by the autonomous scientific mind.

I shall suggest that there do not exist, in the arena of the potentially knowable, any uninterpreted facts. Let me put that by saying that the facts are what they are because they have the meaning they have. We have a perfect illustration of that on a profoundly theological level. The Scriptures present us, for example, not only with the *fact* of the atonement, but also with an explanation or the *meaning* of the atonement. The fact cannot be separated from its meaning. The fact is what it is because it has the meaning it has. It is not necessary to pursue that at length. But the same conclusion and proposition need to inform our entire intellectual enterprise. All of the facts are what they are because God has already thought all the facts, and has ordered them in their various constellations because of the place they occupy in His plan and purpose for created reality.

Issues in the Development of Economic Thought

Against that proposition, and in justification of my dissent from what it is that economists frequently confess or imagine themselves to be about, let me recall the two halves of my title. By the first half of that title I mean to refer to theology proper. I shall not comment extensively on the several loci of the theological disciplines that properly bear on our subject. I mean to speak of theology proper, that is, of the doctrine of God. By that I mean the doctrine, and the relevance of the doctrine, of the being and the knowledge and the covenantal purpose of God.

In the second half of my title, "the Last of the Economists," I refer to what it is that forms the principal thought structures or thought forms of the economists as they go about doing economics or practicing their craft. When I speak of the "Last" of the economists, I shall ask whether there is a "Last" to which, like the proverbial shoemaker, the economists should stick, and whether they should leave the theological import of their discipline alone and proceed as though Scriptural, Christian thought forms had no relevance to what they think and do. If it carries conviction to say that all the facts are God's facts, that they are what they are because God has already thought them, and that they cohere as they do because God has established them in their constellations, then it must follow that there can be no such thing as a satisfying discipline of economics that is not informed by corresponding, cognate, and consistent biblical thought forms.

We can address that conclusion a little more fully. The propositions I have just advanced regarding the necessity of a biblically informed economics have not been accorded significant hospitality in the history of economic thought. During the last two hundred years of the progress of systematic economics, economists have not in general taken conscious account of the ways and purpose of God in and for the world that He has made and that He preserves.

For the main part, the economic enterprise has been of the kind that William Letwin described in his *The Origins of Scientific Economics* (London: Methuen, 1963), in an argument that strikes at the root of economic epistemology. "There can be no doubt," Letwin concludes, "that economic theory owes its present development to the fact that some men, in thinking of economic phenomena, forcefully suspended all judgments of theology, morality, and justice, [and] were willing to consider the economy as nothing more than an intricate mechanism, refraining for the while from asking

Douglas Vickers (Ph.D., London), currently Professor of Economics at the University of Massachusetts, Amherst, held previous positions at the University of Pennsylvania and the University of Western Australia. He has published extensively on issues in analytical and applied economics and has authored several books in economic theory and in doctrinal and apologetic theology. Among his recent works are Money Capital in the Theory of the Firm *(Cambridge University Press) and* Christian Truth in Critical Times *(Skilton House Publishers).*

whether the mechanism worked for good or evil" (p. 147-48). Admittedly, "it was exceedingly difficult to treat economics in a scientific fashion, since every economic act, being the action of a human being, is necessarily also a moral act" (p. 148). But that was the task, according to Letwin, that had to be accomplished in order that the subject as an academic and scientific discipline could develop. There needed to be a separation, it was claimed, of "positive from normative knowledge," a distinction drawn "between moral and technical knowledge."

I shall ask whether economists should leave the theological import of their discipline alone and proceed as though scriptural, Christian thought forms had no relevance to what they think and do.

Of the clear and widening breach between economics and Christian thought there can be no doubt. One of the great systematizing architects of what became known as the neoclassical system in economics that characterizes the contemporary intellectual mainstream was a man named Alfred Marshall. He published the eighth and final edition of his *Principles of Economics* at Cambridge University in England in the 1920s. In his own lifetime he made an explicit and conscientious break with the church and its influence.

Joseph Schumpeter, perhaps the greatest, or at least the most thorough and comprehensive historian of economic thought in modern times, has referred to "the process, as observed in the Cambridge (England) milieu by which Christian belief, gently and without acerbities, was dropped by the English intelligentsia during Alfred Marshall's lifetime" (1842-1924) (*History of Economic Analysis*, New York: Oxford University Press, 1954, p. 772). Terence Hutchison has referred in his scholarly *Review of Economic Doctrines 1870-1929* (Oxford: Clarendon, 1953) to the achievement of academic economics at Cambridge in the last quarter of the nineteenth century as due to the fact that the great architects of the theoretical system "conceived their task as belonging not in the realm of theology and metaphysics, but in clearing a site, and providing an agreed foundation for 'scientific' enquiry, and here ... they drew no specially significant or dramatic distinction between the two broad groups of sciences included under the very rough headings of 'natural' and 'social' (or 'moral') sciences" (p. 50).

During this important formative period in the history of economics, the hold that Christian thought might once have enjoyed in the universities and the scholarly professions was fairly completely shaken. The philosophic milieu, as it closed in on the economists in this important stage in the development of academic economics in the last half of the nineteenth century, can probably not be more perceptively summarized than in a paragraph from Keynes' biographical essay on Marshall. I refer here to John Maynard Keynes, who must be regarded as the most influential of twentieth century economists. The nature of the revolution in economic thought that he accomplished is not our concern at this point. That it was a revolution there should be no doubt. And equally, the general flavor of contemporary economic thought is what it is because attempts are being made to turn back the clock and embrace again certain postulates and procedures that characterized the earlier classical and neoclassical economics that flourished before Keynes wrote. But that is not our present concern. The John Maynard Keynes to whom I refer was the son of a certain John Neville Keynes, also a Cambridge economist, who wrote what was held for a long time during the late nineteenth and early twentieth centuries to be the standard work on economic methodology, *The Scope and Method of Political Economy* (1891).

Of the clear and widening breach between economics and Christian thought there can be no doubt.

At any rate, Maynard Keynes comments as follows on the intellectual developments in economics at the turn of the century: "Marshall's Cambridge career came just at that date which will, I think, be regarded by historians of opinion as the critical moment at which Christian dogma fell away from the serious philosophical world of England, or at any rate at Cambridge. In 1863 Henry Sidgwick, aged twenty-four, had subscribed to the Thirty Nine Articles [of the Church of England] as a condition of tenure of his Fellowship, and was occupied in reading Deuteronomy in Hebrew and preparing lectures on the Acts of the Apostles. Mill, the greatest intellectual influence on the youth of the age, had written nothing which clearly indicated any divergence

from received religious opinion up to his *Examination of Hamilton* in 1865. At about this time Leslie Stephen was an Anglican clergyman, James Ward a nonconformist minister, Alfred Marshall a candidate for holy orders, W. K. Clifford a High Churchman. In 1869 Sidgwick resigned his Trinity Fellowship, 'to free myself from dogmatic obligations.' A little later none of these could be called Christians. Nevertheless, Marshall, like Sidgwick, was as far as possible from adopting an 'anti-religious' attitude. He sympathized with Christian morals and Christian ideals and Christian incentives. There is nothing in his writings depreciating religion in any form; few of his pupils could have spoken definitely about his religious opinions. At the end of his life he said, 'Religion seems to me an attitude,' and that, though he had given up Theology, he believed more and more in religion. The great change-over of the later sixties was an intellectual change, not the ethical or emotional change which belongs to a later generation, and it was a wholly intellectual debate which brought it about ..." (*Essays and Sketches in Biography*, New York: Meridian, 1956, p. 44f).

In its misguided attempt to establish a value-free enquiry, economics partook of the developing strands of individualist-humanist thought that had mounted an increasing pressure on educated opinion since the Enlightenment era.

It is unfortunate, of course, not only that the stage for the development of economics was thus set in the way it was, but that Keynes himself should have fallen prey to such a shallow misunderstanding. For we find him here imagining that Marshall in particular, and economics in general, could retain a productive sense of what he called "Christian morals and Christian ideals and Christian incentives" when the Christian doctrine had been so definitively jettisoned.

We might judge that it is in this way and for this reason that we have now arrived at the situation in Western society in which we are drawing more heavily than is acknowledged on the residue of moral capital inherited from Christianity. But we might agree that the linkages provided by that inheritance have now become tenuous, and the structure of the social fabric has become, as a result, seriously insecure and dangerously short-lived.

The divorce of economics and ethics was substantially, if not universally, acknowledged to be both necessary and complete.

In its misguided attempt to establish a value-free enquiry, economics partook in these ways of the developing strands of individualist-humanist thought and philosophic foundations that had mounted an increasing pressure on educated opinion since the Enlightenment era. In the latter days of Victorian optimism, abetted by the capture of the social sciences by the thought forms of Darwinian evolutionary theory, economics confirmed its rootage in classical utilitarianism, substantially succumbed to the influences of methodological positivism, and thrust forward to the twentieth century the insistence that its integrity as a discipline turned on a distinctively amoral stance in the world of affairs.

The economic system creaked, of course, with the stresses that advanced industrialism imposed upon it. But in the Old World the niceties and stabilities of the international gold standard calmed the mounting rumblings of concern, and in the New World economic expansion and the rolling back of frontiers kept the drive of development alive. In both worlds the divorce of economics and ethics was substantially, if not universally, acknowledged to be both necessary and complete.

Of course there were voices of dissent. But the position that had by this time been reached had fairly completely separated economic argument from any meaningful relation to externally determined norms. The scientific humanism had triumphed. It is only now, so far as technical economics is concerned, in what is a cultural atmosphere of widening disenchantment, that stirrings of dissent are reaching insistent proportions. In the meantime, and as continues to be the case to a large extent at the present time, such external norms of economic conduct as might be expected to derive from an older, and notably Christian, ethical absolutism were surrendered to the pressures of a crassly materialistic self-interest and an economic relativism.

Knowledge and Ignorance in Economic Thought

I do not wish at this time to follow out the manner in which those notions of self-interest have been incorporated into the foundational assumptions of economic analysis. Nor do I want to stay with the related assumption, implicit and pervasive in much of historic and contemporary economic theorizing, that as a result of the working of self-interested market activity an automatic harmony, or the maximization of welfare and benefits, results for economic society as a whole. I am interested, rather, in the proposition I have just reached, that economic thought has in general been addressed to what was, and what is, imagined to be a closed system, a closed causal system and therefore a system of what I call a closed intellectual construction. In other words, economic thought has not in general accommodated any meaningful relation to externally determined norms. It is this, the admission to our thought systems of externally provided norms, that marks off the Christian thinker from his otherwise professional colleagues.

Now it will be clear that those norms of economic thought, and the implied norms of economic conduct and policy, come to expression in what, for the Christian thinker, is the inscripturated Word of God. Because that is so, it is necessary in addressing the subject I have proposed, to give attention to two main points of interest. First, what then is the relevance to economic thought of what I have called theology proper, the issue and the doctrine of the being and knowledge and purpose of God? And second, what is the manner in which the true task of the economist is to be understood? We may put the last mentioned point by asking what is a proper understanding of the "Last" of the economist. I take the first of these questions first.

We do well to bear in mind that only what God has already thought is knowable and exists in the arena of the knowledge potential.

It follows from my introductory remarks that we do well to bear in mind that only what God has already thought is knowable and exists in the arena of the knowledge potential. That, we admit, is extremely difficult to apprehend. For in a more expansive address to the epistemological significance of the statement, we need to grasp carefully the differences and distinctions between God's knowledge and our knowledge. Much ink has been spilt in the arguments of the philosophic theologians, and of those who have an earnest concern for theological apologetics, on the question of whether the difference between God's knowledge and our knowledge is primarily and essentially quantitative or qualitative. Without entering that discussion at length we can insist on a qualitative and not merely a quantitative distinction. For God knows in a different way from that in which we know. There are not, and there cannot be, any sequential moments in the knowledge of God. If there were, there would be sequential realizations in the being of God. God did not have to wait to discover anything about His own being. He knows Himself, as has been said, in one eternal act of knowing. Similarly, God does not, and cannot, wait to discover anything about the eventuation of the history of the created reality that He has structured. Again there can be for Him no waiting to discover. He knows all things, all things internal to the Godhead and all things external to the Godhead, by one eternal act of knowing.

There are not, and there cannot be, any sequential moments in the knowledge of God.

What we are saying is simply that God exists and He knows outside of time. He created time. Our knowledge, on the other hand, is temporally structured. We know sequentially. God too, of course, knows sequences; but He does not know sequences sequentially. All sequences that occur in the life histories of created reality and entities are what they are precisely because God already knows them and has thought them. It is for this reason that in our approach to the scope and content of our professional disciplines we do well to remember that knowledge within them, and the scope for new awarenesses and discoveries within them, exist only because of what God has already structured in His thought regarding His entire creation and its history. Another way of cognizing the importance of the point is to refer to the possibility of probability. What is possible, we can say, is possible only because God has already thought it and ordained it.

In the realm of economics we see precisely a

direct statement of this fact in the book of James. In the thirteenth verse of his fourth chapter James refers to certain merchants who, in the interest of economic profit, said "today or tomorrow we will go into such a city, and continue there a year, and buy and sell, and get gain." James replied to them with a blunt and arresting corrective: "ye know not what shall be on the morrow." The problem in economic affairs and analysis is that, as Maynard Keynes to whom I referred previously put it, "We simply do not know" ("General Theory of Employment," *Quarterly Journal of Economics*, 1937). Our economic affairs and calculations are necessarily bounded in ignorance. It is another question, of serious concern to serious thinkers in our discipline, how meaningful decisions can be made in the conditions of ignorance in which we are bound. But again I must leave those fascinating questions of decision criteria aside for the moment.

The problem in economic affairs and analysis is that, "We simply do not know." Our economic affairs and calculations are necessarily bounded in ignorance.

These considerations imply, however, that for the economic intellectual enterprise, we should consider what it is that God has revealed about the economic structures of reality that He has brought into existence, and what, under captivity to His Word, we can understand to be His will in the economic scheme of things and the principles of conduct and behavior He has given to us.

It would be possible to expand our argument at this point to take fuller account of issues that I have raised in other places regarding the relevance of the Scriptural data to economic thought and conduct (*Economics and Man*, Craig Press, 1976; "Economics in Christian Theological Perspective," in John H. Skilton, ed., *The New Testament Student and His Field*, Presbyterian and Reformed Publishing Company, 1982). But I leave the detail substantially aside. If we were to enter it we should have to say that the economic dimension of reality exists and is what it is because it is a part of the initially and divinely ordained structure of reality. That can be readily exhibited from the early chapters of Genesis. We should draw a vital distinction between the *fact* of the economic dimension of things and the *form* in which, in this time, the economic problem comes to expression. In other words, the *fact* of the economic dimension of reality is due to our created finitude. But the *form* of the economic problem is due substantially to our sin. Our thought is conditioned by the reality of the fact and the implications of Adam's Fall. In the understanding of economics, as on so many levels of thought, we should avoid the danger of confusion between finitude and sin.

Economics Not a Value-Free Enquiry

It follows, then, that the Christian economist cannot in any sense subscribe to the canons of the discipline that would establish, or would argue for the establishment of, a value-free enquiry. Our thought, captive again to the Word of God, must see the economic, as all other dimensions of reality, from the perspective of the purpose of God, the objectives of His covenantal administration, the mandates of His law, and the principles of conduct He has set down for us. In economics, as in all other disciplines, we set out not to prescribe a body of knowable knowledge, as though, in a completely unregenerate fashion, we could arrogate to ourselves an autonomous competence in understanding. That, of course, is the original sin, the arrogation to man of the assumption of not only metaphysical, but also of epistemological and ethical autonomy. I need not expand the point.

Economic thought comes to its truest and fullest self-realization and expression when it bows before the mystery and majesty, the precepts and the will and the covenantal purpose of the triune, creating, and redeeming God.

But these considerations bring us back to where I began. We want to say something about the proper understanding of the "Last" of the economists. What we advance, then, is not only the negative statement that economics cannot be a value-free enquiry. We say positively that economic thought comes to its truest and fullest self-realization and expression when it bows before the mystery and majesty, the precepts and the will and the covenantal purpose of the triune, creating, and redeeming God. We must, I suggest, avoid all the traps of an a-theistic positivism. We remember that there are no brute facts that constitute ultimate epistemological data. We hold in view the realization that all of the facts

are what they are because God has thought them and ordained them and placed them in what I have called their various constellations.

We reject the insistence of our professional colleagues that our discipline is, or can be, value-free.

What this means for the practice of economics can be expressed, finally, on three dimensions or levels. First, we reject the insistence of our professional colleagues that our discipline is, or can be, value-free. Second, the values, or the preconceptions or presuppositions that we consciously bring to our subject are those we find in the inscripturated Word of God as we bow in submission to it. And third, endeavoring in all things to think God's thoughts after Him, we work out the details of our subject in such a way as to see the socio-economic questions and issues and concerns and priorities as they are illumined by the precepts of God's perspicuous revelation. Our economic perceptions, our analysis of economic issues and conditions, and our prescriptions for economic policy are what they are because we see them, in their various and ordered arrays, from the perspective of that revelation.

With this in view, it might be helpful if I conclude these comments with just three examples of what I have in mind. First, if we understand the meaning of the disruptions and the disharmonies that sin has introduced into the world, we might be hesitant to construct a system of economic thought on the assumptions of automatic market harmonies, such as have characterized the mainstream of development in our subject. We might prefer to be alert to the disjunctions, disequilibria, and disharmonies that abound in the world of economic and social affairs. Our analysis will then be addressed to issues that comport with such a perspective.

Second, if we are sensitive to the mandates and injunctions of the Word of God we might be careful as to how we evaluate the obvious distress and poverty and unemployment and economic anxieties we see around us. We might be alerted by a Scriptural concern for the poor. We might look out on the world and be as much concerned, for example, with the 5 or 6 or 10 percent of the work force that is unemployed as with the 95 or 94 or 90 percent that is employed. We might realize that 90 percent employment may be quite good and comfortable for the 90 percent who are employed. But it is conceivably wretched for the 10 percent that are unemployed.

Third, it may be agreed, as I have suggested in other places, that one of the most pointed results of the entrance of sin into the world and its pervasive poisoning of societal structures is, on the economic level, the emergence of excessive concentrations of economic power. Moreover, those excessive concentrations of power, observable at different times in the hands of industrial corporations, trade unions and the suppliers of labor, and the government, have led to the exploitation of that power to the disruption of more stable and equitable economic relations. If such a conclusion carries conviction, then it may well be agreed that a sensibly structured regulatory apparatus that can correct such exploitations can be countenanced as part of our overall economic scheme of things. That, it might be thought, then emerges as a legitimate part of the responsibility of the state, as that has been ordained by God for the correction and prevention of evil.

We might look out on the world and be as much concerned, for example, with the 5 or 6 or 10 percent of the work force that is unemployed as with the 95 or 94 or 90 percent that is employed.

We might look closely at many more examples. But that is not our present concern. If the entry point and the methodological structures, and the purposes and potential results of economic thought as I have raised them warrant concurrence, it is sufficient at this point to say that in the discipline of economics we must, as in all things, be sure that our thought constructions are captive to the Word of God. The working out of the details can be a lifetime occupation. ❋

Tradition and Faith in the Copernican Revolution

JOSEPH L. SPRADLEY

Physics Department
Wheaton College
Wheaton, Illinois 60187

A review of the Copernican revolution reveals the importance of nonempirical factors in its development. The writings of Copernicus, Kepler and Galileo show the continuity of their ideas with the Greek classical tradition and the connection of their work with their Christian faith. These human dimensions illustrate how cultural values, creative insights and personal commitments can be as important in science as empirical evidence.

The success of Copernicus, Kepler and Galileo in developing a heliocentric system of the planets led eventually to the dominance of empiricism in much of Western thought. Ironically, the champion of this new empirical emphasis, Francis Bacon, rejected the Copernican system nearly a century after it was introduced. He stressed the need to examine the data of experience without allowing any personal bias to shape the organization of facts. Bacon's inductive method seems at odds with the deductive method of Descartes, with its emphasis on rationalism; but both agreed that nature should be interpreted by rejecting the traditions of the past.

An examination of the Copernican Revolution reveals that it was based on a much richer approach to interpretation than the rational empiricism that came to dominate the Enlightenment. Its success depended on such nonempirical interpretative elements as imaginative constructs, aesthetic criteria, and ethical commitments. It borrowed heavily from the Greek classical tradition and found fresh motivations from the attitudes and values fostered by Christian faith.

In the century following Copernicus, astronomers competed over several systems for interpreting the motions of the planets. The geocentric system of Aristotle could account for planetary motions by a system of concentric ethereal spheres to carry the planets. The Aristotelian system was refined by Ptolemy about 150 A.D. by using a combination of circles forming epicycles to describe planetary motion. This Ptolemaic system was complicated, but among its advantages was the fact that it could explain the increased brightness of the planets during retrograde motion since this reversal of direction occurred as the planets moved on that part of the epicycle closest to the earth.

The heliocentric system of Copernicus was more than an alternate interpretation of observed data. It involved a radical new perspective and eventually a change in worldview.[1] The Copernican system offered some geometric advantages, but it was not widely accepted for many years because of problems associated with the idea of a moving earth. The Tychonic system was introduced about fifty years after Copernicus and gained a following because it had many of the geometric advantages of the Copernican system, but did not require the motion of the earth. During the sixteenth century these compet-

ing systems were based on the same empirical data, but the interpretation of these data differed widely.

The idea of a moving earth was the stimulus for the development of a new scientific worldview, culminating in the Newtonian synthesis, and a new respect for the authority of science. Although science professes to reject authority as a source of knowledge, most educated people believe that the earth moves on the authority of science. Few know the rational arguments in favor of the Copernican theory, or the empirical evidence that supports those arguments. This blind faith in scientific authority extends to many areas of modern life in ways that are hardly matched by any other influences in our past or present culture. The recognition from its history that science depends on more than empirical evidence and rational demonstration points the way toward finding other valid criteria of interpretation in seeking to understand the world. The effect of Copernican astronomy on Biblical interpretation has been considered elsewhere.[2] Here, the primary concern will be the role of interpretation in natural science, which will be illustrated from the Copernican Revolution.

Copernicus

The work of Nicolaus Copernicus (1473-1543) had strong elements of continuity with past traditions, even though he rejected the geocentric systems of Aristotle and Ptolemy. The revival of Platonism in Italy during the Renaissance as an alternative to Aristotelian scholasticism provided a new community of interpretation emphasizing the Pythagorean doctrine of mathematical harmony. During some of his ten years in Italy, Copernicus studied astronomy with Domenico di Novara, one of the leaders in the revival of Greek studies, who criticized the Ptolemaic system and emphasized the Pythagorean ideas of geometric harmony and simplicity. In the preface to his 1543 treatise *On the Revolutions of the Heavenly Spheres*, addressed to His Holiness Pope Paul III, Copernicus quoted from Plutarch to indicate some of the sources of his new system of the world:

> Some say that the Earth is at rest, but Philolaus the Pythagorean says that it is carried in a circle round the fire, slantwise, in the same way as the Sun and Moon. Heraclides of Pontus and Ecphantus the Pythagorean give the Earth motion, not indeed translatory, but like a wheel on its axis, from west to east, about its own centre.[3]

In his discussion of the motion of the earth he makes a brief mention of the heliocentric hypothesis of Aristarchus of Samos.[4] The conservative nature of this treatise is evident in its adherence to the Platonic theory of "uniform circular motion" in the celestial region.[5] This required combinations of circles for each planet similar to the epicycles used by Ptolemy. Copernicus rejected the equant, introduced by Ptolemy as a point of reference to obtain uniformity of planetary motion, as an unnecessary irregularity. The heliocentric perspective not only eliminated this irregularity, but it also made possible the calculation of the distance of each planet from the sun, revealing a regular increase in proportion to its period.

The heliocentric interpretation of Copernicus involved an element of commitment to his concept of mathematical harmony that sometimes transcended physical reasoning and empirical evidence. In fact, the only physical argument given by Copernicus for the earth's motion was its spherical shape: "For the movement of a sphere is a revolution in a circle, expressing its shape by the very action."[6] It was a bold step of faith for Copernicus to transfer this perfect celestial motion of the Aristotelian tradition to the imperfect terrestrial region: "As it has now been shown that the Earth has the shape of a globe, I *believe* we must consider whether its motion too follows its shape."[7] This "belief" contradicted the common sense ideas of motion derived

Joseph Spradley is Professor of Physics at Wheaton College, Illinois. He received his B.S., M.S., and Ph.D. degrees at UCLA in engineering physics and worked for four years at Hughes Aircraft Company. He has taught at Wheaton since 1959 except for five years on leaves of absence, including two years as Acting President of Haigazian College in Beirut, Lebanon, two years as a USAID science specialist at Ahmadu Bello University in Nigeria, and a recent semester at Daystar University College in Nairobi, Kenya. He is co-author of the book The Making of a Christian Mind.

from Aristotle's physical principles, which taught that violent motion in the terrestrial region requires the agency of a mover. Furthermore, from Aristotelian principles a moving earth would quickly outdistance objects dropped at the earth's surface, resulting in an apparent horizontal motion that is clearly contrary to observation.

From Aristotelian principles a moving earth would quickly outdistance objects dropped at the earth's surface, resulting in an apparent horizontal motion that is clearly contrary to observation.

Even apart from Aristotelian physics, the Copernican theory had few empirical advantages and failed to satisfy the crucial empirical test of stellar parallax. His system offered no greater accuracy in predicting planetary positions than the Ptolemaic system. It did give a more natural explanation for the proximity of Mercury and Venus to the sun and for the retrograde motions of the planets; but Copernicus himself recognized the empirical failure of his system to account for the lack of stellar parallax. Thus, if the earth orbits annually around the sun, the directions to the stars (parallactic angles) should change as the earth revolves about an orbital diameter of 186 million miles. Copernicus offered the following argument for this empirical failure:

> That there are no such phenomena for the fixed stars proves their immeasurable distance, because of which the outer sphere's (apparent) annual motion or its (parallactic) image is invisible to the eyes ... So great is this divine work of the Great and Noble Creator![8]

Thus, his interpretive commitment to the earth's motion led him to a greatly expanded view of the universe supported by his faith in the power and majesty of God. The first evidence of stellar parallax was not observed until nearly 300 years later by F.W. Bessel, using telescopic equipment of much greater accuracy.

Copernicus' commitment to a realistic interpretation of the earth's motion was brought into question for several years by an anonymous preface to *The Revolutions*, apparently added without his approval at the time of its publication in 1543 as he lay dying. Entitled "To the Reader on the Hypotheses in this Work," this preface stated: "Nor is it necessary that these hypotheses be true, nor indeed even probable, but it is sufficient if they merely produce calculations which agree with the observations."[9] Such an instrumentalist interpretation seems to misrepresent the intentions of Copernicus, but was probably added to make it more acceptable to possible critics. It was written by the Lutheran Andreas Osiander who had been left in charge of publication arrangements by Joachim Rheticus, also Lutheran. Rheticus had taken leave from the University of Wittenberg in 1539 to study with Copernicus, not without some risk for a Protestant at the time. He published one of the first accounts of the heliocentric system in 1540. The Osiander preface was identified years later by Kepler as a deception.

Brahe and Kepler

Acceptance of the ideas of Copernicus was a slow and gradual process. His mathematical techniques were often used without accepting the mobility of the earth. The greatest observational astronomer before the invention of the telescope, the Danish nobleman Tycho Brahe (1546-1601), rejected the Copernican system, but he did recognize the advantages of heliocentric motion. In 1577 Brahe showed that comets move through the planetary orbits, casting doubt on the medieval idea of crystalline spheres. He greatly improved the accuracy and scope of astronomical observations, but was unable to detect the stellar parallax that would empirically demonstrate the earth's motion. His solution to the problem of planetary motions was a stationary earth with all the planets orbiting the sun as it circled the earth. This Tychonic system was mathematically equivalent to the Copernican system, but avoided the problems of a moving earth. Several natural philosophers, including Francis Bacon, accepted it as a convenient compromise of the more radical Copernican interpretation. It is a good example of the way in which science can be hindered by placing too much emphasis on the limitations of empirical data.

The Tychonic system is a good example of the way in which science can be hindered by placing too much emphasis on the limitations of empirical data.

Brahe's younger associate during the last year of his life, the German Lutheran Johannes Kepler (1571-

1630), had great respect for the accurate data he inherited from Brahe, but none of the empirical inhibitions to prevent him from embracing the Copernican vision. He was introduced into the small community of Copernican interpretation by his astronomy professor, Michael Maestlin, at the Protestant University of Tubingen where he was studying for the clergy. He was strongly motivated by Renaissance Platonism and a desire to discover the architectural design of God's creation. The Copernican geometry provided an unprecedented basis for calculating the distances of the planets relative to the earth's orbital radius, which Kepler attempted to correlate with the geometry of the five regular solids of Pythagoras in his *Cosmographic Mystery* of 1596.

In seeking such harmonies, Kepler was motivated by theological and aesthetic values in his interpretation of the planets "since God has established nothing without geometrical beauty...."

Although much of Kepler's creative interpretation was inspired by Pythagorean concepts of geometry and harmony, he did not allow his presuppositions to suppress empirical data. When his analysis of the orbit of Mars conflicted with Brahe's measurements, he abandoned the Platonic tradition of circular orbits, even though their deviation from the measured positions was only detectable because of the improvement of Brahe's new data over Greek observations. He discovered that elliptical orbits (now known as Kepler's first law) did fit the data. This law was augmented by his second law describing planetary speeds by equal areas swept out in equal times about the sun, which for Kepler symbolized God's rule over His creation. These laws eliminated the need for complicated combinations of circles, and introduced a new level of geometric simplicity to the heliocentric system. In seeking such harmonies, Kepler was motivated by theological and aesthetic values in his interpretation of the planets "since God has established nothing without geometrical beauty...."[10]

Kepler's incredible efforts to understand and interpret planetary motion were sustained by his faith in the order of God's creation and the Biblical conviction that it was intelligible to those created in His image. He offers this response to news of Galileo's telescope:

> All that is overhead, the mighty orbs
> With all their motions, thou dost subjugate
> To man's intelligence.[11]

Kepler's incredible efforts to interpret planetary motion were sustained by his faith in the order of God's creation and the Biblical conviction that it was intelligible to those created in His image.

His third law of the planets relating their distances and periods about the sun was a by-product of an extended analysis based on musical harmony. This result eventually became a key element in establishing Newton's law of universal gravitation as a unified physical basis for the Copernican system. Kepler's faith in the reality and simplicity of the Copernican system led him to discover new mathematical harmonies in its structure based on Brahe's data, in spite of the unresolved problems of a lack of stellar parallax and an inadequate physical basis for the earth's motion. In the conclusion of his *Harmony of the World*, published in 1619, Kepler gave expression to the religious foundation of his radical interpretation of the celestial world:

> Great is the Lord and great His virtue
> and of His wisdom there is no number:
> praise Him, ye heavens,
> praise Him ye sun, moon, and planets,
> use every sense for perceiving,
> every tongue for declaring your Creator.
> Praise Him, ye celestial harmonies,
> praise Him, ye judges of harmonies uncovered:
> and thou my soul, praise the Lord thy Creator ... [12]

Galileo

In his support of Copernicus, Kepler was joined by Galileo Galilei (1564-1642), his Italian contemporary and sometime correspondent. Galileo's use of the telescope and his study of motion were vigorously applied to the defeat of Aristotelian science and arguments in favor of the heliocentric system. His efforts also reveal an interesting mixture of traditional and radical elements of interpretation that often went beyond the empirical evidence he discovered. Although Galileo rejected the more mystical aspects of Kepler's

Pythagoreanism, he shared the Platonic emphasis on geometry strengthened by his great admiration for the mathematical works of Archimedes, which became available in printed form in 1543 about the time Copernicus died. Galileo's major publications were written in the form of a Platonic dialogue, with Salviati expressing his opinion:

> That the Pythagoreans held the science of numbers in high esteem, and that Plato himself admired the human understanding and believed it to partake of divinity simply because it understood the nature of numbers, I know very well; nor am I far from being of the same opinion.[13]

Galileo's Christian faith reinforced this view:

> ... the great book of nature ... is the creation of the omnipotent Craftsman, and is accordingly excellently proportioned, nevertheless that part is most suitable and most worthy which makes His work and His craftsmanship most evident to our view.[14]

In some ways Galileo maintained a more traditional interpretation of the planets than Kepler, refusing even to accept Kepler's elliptical orbits in place of the perfection of celestial circles.

In some ways Galileo maintained a more traditional interpretation of the planets than Kepler, refusing even to accept Kepler's elliptical orbits in place of the perfection of celestial circles. In attempting to develop a physical basis for the motion of the earth and the tendency of falling objects to move with the earth, even his concept of inertia is defended as a form of circular motion:

> But motion in a horizontal line which is tilted neither up nor down is circular motion about the center; therefore circular motion is never acquired naturally without straight motion to precede it; but, being once acquired, it will continue perpetually with uniform velocity.[15]

This inertia concept borrowed heavily from the impetus theory of the fourteenth century nominalist tradition of Jean Buridan and Nicole Oresme of the University of Paris. Eventually the concept of inertia was generalized to straight-line motion by Descartes and became the first of Newton's axioms of motion. Thus, the interpretive assumption that the natural state of a moving object was to remain in motion with a constant velocity became the basis for a consistent Copernican cosmology, replacing the Aristotelian idea that motion requires a mover.

Galileo's most convincing efforts to establish the Copernican system were related to his pioneering telescopic observations. But even these results required a great deal of interpretation and were not completely adequate to verify the heliocentric theory. Galileo acknowledged that his scholastic critics held the view that operations with the telescope were "considered as fallacies and deceptions of the lenses."[16] His observations of lunar craters and sun spots were interpreted as celestial imperfections and therefore damaging to the Aristotelian doctrine of the perfection and incorruptibility of the heavens. The discovery of four celestial objects adjacent to Jupiter but with a shifting alignment were interpreted as moons circling Jupiter, thus providing a counter example to geocentric motion. Perhaps the most important telescopic discovery of Galileo was his observation of the phases of Venus changing in a complete cycle like the moon, which could be explained by the Copernican system but not by the Ptolemaic system. However, this could also be explained by the Tychonic system, which was conveniently ignored by Galileo.

The final acceptance of the heliocentric system came after the Newtonian synthesis provided a complete physical explanation for the motion of the earth and the planets, held in their orbits by universal gravitation.

Thus, Galileo's interpretations cast doubts on Aristotelian cosmology and Ptolemaic astronomy, but the evidence was still insufficient to establish the heliocentric system. In discussing stellar parallax as missing evidence for the earth's motion, he suggests that it had not been observed due to lack of precision, "both on account of the imperfection of astronomical instruments, which are subject to much variation, and because of the shortcomings of those who handle them with less care than is required."[17] The final acceptance of the heliocentric system came after the Newtonian synthesis provided a complete physical explanation for the motion of the earth and the planets, held in their orbits by universal gravitation. This provided a unified interpretation of all motions on earth and in the heavens, refining Galileo's laws of terrestrial motion and Kepler's laws of celestial motion, even though another 150 years were required for direct

evidence of the earth's motion from measurements of stellar parallax.

Summary and Conclusions

The Copernican Revolution reveals a richness of interpretation that goes beyond the typical view of scientific empiricism. Science, like literature, theology, or other forms of human understanding, depends on past traditions, cultural values, communal relations, imaginative speculations, aesthetic considerations, and ethical commitments, as well as empirical evidence. Indeed, these additional criteria of interpretation are often the key to success in science. It will be instructive to conclude with a brief review of the role of historical traditions, communal values, creative insights and personal commitments in scientific interpretation during the Copernican Revolution.

Continuity with past traditions is evident in varying degrees in the work of Copernicus, Kepler, and Galileo, even though much of their effort marked a break with the Aristotelian tradition. They were especially influenced by the mathematical concepts of the Pythagoreans and the philosophical ideas of Plato. Even Brahe's greater empirical emphasis led to an interpretation of the planets based on the Platonic assumption of uniform circular motion in his Tychonic system. The Alexandrian Greek tradition also provided alternatives to Aristotelian scholasticism, especially in the work of Aristarchus and Archimedes. Galileo also benefited from the fourteenth-century nominalist reaction against the original Aristotelian doctrine of violent motion, and from the resulting impetus concepts of Buridan and Oresme.

Instead of faltering over the lack of stellar parallax or decrying the displacement of human centrality in the universe, they imagined an expanded universe matching the power and glory of God.

Community sources of interpretation helped to advance the gradual development of the Copernican Revolution by providing mutual support and the reinforcement of new cultural values. Copernicus was aided by men like Rheticus, while Kepler was encouraged by correspondence with Galileo, who was supported by a circle of like-minded students. The revival of Greek classics and the renewed interest in Platonism in the fifteenth century opened up the new emphasis on mathematical harmony, simplicity, and order in the sixteenth century. These new ideas were reinforced and expanded by the context of new Christian attitudes and values that had emerged in the preceding centuries. Many of these values were supported by the Church in spite of their opposition to heliocentrism. Platonic thought emphasized the application of mathematics primarily to the celestial realm of perfection. In contrast, the Biblical view of creation with its emphasis on the goodness of all that God made, along with the Christian doctrine of the incarnation, introduced a new appreciation for material reality and order in the terrestrial world. This is evident in the Franciscan celebration of all of God's creatures and the nominalist interest in the detailed particulars of creation.

The ethical norm of commitment demands responsible efforts, including a willingness to reconsider a theory in the light of new evidence or criticisms leveled by other scientists.

Creativity was one of the strongest features of the Copernican interpretation, transcending its empirical and physical limitations. Instead of faltering over the lack of stellar parallax or decrying the displacement of human centrality in the universe, they imagined an expanded universe matching the power and glory of God. Instead of accepting the constraints of an imperfect terrestrial world bound within the perfect celestial spheres, they saw the motion of the earth as the basis for unifying physical laws and demystifying the heavens in a universe created and sustained by One God. Creative imagination is especially evident in Kepler's vivid use of geometric, musical, and spiritual analogies to discover new levels of order among the planets. The Renaissance and Reformation produced new confidence in the intelligibility of the world and its status as a revelation open to creative interpretation.

Commitment to the reality and harmony of the Copernican universe is evident in the persistent efforts required to establish it in the face of scientific objections and scholastic opposition. A kind of men-

tal conversion was required to see old information from a new perspective. Personal commitment to this new worldview was necessary to sustain a lifetime of active effort to work out its implications during the decades of its conflict with accepted ideas. Commitment to a theory is a necessary ethical norm if a scientist expects to be trusted by fellow scientists that evidence for a theory is considered adequate and consistent. The ethical norm of commitment demands responsible efforts, including a willingness to reconsider a theory in the light of new evidence or criticisms leveled by other scientists. In the Copernican Revolution this commitment was accompanied by a strength of conviction and religious zeal not always associated with scientific interpretation. But it reveals the human dimensions of science that serve as a warning against the temptation to worship scientific authority. ❋

NOTES

[1]Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: The University of Chicago Press, 1970), pp. 111-135.
[2]William Hine, "Copernican Astronomy and Biblical Interpretation," *Christian Scholar's Review, III*: 2 (1973), pp. 134-149.
[3]Copernicus, *On the Revolutions of the Heavenly Spheres*, trans. A. M. Duncan (New York: Barnes and Noble, 1976), p. 26.
[4]*Ibid.*, p. 53.
[5]Plato, "The Timaeus," in *Timaeus and Critias*, trans. Desmond Lee (Baltimore: Penquin, 1974), p. 45.
[6]*On the Revolutions of the Heavenly Spheres*, p. 38.
[7]*Ibid.*, p. 40, emphasis added.
[8]As cited in Thomas S. Kuhn, *The Copernican Revolution* (Cambridge: Harvard University Press, 1957), p. 179.
[9]*On the Revolutions of the Heavenly Spheres*, p. 22.
[10]Kepler, *The Harmonies of the World*, in *Great Books of the Western World*, Vol. 16, ed. Robert Hutchins, trans. Charles Glenn Wallis (Chicago: Encyclopedia Britannica, 1952), p. 1025.
[11]Kepler, *Dioptrics*, as cited in L. Pearce Williams and Henry John Steffens, *The History of Science in Western Civilization*, Vol. II (Washington D.C.: University Press of America, 1978), p. 172.
[12]*The Harmonies of the World*, p. 1085.
[13]Galileo Galilei, *Dialogue Concerning the Two Chief World Systems*, trans. Stillman Drake (Berkeley: University of California, 1962), p. 11.
[14]*Ibid.*, p. 3.
[15]*Ibid.*, p. 28.
[16]*Ibid.*, p. 336.
[17]*Ibid.*, p. 387.

Book Reviews

FOUNDATIONS OF CONTEMPORARY INTERPRETATION by Moises Silva, (Series Editor). Grand Rapids, Michigan: Academie Books, Zondervan Publishing House.

(Vol. 1) HAS THE CHURCH MISREAD THE BIBLE? by Moises Silva. 1987. 129 pages, index.

(Vol. 3) LITERARY APPROACHES TO BIBLICAL INTERPRETATION by Tremper Longman III. 1987. 154 pages, index.

(Vol. 6) SCIENCE AND HERMENEUTICS by Vern S. Poythress. 1988. 171 pages, index.

These are three books in a seven-book series, edited by Moises Silva, Professor of New Testament at Westminster Theological Seminary, dedicated to working "toward a clarification of the basic problems of interpretation that affect our reading of the Bible today." The other authors above are Tremper Longman III, Associate Professor of Old Testament, and Vern S. Poythress, Professor of New Testament Interpretation, both at Westminster Theological Seminary.

What these books have to say is particularly significant because they arise out of a conservative theological tradition. All of the authors are "committed to the divine authority of Scripture," and "assume from the start that a right relationship with its divine author is the most fundamental prerequisite for proper biblical interpretation" (iv). They are well worth reading for several reasons, not least of which is their significance for those seeking to maintain a dialogue between authentic science and authentic biblical theology. The individual volumes in the series approach the subject from the points of view of philosophy, literary criticism, linguistics, history, science, and theology.

The subtitle of Silva's introductory book is "The history of interpretation in the light of current issues." He recognizes at the outset that "The truth of scriptural authority does not automatically tell us what a given passage means.... The common insistence that we should approach the text without any prior ideas regarding its meaning becomes almost irrelevant" (pp. 4, 6, 7). His discussion deals with the tensions implicit in such key issues as "Literal or Figurative?," "Clear or Obscure?," "Relative or Absolute?" His perspective is summed up in one place in the words, "It may well be that the one great aim in our own interpretation of Scripture must be that of resisting the temptation to eliminate the tensions, to emphasize certain features of the Bible at the expense of others" (p. 38).

Longman develops the framework of a literary approach to the Bible and then describes the analysis of both prose and poetic passages, with suitable examples. He echoes the theme introduced by Silva, "We must remember that *no one* can approach the biblical text objectively or with a completely open mind. Indeed, such an approach to the text would be undesirable. Everyone comes to the text with questions and an agenda. One's attitude, however, should be one of openness toward change" (p. 40).

Poythress writes from the unique position of one who holds a Ph.D. in mathematics and a Th.D. in Pauline theology. He asks whether we can learn anything from science about "how to enhance our knowledge of the Bible" (p. 11). He does not address himself in this book to whether theology should be scientific, to specific questions of fact, or to whether science can be used legitimately for the development of a worldview, but instead asks "whether the growth of knowledge in science can tell us something about how knowledge grows in biblical interpretation and in theology" (p. 12).

The paradigm for his central task is provided by Thomas Kuhn's book, *The Structure of Scientific Revolutions.* In fact, Poythress goes so far as to say that, "Even if he (Kuhn) is wrong about science, he may be right when we apply his claims to biblical interpretation" (p. 52). One of the key concepts is the use of complementary models and analogies. "Suppose ... that we approach Scripture expecting to find a number of analogies making complementary points. Since each analogy is partial, the various analogies may sometimes superficially appear to be at odds with one another" (p. 96). This theme is developed with examples drawn from the Bible.

This book concludes with a statement that appears to characterize the series as a whole.

> The common thread through all our discussion has been the theme that world views, frameworks, and overall context influence knowledge and discovery in all areas. Knowledge is always qualified by its context. ... Our background of knowledge colors any particular bit of knowledge and colors our expectations about what we will discover when we look at something new or when we look at something for a second or third time. (p. 159)

While such an approach does not compromise our conviction of the authority and reliability of the Bible, it does make us more keenly aware of a number of pitfalls if we take a more naive and sometimes traditional approach to biblical hermeneutics.

This series shows considerable promise and should be of particular value to anyone involved in biblical interpretation or teaching.

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

PSYCHOLOGY THROUGH THE EYES OF FAITH by David G. Myers and Malcolm A. Jeeves. San Francisco: Harper & Row, 1987. 224 pages, index. Paperback; $9.95.

The authors, David Myers and Malcolm Jeeves, professors of psychology at Hope College and University of St. Andrews, respectively, are well known psychologists and Christian scholars. In a series of short essays, Myers and Jeeves show us that, contrary to the prevailing wisdom in both psychology and Christianity, the major findings within the varied subdisciplines of psychology are consistent with the biblical view of man.

The book is divided into sixteen parts. The first part looks at the history of the relationship between science and faith, presents the levels of analysis approach to understanding this relationship, and then asks whether there should be a Christian psychology. Myers and Jeeves argue that psychology offers a limited but useful perspective on human nature that complements the perspective of faith, and that a Christian psychology is simply one that is faithful to reality. However, consistent with the "Christianizers" of science, Myers and Jeeves realize that psychologists never approach their subject free of beliefs and prejudices. In fact, the authors state that psychologists who are Christians must not wall off their scientific and religious beliefs from each other, but must view human nature through the eyes of faith.

Parts two through sixteen are a series of short essays on the subdisciplines within psychology and are arranged in the order typically presented in introductory textbooks. In each essay the authors present some of the major findings in that field and show how these findings are consistent with the biblical view of man. For example, research in social psychology has found that humans suffer not from low self-esteem, as is commonly believed, but instead that human pridefulness is rampant.

Their essay on perception, which presents the Vokey and Read (1985) experiment on backmasking, was very useful in arousing interest and provoking discussion in my introductory psychology classes. Backmasking is the term used to describe messages which are recorded backward onto rock music and are believed to subconsciously influence the listener. Vokey and Read found no evidence of either conscious or subconscious extraction of meaning from messages which were recorded backward. As Myers and Jeeves point out, this finding has implications for Christians as well as psychologists—that is, that Satan probably prefers that Christians expend energy on eliminating backward messages from which no meaning can be derived rather than countering the forward messages of some rock music.

The authors did not limit themselves to describing the relevance of the Christian view of man to perception and to social psychology, but have applied their unique perspective to other areas of psychology. For example, in the essay on human intelligence, the psychological concept of giftedness, that only a few individuals possess special intellectual or artistic talents, is contrasted with the biblical concept of giftedness, that every Christian has specific gifts.

I found the essays to be well-written and convincing. The authors make their points clearly and support them with data. I recommend this book for psychology students in Christian colleges and for all Christian psychologists. This is also a good book to give to Christians who are suspicious of psychology and psychologists who are suspicious of Christianity.

Reviewed by Mary Masters, Psychology Department, San Jose State University, San Jose, CA 95192.

STAINED GLASS: Worldviews and Social Science by Paul A. Marshall, Sander Griffioen, and Richard J. Mouw (eds). Lanham, MD: University Press of America and Toronto: Institute for Christian Studies, 1989. 187 pages, no index, chapter references. Hardcover; $25.75; paperback; $12.50 & available from ICS, Toronto, $15.50 Canadian.

This slim volume contains the proceedings of a 1985 conference on social philosophy sponsored jointly by Calvin College of Grand Rapids, Michigan, the Free University of Amsterdam, and the Institute for Christian Studies in Toronto. Those of us familiar with Dutch Reformed traditions will recognize these sponsors.

"Worldview" and related notions have permeated many corners of Evangelical scholarship in recent years. Intuitively many of us appreciate the implication of worldview concepts that all aspects of life reflect the basic faith commitments and life circumstances of people. Unfortunately, the complexity of worldview issues means we have not always been clear or helpful when trying to discuss these concerns. It is perhaps a minor solace to learn from this volume that the wider scholarly community has not fared much better in this regard.

As a sympathetic outsider to Reformed traditions, I note with great interest that Reformed scholars have been leaders in the introduction of worldview notions to North American Christians. The historic roots and development of worldview notions among Reformed scholars are briefly described in various essays of this volume. As a case study in Christian scholarship, those descriptions are of interest to us all. Perhaps most important for contemporary Christian scholars, however, these essays enhance the critique and evaluation of worldview notions as used to formulate Biblical perspectives in contemporary scholarship.

The first three chapters explore the relationships between worldviews, theoretical thought, and personal experience. Albert Wolters gives us a valuable typology which can help non-philosophers get a handle on relations between worldviews and philosophy. He also avoids simplistic applications of the typology while exploring

the role of worldview notions in Christian scholarship. James Olthuis discusses the functioning of worldviews in the experience of human beings, especially as an integrating process between faith and a way of life. *PSCF* readers may have already encountered this article in the 1985 *Christian Scholar's Review,* 14:153-164. Then Jacob Klapwijk provides a constructive critique of both Wolters and Olthuis, helping us remember the long road ahead for Christian scholars wanting to faithfully understand worldviews. These essays alone are worth the price of the book. Although often focusing on philosophy in relation to worldview, the principles developed are valuable for every scholar regardless of discipline.

Most of us are familiar with Nicholas Woltersdorff if for no other reason than his *Reason Within the Bounds of Religion.* In this essay he extends his argument on "control beliefs" and places it in the context of neo-Calvinist thought on worldviews. We are left with another stimulating analysis of the fundamental features of Christian and non-Christian scholarship.

Some of the essays in the book have a technical focus which may limit the size of an appreciative audience. William Rowe's essay on subjectivism and the notion of "the subject" travels through several interesting and divergent topics. Though there is promise in the directions marked out in this essay, the work is not yet advanced to the stage of great benefit beyond that of the specialist. Pieter Drenth's chapter on work provides the sole look at empirical data. Unfortunately, his connections with worldview themes are overly brief and undeveloped, yielding little direct contribution to the book project. As Paul Marshall notes in the epilogue, adequate examination of worldview interactions with empirical science is a task which remains to be addressed in depth. Jan Verhoogt's discussion of sociology and social progress in the West assumes some background in social theory, but his pithy discussion of inherent limitations in current formulations of the welfare state is of interest to all concerned with social policy.

The essay by Sander Griffioen probably embodies the subtitle theme most fully in this collection. After reviewing the impoverished status of worldview and related notions in several social science disciplines, he examines basic issues for Christians attempting to develop social theory with worldview notions.

A few problems with the volume make it less useful than it could have been. The lack of both name or subject indexes is puzzling given today's publishing standards and is bothersome when trying to cross-reference the essays. The essays are quite diverse in the degree of technical background assumed, making the reading uneven for many readers outside of social theory (and occasionally for those unfamiliar with Reformed scholarship). The editors' efforts at formulating coherence in the introduction are helpful but insufficient to generate the promised unity.

Nevertheless, the importance of the worldview issues raised at this conference are well worth the "stretch" needed for a few chapters. The Reformed content is unapologetic without being parochial. Enough of the essays are both accessible and appropriate for a wide audience that the community of Evangelical scholars as a whole cannot afford to miss the contributions offered in this collection. This work transcends the boundaries between the philosophy of science, general foundations of scholarship, and theology in a manner necessary for solid critique of worldview models. Finally, students of the social sciences will benefit from a few focused essays in addition to learning from the more broadly relevant work.

Reviewed by Marvin McDonald, Assistant Professor of Psychology, The King's College, 10766-97th St. Edmonton, AB, Canada T5H 2M1.

SCIENCE AND THE CHRISTIAN FAITH by Samuel Ramirez. Nashville, TN. Graded Press, 1985. 64 pages. Paperback; $2.00.

By and large, mainline denominations have not done a very good job of providing educational resources dealing with the science-theology interface for use in congregations. Thus, it is worth noting the present six-unit adult study from the United Methodist Church which attempts to remedy that lack. The author is a former professor of Bioethics who now heads a consulting firm. Each unit has a discussion of the subject material, a "Practical Application" section for the learner during the week, and material for the group leader.

The presentation is at a level appropriate for adults who have no special training in science or theology. There are no technicalities to scare away the uninitiated. Thus, this could be a useful resource for parish pastors or other educators who want to begin a study of the relationships between theology, science, technology, and ethics. But this relatively low-level approach also means that there is no real discussion of the ways in which modern science pictures the world. None of the mind-stretching aspects of quantum theory or modern scientific cosmology, for example, are introduced. The emphasis is on the impacts which science-based technology has on people's lives.

Ramirez' opening chapter emphasizes the rapidity of change in today's world and suggests some working definitions of science, technology, and religion. An emphasis on stewardship of creation is also introduced here from Genesis 1:28. Succeeding chapters deal with technology and the Bible and the relationship between science and technology, the latter topic being approached as a question of values. Chapter 4 addresses the use of technology in terms of "quality of life" concerns, Matthew 22:27-39 and John 10:10 providing biblical views of what constitutes a "quality" life. The final two sessions of the study address the questions of whether or not there need be conflict between science and religion and how a person can honestly be both a scientist and a Christian.

This study is clearly from the United Methodist tradition, with quotations from John Wesley, reference to that denomination's statements, and an emphasis on pluralism of understanding. This gives a clear, albeit broad, theological orientation. At the same time, it is sufficiently catholic to be useful in other Christian settings as well.

One always has the blunt reality that many adult learners in a parish setting are not going to "do their homework" between Sundays. A leader can't assume that a book like this actually will be read by all. But it can, at the least, be a useful resource for the leader, especially one not an expert on the science-theology interface. It can suggest ways to organize presentations and discussions, and give some useful insights on some (though not all) of the topics in which people in a class dealing with science and faith would be interested.

Reviewed by George L. Murphy, Pastor, St. Mark Lutheran Church, Tallmadge, OH 44278.

A JUST DEFENSE: The Use of Force, Nuclear Weapons, & Our Conscience by Keith B. Payne and Karl I. Payne. Portland, OR: Multnomah Press, 1987. 331 pages, indexes. Hardcover; $14.95.

Nearly four years ago I moved from a hub of nuclear pacifism to my present home, a place where the livelihood of many people depends on the production of nuclear missiles. Living in these extreme environments, I have often wondered if a moderate, rational view of nuclear weapons could be found. Therefore, *A Just Defense*, which considers this complex issue in a temperate fashion, was refreshingly welcome reading.

In the introduction, the authors assert that many of the positions held by Christians concerning nuclear weapons are based on more fundamental views regarding the use of force by a government to protect its citizens. Six of these foundational views, including (1) non-resistance, (2) historic pacifism, (3) radical pacifism, (4) nuclear pacifism, (5) preventive war, and (6) just war, are presented in the first five chapters of the book. Each view is critiqued on a Scriptural basis, an approach that underscores the Christian perspective of the authors. The Paynes also acknowledge the crucial role that hermeneutics plays when Scriptural directions for issues such as this one are not expressly mapped. Indeed, the reader's hermeneutic will probably be the determinant by which he accepts or rejects the book's ultimate conclusions. The Paynes use a hermeneutic that appeals strongly to the traditional church interpretation of passages such as Romans 13:1-7. Like the historical hermeneutic, it concludes that government is mandated by God to use necessary force to defend its citizens (the innocent) and leads the authors to espouse the traditional "just war" view.

The latter five chapters of the book, comprising two-thirds of the text, address practical strategies which have been developed for preventing nuclear war. Critical evaluation of "deterrence," "disarmament," "arms control," "nonmilitary defense," and the strategy proposed by the writers—a "just defense"—is based upon the congruity of each strategy with the tenets of the "just war" view. The relationship between the five strategies and the six fundamental views is presented well.

As part of the Critical Concern Book series, *A Just Defense* is written clearly, if at times repetitively, and follows closely the objectives outlined in the introduction. It is especially recommended for those seeking a single-text overview and critique of the primary solutions proposed to the dilemma posed by nuclear weapons. The book has a useful Scriptural Index and a short Subject Index. The notes collimated at the end of each chapter will be useful for those desiring a more in-depth study of the issue. The credentials of co-authors Keith Payne (recognized authority on domestic and foreign policy) and Karl Payne (pastor/theologian) are complementarily strong.

Reviewed by John W. Haas III, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6113.

CRIME AND ITS VICTIMS: What We Can Do by Daniel W. Van Ness. Downers Grove, IL: InterVarsity Press, 1986. 240 pages, index. Paperback; $7.95.

As one who has been involved with ministry to prisoners for the past two decades, I approached this book with great interest.

Daniel Van Ness is president of Justice Fellowship, the criminal justice reform element of Chuck Colson's Prison Fellowship. This book is concerned with the criminal justice system and how it relates to a biblical perspective. It lays the foundation for what Van Ness and Colson call"Restorative Justice," which they suggest as a model that the American criminal justice system should move toward.

The book is well written, easy to read, and filled with interesting and illustrative examples of people's experiences as victims of crime, their experiences as prisoners processed through the criminal justice system, and their experiences as Christians concerned about society who are attempting to do something about crime in America. This book is an excellent introduction for Christians who have had little exposure to America's criminal justice system. It will whet their appetite to know more about it. This book will challenge them to think about their civic and spiritual responsibilities, but the book by itself is not comprehensive enough to satisfy the serious student of the subject, and perhaps is too elementary for those who have been involved much with the criminal justice systems and with criminals. However, that should not affect very many since few Christians have given much attention to the criminal justice system.

Van Ness states that this book is the outgrowth of what Justice Fellowship learned in its first five years. It reflects their research on the subject, their understanding of how biblical teachings apply to the problem of crime and criminals, and the insights of criminal justice practitioners, victims, prisoners, and biblical scholars. The book includes a series of study questions which an individual or group can use to develop a deeper understanding of the issues the book addresses. I hope that many will read it.

Reviewed by D.K. Pace, The Johns Hopkins University Applied Physics Laboratory.

TWIN POWERS: Politics and the Sacred by Thomas Molnar. Grand Rapids, MI: Eerdmans, 1988. 147 pages, index. Paperback; $9.95.

The title of this book would suggest a simple consideration of the two kingdoms of Caesar and Christ; however, its scope is far more ambitious than a treatment of this familiar theme. In the short space of six chapters the author traces the passing of a sacral or sacramental vision of the world into the desacralized vision characteristic of the modern world. This change, he argues, has had momentous implications for the way we view political power.

The author's argument divides into two parts. In the first half of the book, Molnar surveys history and finds that a great diversity of regimes have one feature in common—the sacred character of power and its holders. Social cohesion, he concludes, long relied on the belief that the community of which one was a member had a sacred foundation, that it belonged to a higher, sacred reality, and that political rulers provided the link between sacred and human reality.

In the second half of the book, Molnar traces the desacralization of power and its consequences as they shape the present. He argues that there is a direct link between Christianity and the desacralization of political power. Indeed, the denial of the divinity of the world is a conclusion of the history of science, a course of reflection and discovery which was possible only on Christian ground. In consequence, the citizen of secular society faces the issues of public life without references to the transcendent. And so the reader confronts the bald reality of political power in the liberal democratic polity—a power without foundation, an authority which is merely an expression of human will, in actuality the assent of a plurality. For Molnar, then, the question is whether power will remain an ordering principle of society and state, or whether it will become a source of disorder and anarchy.

If this diagnosis is correct, then what is the answer to the problem of power in the secular society? The author is strangely silent. He offers no formula for renewal, no program of reform, no mission for the church. His response is merely an assertion of his confidence in Providence. There is, it seems, no basis for confidence in the liberal democratic polity; for its ultimate logic, he claims, returns us to the Hobbesian nightmare, "the war of everyone against everyone." But is there a Christian alternative to the secular polity? Again, he is silent, but by implication his answer is no.

In a sense this book belongs in the company of other critical surveys of modern civilization, notably Alasdair MacIntyre's *After Virtue* and Allan Bloom's *Closing of the American Mind*. It displays a range of concern which suggests its affinity with the works of Eric Voeglin and Louis Dumont. Moreover, the author, a Roman Catholic philosopher, reveals his familiarity with French and other Continental authors. Yet Molnar is not content merely to repeat the warnings of his contemporaries or embellish their prognoses. He stands before the problem of modern civilization without the props of opinions or slogans. And he argues with a passion which does not pass into polemic. There is, in short, a sincerity and integrity in his arguments—however controversial they may be—which commends him to the reader.

Reviewed by Gregory A. Bezilla, Department of Political Science, Columbia University, New York, NY 10021

ABORTED WOMEN: Silent No More by David C. Reardon. Westchester, IL: Crossway Books, 1987. 373 Pages, index. Paperback; $9.95.

With the widespread abortion that is taking place in our society, it is important for counselors to understand what psychological effect such procedures have upon the women involved. Unfortunately such information is often difficult to find, and much that is available is biased either for or against abortion, depending upon the views of those conducting the research. (For a scholarly examination of some of the methodological flaws in such research, see "Validity of existing controlled studies examining the psychological effects of abortion" by James L. Rogers, James F. Phifer and Julie A. Nelson, *Journal of the American Scientific Affiliation*, March, 1987).

The Reardon book is a combination of primary research and an overview of the existing research from other sources on the consequences of abortion. Reardon does not avoid all of the methodological flaws described by Rogers, Phifer and Nelson, but he does bring together in one source a summary of a large number of such studies, and contributes a potentially useful study of his own.

Two hundred and fifty-two members of the WEBA organization ("Women Exploited by Abortion") were surveyed regarding their experiences prior to, during, and subsequent to receiving abortions. Immediately it becomes apparent from the organization's name that the results are unlikely to be representative of all women who have received abortions—they are unlikely to be favorable towards something by which they feel exploited. The author frankly admits that the sampling makes skewing of the conclusions likely in certain areas, yet he also presents additional data about the sample that suggests the women studied are similar to aborted women in general.

Does a biased sample rule out the usefulness of the primary research this book contains? I believe not, since it represents the views of a large number of women who have had a negative psychological experience with abortion. These women would be the most likely to seek counseling from a Christian therapist, and by examining this research we may have greater insight into their problems and perspectives. The fact that many, many local chapters of WEBA exist would suggest that problems *can* result from abortion.

The psychological consequences of abortion are emphasized in chapter four as well as parts of chapters one, two, five and six. Other chapters and parts of the book describe physical problems with abortion or concentrate upon specific issues, such as the results of abortion after rape or incest and the priority of business and economics over medical care among many abortionists.

The book makes use of both quantitative and qualitative methodologies. Each chapter concentrates upon quantitative studies for the most part, while more qualitative profiles of specific individuals are to be found between chapters.

The number of research studies cited is considerable, yet this is not quite a comprehensive summary. While I am not an expert in the area, I was familiar with several studies that were not cited. These include several that would have strengthened his case for negative psychological effects (for example, a study by Wanda Franz and Olivia Gans that identifies a "post-abortion syndrome" as an adjustment disorder).

That abortion is an overwhelmingly negative experience for the women studied is thoroughly documented, as indicated by an excerpt from the Foreword:

> Women who have abortions quickly learn that it is not nearly as "safe and easy" as pro-abortionists would have us believe. Instead, *abortion is dangerous to both the physical and mental health of women.* In fact, as we will see, half of all aborted women experience some immediate or long-term physical complications, and almost all suffer from emotional or psychological aftershocks ... *legal abortion is the most destructive manifestation of discrimination against women today.*

As the Foreword implies, the writer passionately advocates that we consider the case of women hurt by abortion and attempt to minister to their needs. The many case studies included indicate that, at least for some women, the negative effects are extensive.

Reviewed by Donald Ratcliff, Assistant Professor of Psychology and Sociology, Toccoa Falls College, Toccoa Falls, GA 30598.

UNIVERSE: An Evolutionary Approach to Astronomy by Eric Chaisson. Englewood Cliffs, NJ. Prentice Hall, 1988. 572 + xix pages with preface, glossary, and index. Hardcover.

Anyone whose last contact with astronomy was an introductory astronomy text of, say, 1955 would be amazed at the content of a modern course or text. No longer do we have the long historical development, the merely suggestive earth-based photos of other planets, and the brief mention of the expansion of the universe at the end. The field has been transformed by space exploration, new observational windows on the universe, and by theoretical developments. This book by Chaisson, a senior scientist with the Space Telescope Science Institute and author of several previous books on astrophysics and cosmology, provides a good introduction to this new astronomy.

After an overview which sets out the interdisciplinary approach which will be taken, the presentation is divided into three parts. "The Introductory Format" sketches some of the basic theoretical and observational tools of astronomy, and the scale of the universe. "The Space For-

mat" proceeds from the earth to external galaxies and concludes with discussion of the large-scale structure of the universe. "The Time Format" deals with various levels of evolution, from that of particles in the early universe through the development of life and intelligence to questions about extraterrestrial life.

The result is something considerably more than simply an updated astronomy course. It is that, integrated with an introductory course in evolutionary biology. Such an integration is necessary if one is to have a full picture of modern science's evolutionary view of the cosmos, and Chaisson does a good job of presenting this picture at an introductory level. The book is well written, with light touches, good illustrations, and interesting sidelights mentioned along the way. A teacher contemplating adoption of this as a text must remember the interdisciplinary demands which its full use will place on teachers as well as on students.

There are, of course, some points in the presentation which can be questioned. The old theory of G.H. Darwin of the origin of the moon from the earth by tidal resonance is probably wrong, but why "absurd" (p. 425)? And is it really accurate to say, concerning chemical evolution and the origin of life, "Only the details remain to be unraveled" (p. 6)? It would have been good, too, in a book of such scope, to suggest something about interactions of science and religion beyond rejection of a rather simplistic supernaturalism on p. 451. But this is consistent with the author's stated intention (p. xix) to deemphasize historical and philosophical considerations. And one certainly has to agree that there is enough simply of the content of modern astronomy to occupy the non-scientific student for whom the book is intended.

Within the limits of an introductory non-technical textbook, Chaisson has done a commendable job of describing the modern scientific picture of the universe. We are shown not a static cosmos but, to use Teilhard de Chardin's term, the unfolding of cosmogenesis. If I were still teaching college astronomy, I would consider this very seriously as a text. Beyond that, I think that anyone who wants to get a good feel for an evolutionary view of the universe will find Chaisson's book worthwhile.

Reviewed by George L. Murphy, Pastor, St. Mark Lutheran Church, Tallmadge, OH 44278.

BIBLICAL SEXUALITY AND THE BATTLE FOR SCIENCE: Healing the Sexual Turmoil of our Time by F. Earle Fox. Ripon, WI: Ripon Community Printers, 1988. 204 pages. Paperback; $6.95.

Fox is the president of Emmaus Ministries, which is dedicated "to the practical ministry of inner healing with the development of a Biblical psychology and mode of therapy, and also more broadly to the development of a clear Biblical witness with intellectual integrity" (back cover). An Episcopal priest, Fox holds a doctorate in theology and the philosophy of science from Oxford University and has served as a parish pastor, university professor, and school chaplain and counsellor. In his book, he seeks to develop a biblical basis for an approach to some of the sex-related problems of our time. Although he uses the Bible as his source, his book is not a proof-texting for individual sexual morality. Rather, he develops a biblical theology of gender, the proper understanding of which should profoundly affect our sexual behavior.

He describes God as having both masculine and feminine qualities; not in the physical sense, for God is not a biological being, but as spiritual parts of His divine nature. His masculine attributes are decision-making, exercise of authority, and His functioning as a leader, protector, and provider. The feminine qualities of God are those of dependency, sustenance, nurturing, and helping. These two distinct aspects exist with perfect complementarity in God. Since we, both men and women, are made in His image, men inherit the masculine aspect and women the feminine aspect of God. A man and woman together exhibit the fullness of God. Seen from that standpoint, according to Fox, much of the "sexual turmoil of our time" would clear up.

His book has three sections. The first two are detailed critiques of two recent task force reports from the Episcopal dioceses of Newark and Connecticut. Those reports, particularly the Newark one, hold that the church should be sympathetic towards young men and women living together without marriage, older widows and widowers living together without marriage, and homosexual couples. Believing biblical laws and traditions to be outmoded, these task force reports say that the church should receive these people as having an acceptable life-style.

Fox is deeply critical of these two reports and addresses the issues raised, point by point. He feels these task forces have been indoctrinated by the "Perennial" view, so-called because it has surfaced in one form or another in every culture that is not Bible-based. This view does not recognize a personal Creator separate from the cosmos; the cosmos itself is the eternal entity. From this, it follows that there is no absolute, objective truth, no objective moral values, and the search for meaning is"through feeling experience devoid of intellectual content" (page 14). Against this, Fox sets the biblical world view: "It is my contention that a fairly straight-forward reading of the Bible will discover, once one knows what to look for, a cosmic and philosophical framework unique to the Bible which far outclasses anything secular or pagan philosophy can give us" (page 10). There is a God, separate from His created world, who communicated objective truth to the people He created.

The third section deals largely with the effects of Alfred C. Kinsey's reports in 1948 and 1953 of sexual behavior in America. Fox quotes extensively from a paper by Judith Reisman, and an article and a letter by Edward Eichel, a human sexuality, marriage and family life education consultant. They report some startling facts about Kinsey's research and his goals. Most of us, perhaps, think his

main contribution was to report the prevalence of sexual activity in America in the late 1940s and early 1950s. His research, however, included child sex experiments, testing such things as frequency of orgasm in children (babies) of certain ages due to "specific manipulations." Quoting his research as a means of giving scientific credence, he promulgated his belief "that sexual orgasm was the primary goal and pleasure of the human species on the grounds that we humans are essentially animals." Furthermore, "The source of the stimulation was essentially irrelevant as long as it produced the orgasmic state of feeling" (page 138). It follows therefore that homosexual or heterosexual stimulation would be equally permissible, and Kinsey and his more modern followers are reported to encourage a "pansexual" ideal, in which there are no clear distinctions between female and male. The fact that they attempt to inculcate these views through our educational system is a frightening prospect that Eichel outlines in his article, "Heterophobia—A Hidden Agenda in Sex Education."

Finally, Fox points out that this philosophy has captured the perception of being scientifically based. Christians have watched this happen despite the fact that the Bible lays the only foundation for the study of science—"objective truth about an objective world." This, he describes as the "Battle for Science" in the book's title. This book is not light reading, but Fox writes clearly as he describes these rather deep concepts. His book is valuable both for providing a basis for Bible-based sexuality and also for alerting us to the subtle and not-so-subtle secular assaults on the biblical standard.

Reviewed by Edward M. Blight, Jr., Professor of Surgery, Oral Roberts University School of Medicine, Tulsa, OK 74136.

COUNSELING FAMILIES by George A. Rekers. Waco: Word Books, 1988. 212 pages, index. Hardcover.
COUNSELING FOR UNPLANNED PREGNANCY AND INFERTILITY by Everett Worthington, Jr. Waco: Word Books, 1987. 264 pages, index. Hardcover.
COUNSELING FOR FAMILY VIOLENCE AND ABUSE by Grant L. Martin. Waco: Word Books, 1987. 281 pages, index. Hardcover.

These three books are on families, from the series on counseling edited by Gary Collins and published by Word Books. Each author was chosen to write his book because he has written books on similar subjects, so each brings skill and experience to the task. Rather than review the books separately, due to the common subject, they will be treated as a group.

Rekers states in his introduction, "Academic institutions, professional societies, Christian organizations, and especially church groups seem to be sponsoring an endless stream of seminars, workshops, weekend retreats, and banquets that focus on family issues." That statement sums up the potential helpfulness of this series on the family, meeting a need. If the family is the cornerstone of our society, which we believe it is, then attention must be paid not only to the wellness aspect of the average family, but also to the problems which plague the members. Bringing healing to the dysfunctional family is the central purpose of all three books.

One feature of this series of books on counseling is that each writer is described at the end of the book. Rekers is a professor at an unnamed major medical school and brings to his task an impressive list of credentials. Worthington is professor of psychology at the Virginia Commonwealth University and has written three books in this field. Martin is a therapist on the staff of CRISTA Counseling Service in Seattle and has written several books. Each author appears uniquely qualified for writing his part of the whole series. Were all three books combined into one, it would make an effective tome.

Families are in crisis in many situations, and these books can give the pastor or counselor help in dealing with a wide variety of subjects. Each book has practical hints illustrated by case studies which give life to the discussion. Each one also ties concepts to Scriptural principles. This is especially helpful to the pastor and Christian counselor who may not be clearly aware of the correlation between some aspects of psychological principles and the Bible.

Rekers' book is the most general, and he spends time documenting the need for the specialty of family counseling. He also discusses the detection of underlying problems and supplies assessment questions and check lists. He has a chapter on biblical perspectives and goals for overcoming enmeshments. An unusual chapter discusses wellness and family counseling. He adds information on different approaches and in the appendix reviews specific methods of family counseling.

Worthington provides extensive notes with biblical references for each chapter. He also has an appendix with recommended readings for further study. This subject tends to get rather complicated, and the author handles this well for a short treatise. With the references, he provides the means for the serious student to follow up in the areas of concern and need. He details a problem and gives suggestions for counseling. The specificity of his analysis is the strongest part of the book.

Martin has written a book of almost encyclopedic coverage. The topic is so broad that he is able to present rather sketchy outlines, but his references open the door to further research. The first and longest section is on spousal abuse, and he analyzes the factors involved from many different angles. His primary treatment is wife abuse and treatment of men who abuse. The fact that men also are often abused by wives in marriage is not discussed, primarily, I suppose, because there is less literature on the subject.

The section on child abuse includes physical, emotional, and sexual abuse. Treatment of both the victim and the abuser is discussed, and he offers considerable help

for the counselor. The final brief section is on elder abuse, a topic that is being investigated to a much greater degree recently. His appendix supplies additional recommended resources.

These books can make a definite contribution to the pastor's library and to the counselor who has not had much experience in these fields. The treatment is of necessity rather limited because of the breadth of the subject matter included. However, as noted, the references given allow each reader to go beyond the limits of these books, and thus they can become the beginning of a trail of study. To me, this factor is one of the most desirable features of all three books.

The extensive use of case histories is also very helpful in explicating some of the difficult points made. The many questionnaires and outlines likewise make the books practical for those who do not have this type of material available to supplement their counseling.

Reviewed by Stanley E. Lindquist, Professor of Psychology Emeritus, California State University, Fresno, CA 93711.

HEAVY DRINKING: The Myth of Alcoholism as a Disease by Herbert Fingarette. Berkeley: University of California Press. 166 pages, index. Hardcover; $16.95.

The author of this controversial book is well qualified. He is a professor at University of California, has written several books, is a consultant on alcoholism to the World Health Organization, Visiting Fellow at the Addiction Research Center of the Institute of Psychiatry in London, and a Fellow of the Stanford Center for Advanced Studies in the Behavioral Sciences. It is necessary to recognize the distinguished career of the author as the book may create much furor. The author comes with a careful research review to back up his assertions.

I personally have maintained that alcoholism, if diagnosed as a disease, removes responsibility from the person and thus responsibility for doing what is necessary to recover. I have found that facing the issue of maladaptive behavior and taking responsibility for it has been helpful with many of my clients. I wince every time I hear on television or read in the news that heavy drinking is a disease. Here is cumulative evidence that that concept is not helpful; reinforcement at last.

The book is divided into sections: (I) The Classic Disease Concept of Alcoholism, and (II) New Approaches to Heavy Drinking, with an introduction covering "What Science Knows, but the Public Doesn't." He first sets out to demythologize the myth that alcoholism is a disease. His aim is "to bring the major findings of mainstream science—biology, medicine, psychology, and sociology—to the attention of the general public." Many heavy drinkers deny their problem and refuse help, saying, "I can handle it." When in serious trouble they say, "Everyone has problems" and suggest they don't have the symptoms of alcoholics—such as loss of control, blackouts, job absenteeism, or drinking on the job. Yet the experts agree that there is no difference between an alcoholic and a heavy drinker.

Researchers have devised new conceptual approaches: 1. there are crucial psychological and social dimensions to problem drinking, including economics, politics, cultural stereotypes; 2. they do not constitute one homogeneous grouping. Drinking serves many different functions and different needs for each person.

In part I, the author discusses and repudiates many of the classic disease concepts of alcoholism. He reviews history; discusses whether the alcoholic can control his drinking; discusses causes, including genetic and metabolic; and reviews the efficacy of the treatment programs. One and a half million Americans were seen in inpatient settings last year, costing about $1 billion, mostly paid by second parties. He states on page 73, "The current consensus in the research community is that by scientific standards of effectiveness, the therapeutic claims of disease-oriented treatment programs are unfounded. The evidence is cumulative and consistent." In summary, these treatment procedures have the same cure as doing nothing, and one researcher commented that the only thing that could be said is, treatment didn't make them worse!

The second part deals with new approaches. Getting rid of the disease concept helps society to perceive a much larger and more diverse assessment of the heavy drinker. Strangely, the endorsers of the disease model remove responsibility from the person, yet turn around and say that the first thing to be done is to quit drinking. The concept of responsibility involves recognition that the heavy drinker seeks out people and situations that evoke and stimulate drinking. Over a long period of time they have made a series of decisions, judgments, and choices that have coalesced into a central activity. It is at this point where help is needed. People need to be analyzed, then matched to therapists and treatment programs that suit them.

Social policies are important to consider. The author points out that in spite of the problems, prohibition would reduce the amount of alcohol consumed. He suggests that the availability of alcohol be more restricted, and the price increased by more taxes. He pointed out that if the tax on a fifth of liquor had kept up with inflation, it would now be $5.00.

Finally, Fingarette points out that alcohol will never be removed from our culture; that there are no guaranteed ways of treating the heavy drinker; but that most can be helped in some way. The disease concept has held back our understanding of alcoholism and needs to be clarified.

I found the book to be well-written, well-documented, and helpful in my understanding. There will be many who will disagree with the concepts presented, but all need to face the reality as clearly as it can be discovered

through research and not through opinion. This Fingarette attempts to do.

Reviewed by Stanley E. Lindquist, Professor of Psychology, Emeritus, California State University, Fresno, CA 93710.

YOUR MONEY OR YOUR LIFE: Economy and Religion in the Middle Ages by Jacques Le Goff. (Translated from the French: *La bourse et la vie* by Patricia Ranum). New York, NY: Zone Books, 1988. 95 pages, appendices, notes, bibliography. Hardcover; $18.95.

The author, Jacques Le Goff, is director of the *École des Hautes Études en Science Sociales*, Paris, and co-director of the *Annales-Économies, Sociétés, Civilizations*. He is also author of *The Birth of Purgatory* and *Time, Work, and Culture*.

As one of the most esteemed contemporary historians of the Middle Ages, the author presents a concise and well-documented (sources are distinguished as primary and secondary) analysis of the problem that usury had for the medieval Church, which had long denounced the lending of money for interest. As the changing economy began to include financial loans, he describes how the Church refashioned its theology to condemn the usurer not to Hell but merely to Purgatory.

Le Goff's purpose is to try "to show how an ideological obstacle can fetter or delay the development of a new economic system." His methodology is "examining closely the men who were the actors, rather than looking solely at economic systems and doctrines" (p. 69). He accomplishes this by quoting many *exempla*. "An *exemplum* is a brief narrative, presented as true and intended for use in a speech, generally a sermon, in order to convince an audience by means of a salutary lesson" (p. 13). These choice, imaginative, amusing, or more often, terrifying stories are the most interesting parts of the book and allow one to feel the issues at stake.

A fine summary of the book is given in the final paragraph.

> One economic system replaces another only after it has passed through a long and varied obstacle course. History is people, and the instigators of capitalism were usurers: merchants of the future, sellers of time. These men were Christians, but it was not the *earthly* consequences of the Church's condemnation of usury that restrained them, on the threshold of capitalism; it was the agonizing fear of Hell. In a society where all conscience was a religious conscience, obstacles were first of all—or finally—religious. The hope of escaping Hell, thanks to Purgatory, permitted the usurer to propel the economy and society of the thirteenth century ahead toward capitalism.

This is a careful historical work with no current applications given by the author; however, this does not restrict its usefulness, for it is brimming with ideas for the thoughtful reader to pursue. Much is suggestive of or relevant to our current problems. For example, one *exempla* says that "God created three types of men: peasants and other laborers to assure the subsistence of the others, knights to defend them, and clerics to govern them. But the Devil created a fourth group, the usurers ... (At a later date, others would describe this fourth category as being composed ... of lawyers)" (author's parentheses) (pp. 56-57). How do we categorize society? And which elements do we regard as most reprehensible, or threatening to our set of values? And how do we go about eliciting positive change? Do we turn up the volume and heat of hellfire and damnation sermons? Or do we redesign our theological categories to accommodate undesirables into our own modern purgatories that punish but eventually offer release and acceptance? Or like our Lord did in the midst of conflicting old and new trends, can we bring fresh, good news and new directions to a world confused by rapid change, yet retain what is good in the old?

Just about anything has a potential for good or evil. A fair rate of interest can escalate to the unjust gain of usury. Rather than being an obstacle to new ideas and technologies, how does the Church work for positive change? This is the challenge of this book in our times of ferment.

On the lighter side, one cannot help but wonder about the therapeutic effect that a healthy dose of a medieval usurer's fear of the final judgment would have on the inside traders and churners of investment accounts on Wall Street!

One technical note: on page 10 the reference to Ecclesiastes 31:5 should be corrected to Ecclesiasticus 31:5.

Reviewed by Albert C. Strong, Senior Representative, Retired, Presbyterian Ministers' Fund, Silverton, OR 97381.

THE EMERGING RELIGION OF SCIENCE by Richard C. Rothschild. New York: Praeger, 1989. 164 pages. Hardcover; $34.95.

The Emerging Religion of Science is not a treatise on a specific topic but rather a collection of reflections about a variety of questions. The book is sparkling with interesting thoughts and observations. However, it is somewhat lacking in organization. The author swerves from topic to topic and Jacques Ellul's observation about the way books in the sixteenth and seventeenth centuries were written fits this book: in these centuries "every intellectual had perforce to be a universalist. He had to have complete knowledge, and when he wrote on a given subject he felt constrained to put into the work everything he knew, pertinent or not" (p. 40).

The author wants to "start from scratch" and makes an attempt "to let fact and reason set the tone rather than emotion or authority" (p. 2).

Chapter two discusses the view of science and is the most interesting. Science attempts to determine the order underlying all changes and events. Often (if not always) expanding and reifying a metaphor is an attempt to unravel the mystery of the universe. For instance, as the author aptly observes, in the last century "mechanism as a theory had been the result of ... taking a metaphor from mechanical elements in daily life and raising it to the status of a universal law" (p. 21). But as the author repeats after Einstein, the comprehensibility of the world remains always a mystery, whatever laws are added to the pool of knowledge. Paradoxically, "a scientific discovery *adds* to the mystery of things" (p. 37).

Rothschild relates the meaning of life to the oneness of all things. "We *believe in* it, but we cannot *know* it in any ordinary way" (p. 42). Only this oneness has full reality, and everything else is its adumbration at best. Although the author is not quite clear about it, he seems to identify this oneness with the Ultimate, a "necessary postulate of rationality" (p. 51). He does not speak about God, and religion is to him "simply the expression of man's need for sanity" (p. 57).

Ethical attitude and doing good is for him just a matter of rationality. A rational subject is not selfish because ultimately selfishness has a destructive effect. The goodness of deeds is to be measured in reference to the whole of society and the world. It is a concept of an enlightened selfishness and eventually "religion within the limits of reason alone." The history of mankind shows that actions of individual people and entire nations are never guided by reason alone.

Although *The Emerging Religion of Science* does not give an unfailing solution for all the ills of society, it is worth reading for the many observations and discussions offered by Rothschild.

Reviewed by Adam Drozdek, Duquesne University, Pittsburgh, PA 15282.

CHOICES: Making Right Decisions by Lewis B. Smedes. San Francisco, CA: Harper & Row, 1986. 121 pages. Hardcover; $13.95.

This book arises out of Smede's extensive experience teaching theology and ethics at Fuller Theological Seminary and serving on the ethics committee of a large hospital in southern California. He was also profoundly influenced from an early age by the example of his Christian mother raising a large family with prayer and a strong commitment to doing what is right. Previous results of his reflections include: *Forgive and Forget: Healing the Hurts We Don't Deserve, How Can It Be All Right When Everything Is All Wrong?, Love Within Limits: A Realist's View of I Corinthians*, and *Mere Morality: What God Expects from Ordinary People.*

The subtitle of this work is well chosen; it is a highly analytical book on how to make right decisions in a very complex, ambiguous, and frustrating world where sometimes the best choice is only the lesser of available evils. While Smedes makes no attempt to hide his Christian orientation, he has obviously written the book to serve as a guide to anyone accepting the prevailing ethics of Western civilization. The type of decisions covered range from how to make something work right, to the highest moral questions. He moves through every aspect of the subject, from "What's good about being right" to the various categories of moral decisions. Other topics include the many kinds of facts and their relevance, a full discussion of the kinds of rules and their relative importance, how to tell if you've made the right decision, the importance of excellence and responsibility in everything we do, and, finally, a discussion entitled "Being wrong is not all bad." We cannot avoid making choices, but we can know that "no wrong choice you make can persuade God to love you less."

The strength of the book is that it provides a very detailed framework for evaluating every choice in terms of all possible variables. The value system informing this analysis is not made explicit, although his discussion does assume the Judeo-Christian ethic. He accepts only the rules of justice and love as absolute. Others can be nearly absolute, but one can think of situations where, for instance, it would be at least permissible to steal or to kill someone. Once the absolutes of justice and love are accepted, the rest of the task becomes simply one of applying logic, consistency, and that all too uncommon "common sense." In fact, there is a chapter entitled, "When you can't be sure, be responsible." The discussion of the importance of excellence and "style" in making and executing our choices is outstanding. One example of a grievous lack of these qualities is the woman who provides gifts of money to needy families "with the deftness of a donkey," subtly condemning them with hints on how they could better themselves!

A good understanding of his approach can be gained from his discussion of different kinds of facts: relevant facts, irrelevant facts, slightly to somewhat relevant facts, interpreted facts, felt facts, and evaluated facts. By the time we have filtered the "brute facts" through our own feelings, fears, desires, values, and background experiences, they are no longer objective but become highly personalized. To make good choices we will have to become genuine listeners, so that we can break through the subjective fog and really understand other people and their situations. This is an excellent chapter to read just before meditating on Jesus' warning to "judge not, lest you be judged."

In a book this size, there is obviously no space for extended discussion of the full ramifications of the points he develops. The style tends to be a point-by-point exposition of a detailed, analytical outline. He makes his

points clearly and forcefully, leaving it to the reader to apply them and ponder their full significance. Happily, the terse style is relieved and enlivened by the language and vivid illustrations he employs. For instance, in his discussion of the necessity of good rules for communication, he states, "It is not enough to cut and thrust through people's lives with honest meanness. Not enough either to bore our neighbors to death with truthful trivia."

This is not a book that will help you interpret and apply the Bible to your daily life; neither is it a book to explore deep philosophical truths on the nature and theory of ethics. However, if you would appreciate a book that will provide a framework for good, hard intellectual work in using the Bible to chart your own course through the reefs of daily existence, then you will enjoy this book.

Reviewed by Eugene O. Bowser, University of Northern Colorado, Greely, CO 80631.

THE OLD TESTAMENT CANON OF THE NEW TESTAMENT CHURCH AND ITS BACKGROUND IN EARLY JUDAISM by Roger Beckwith, Grand Rapids: Eerdmans, 1986. xiii + 528 pages. Hardcover; $35.00.

This is an important book about an important subject. A basic belief of evangelicalism is that Scripture is inspired, but an antecedent question which needs to be addressed is "what is in Scripture and what is not." In other words, how do we understand the canon? This is the question addressed with considerable diligence by Beckwith of Latimer House, an evangelical Anglican research center in Oxford.

Canon has been at issue since the time of the Samaritans, who in the sixth century B.C. split from the mainstream of Judaism, recognizing as authoritative (and canonical) only the writings of Moses. It still is a practical problem today, since in most pulpits the Old Testament is either ignored completely or only read and preached in a very abridged form. Another aspect of the problem is stated by Beckwith, "though Protestants may base everything else which they believe on the authority of Scripture, they base their very canon of Scripture on the authority of tradition, and so overthrow the foundations of their own theology" (p. 5).

Beckwith very painstakingly and exhaustively marshalls the evidence regarding the canon culled over more than twenty-five years of study. He discusses the various witnesses to the canon from the Old Testament itself through the rabbis, traces the rise of the whole concept of the canon, looks at its structure and what it is called, the order and number of canonical books and the identity of books included and excluded.

Among the many positive contributions of the volume is a strong contestation of the suggested closure of the Old Testament canon in the late first century A.D. Beckwith supports a view that it was closed at least in the second century B.C., and argues that even this position might be too conservative, judging by the available evidence.

This book is very important, but it will not be for most lay people. Foreign languages are generally translated in the text itself, but not in the footnotes, which themselves are copious. Detailed indices of Scripture, ancient literature, and names and subjects make the mass of information usefully accessible, and also show the encyclopaedic research base used to undertake this massive piece of work. Though the book will not join their best-seller list, we can only thank Eerdmans for making it available and Beckwith for dedicating his life to this research which will be foundational for subsequent discussions of the area of canon for years to come.

Reviewed by David W. Baker, Associate Professor of Old Testament and Hebrew, Ashland Theological Seminary, Ashland, OH 44805.

MIRACLES: From God or Man? by Jimmy Jividen. Abilene, TX: Abilene Christian University Press, 1987. 163 pages. Softcover.

Jividen poses his question in the title of his book and summarizes his answer on its last page: "The New Testament miracles were from God, but the contemporary claims of miracles are from man." *Miracles* is divided into 13 chapters with a scripture index. In it the author argues that the basic purpose of New Testament miracles was confirmation of the truth of God's message. His argument against present day miracles is based on their lack of evidence, purpose, qualified miracle-workers, authority, and distinctiveness. Contemporary miracles, writes Jividen, "consist of tricks, frauds, paranormal happenings, psychosomatic cures and psychological phenomena."

New Testament miracles were unique events designed to confirm that the miracle-worker and the message were from God. Jividen believes that God works today in the world through nature, answered prayer, providence and an orderly world. Jividen has lectured about miracles throughout the United States and in foreign countries. He has served as minister of many churches and taught college-level Bible. Prior to this book he wrote *Glossolalia*, a popular book in its fifth printing which has been translated into four languages.

Reviewed by Richard Ruble, John Brown University, Siloam Springs, AR 72761.

PEACE AND JUSTICE IN THE SCRIPTURES OF THE WORLD RELIGIONS by Denise Lardner Carmody and John Tully Carmody. Mahwah, NJ: Paulist Press, 1988. Paper; $9 95.

If the peoples of the world are to live together in peace and justice, they must share at least some fundamental ethical principles. Do the major religions contain shared ethical principles that will allow diverse peoples from many nations to live in peace? The authors of this book are convinced that they do.

The authors explore these major world religions: Hinduism; Buddhism; Confucianism; Taoism; Judaism; Islam. They are writing to a Christian audience, and they presuppose a knowledge of what the Bible says about peace and justice. They explore the following scriptures: the Bhagavad-Gita; the Dhammapada; the Analects; the Tao Te Ching; the Talmud; and the Qur'an (Koran). I found their summaries of the history and major tenets of each religion very helpful to the non-expert.

For each of these scriptures, the authors selected a few passages they believed to be relevant to peace and justice issues. Often these passages deal with spirituality or with personal interactions, for instance, Buddha's injunction to "...overcome anger by mildness, ...overcome evil by good..." They then explain the relevance of these passages to the promotion of peaceful interactions among people. In many cases, such as the one I just cited, the relevance of the passage to peace issues is obvious. In many other cases, however, I believe the authors have to really stretch the meaning to make it render a peace-and-justice message. For instance, they cite the saying attributed to Confucius, "When you have offended against Heaven, there is nowhere you can turn to in your prayers." From this they conclude, "...this text represents a Confucian conviction about the primacy of one's relationship with Heaven. Get that relationship straight and you will have cleared the deck of the idols that spur most wars, that create most injustices." This is a permissible conclusion, but not necessarily one that a devotee of Confucius would think to draw.

I believe this book can, given the opportunity and put properly to use, make a major contribution to cross-cultural peace efforts. If people around the world pay close attention to some of the fundamental principles of their own religions, they will all be able to agree on at least enough things to keep the world from blowing up. If even one war can be prevented because the combatants reexamined their scriptural heritages, the effort of such people as the Carmodys will have been fruitful. However, there are a couple of problems that we must face honestly. First, most people in the world do not study and understand the scriptures of their own religions. Even Christians in the United States have a poor knowledge of the contents of the Bible. In order for the authors' objectives to be realized, the scholars and clerics within these religious traditions need to be convinced that their scriptures do in fact promote peace and justice. Then these ideas can perhaps be passed down to the multitudes. Second, in most cases, the scriptures are ambiguous with regard to peace issues. For instance, the phenomenon of warfare is incorporated into Krishna; how then can it actually be considered wrong? "Allah loves those who act in justice," but the Qur'an also approves of jihad, holy war. Thus, although all of these scriptures will bear interpretation the authors have placed (perhaps forced) upon them, they have not actually proved their case in any instance.

The Bible stands in stark contrast to all these scriptures. It appeared to me that the authors of this book had to really search to find passages with relevance to world peace in the non-Christian scriptures. None of these passages had the intensity of the Biblical statements that demand peacemaking and just treatment of the poor. None of these other religions can produce scriptural passages like "...they shall beat their swords into plowshares, and their spears into pruning-hooks; nation shall not lift up sword against nation, neither shall they learn war any more" (Isaiah 3:4; Micah 4:3) or "Behold, this was the guilt of your sister Sodom: she and her daughters had pride, surfeit of food, and prosperous ease, but did not aid the poor and needy" (Ezekiel 16:49) or "Put your sword back in its place; for all who take the sword will perish by the sword" (Matthew 26:52).

While the Carmodys' effort to find peace messages within non-Christian scriptures is laudable, I think it might be a better service to world peace to actively promote the Christian gospel of peace rather than to try to find a few pale glimmers of peace within the other world religions.

Reviewed by Stanley Rice, Huntington College, Dept. of Biology, Huntington, IN 46750.

MERCHANTS OF DEATH: The American Tobacco Industry by Larry C. White. New York: William Morrow, 1988. 240 pages, index. Cloth, $17.95.

Many of us, as we grew up, were exposed to information about the dangers of smoking. I remember how appalled I was upon reading a *Reader's Digest* article, "What the Cigarette Ads Don't Show," when I was a child. We wonder what insane compulsion causes people to begin and continue a practice whose lethal consequences have been amply proven. Is it really just due to the collective stupidity of smokers? Larry White's devastating examination of the practices of the major American tobacco companies reveals that a great burden of guilt for tobacco use, and the deaths caused by it, lies with these companies. Here is an expose in the best tradition, not only of sinister business practices but of the helplessness of our legislative and judicial systems to cope with them.

The link between tobacco use (including smokeless tobacco) and diseases such as cancer and heart failure has been amply established by the vast majority of over 50,000 published studies. In contrast, one seldom encounters references to the dangers of tobacco use, despite the numerous articles about health and lifestyle in today's major magazines. Why? As White explains, the tobacco companies provide a major portion of the advertising revenues for the major magazines, and refuse to advertise in these magazines if any negative references are made to tobacco.

Some magazines, most notably *Reader's Digest*, have a tradition of valiantly publishing anti-smoking articles despite pressure from the tobacco companies. However, recently these companies have begun diversifying into other products, especially food (R. J. Reynolds bought Nabisco, Philip Morris bought General Foods), and now even *Reader's Digest* has begun refusing to print articles critical of smoking, lest they lose advertising revenues from Nabisco and General Foods. The Loews Corporation owns both Lorillard tobacco company and CBS, which compromises the freedom of the networks to speak out against the dangers of tobacco.

Tobacco use has consistently declined, but tobacco profits have continued rising even for those companies with diversified investments. More money is spent to advertise tobacco than any other product in our economy. Tobacco companies continue aggressively promoting a product which, when used as directed, can cause sickness and death. More recently, these companies have begun relying more heavily on tobacco imported from Brazil and Zimbabwe, which is raised by people living in conditions of abject squalor. The tobacco companies have therefore not only victimized the American consumer but also the third-world farmer.

White also examines the history of the tobacco companies, of research into tobacco-related diseases, and gives a detailed description of the lawsuits currently being brought against tobacco companies by the families of cancer victims. As I was reading this book on January 5, 1990, the evening news reported that a federal court reversed a judgement that had been made against a tobacco company. White's book, it appears, is not the least bit out of date on this front.

White's proposals are wisely thought out. He suggests: 1) that tobacco companies pay for the medical costs that lung cancer and heart failure incur for Medicare and Medicaid, costs which they and not public funds should cover (this would raise cigarette costs to three dollars a pack); 2) that tax deductions for cigarette advertising be eliminated; and 3) that each state be allowed to decide what sorts of restrictions and warnings be required. White describes how the extreme proposal of banning all tobacco advertising would not only fail to be "the magic bullet" but would actually serve to increase tobacco company profits!

This is one of the most fascinating books I have read recently. White concludes, "Like a cancer that has metastasized, the cigarette companies have spread throughout the American economy. Until now they have managed to escape the consequences of selling products that cause disease and kill. The time of reckoning has got to come. We know too much to let this man-made plague continue unabated."

Reviewed by Stanley Rice, Huntington College, Biology Dept., Huntington, IN 46750.

WHAT MAD PURSUIT: A PERSONAL VIEW OF SCIENTIFIC DISCOVERY by Francis Crick. New York Basic Books, 1988. 182 Pages. index. Hardcover: $16.95.

Nearly twenty years after James Watson wrote *The Double Helix*, Francis Crick has given us his account of the events surrounding the development of the DNA model. Although not as pointedly personal as Watson, Crick has given his own reflections on the early DNA research, later research on the genetic code and other areas of molecular biology, and also the people involved in these areas.

After a brief description of his early life and wartime experiences Crick relates his scientific endeavors from

about 1947, when he began at the Cavendish Laboratory in Cambridge, to the present time. Early chapters deal with the DNA work with Watson and their attempts to precede Linus Pauling in developing a viable model of DNA. The latter half of the book is concerned with the more than three decades of molecular biology since that day in 1953 when Crick and Watson published the first description of the DNA molecule. Crick spent much of that time doing research on the genetic code and gives his account of that period. He is currently an endowed Professor at the Salk Institute in California and is doing research in neuroscience. The final chapter contains a brief discussion of his work there.

What Mad Pursuit is one of several books written by well-known scientists aimed at "encouraging public understanding of science." This series has been sponsored by the Alfred P. Sloan Foundation and includes books by other authors such as Freeman Dison, Lewis Thomas, Luis Iverez, and S. E. Luria.

The book is directed at a general audience, although a knowledge of biology and chemistry is helpful. A brief discussion of molecular biology and the genetic code is given in an appendix for those who may not have such knowledge.

As the subtitle suggests, Crick has written a very personal account of his scientific work. The book is permeated with his own personal philosophical views on various subjects ranging from religion to the nature of life. If nothing else, Crick has provided an account which is more objective, less critical of others, and balances well the earlier book by Watson. Personally, I enjoyed the book and would recommend it to anyone interested in this area.

Reviewed by Phillip Eichman, 2705 Paligraf Dr., Muncie, IN 47304.

THE SO-CALLED HISTORICAL JESUS AND THE HISTORIC BIBLICAL CHRIST by Martin Kähler. Translated, edited, and with an introduction by Carl E. Braaten. Foreword by Paul J. Tillich. Philadelphia, PA: Fortress Press, 1988. 148 pages, foreword and index. Soft cover; $8.95.

It is good to have easily available again this reprint of the 1964 English translation of Kähler's 1896 classic. Its theme continues to be vital for the Christian understanding of Scripture. For Kähler argued that an overemphasis on a scientific "search for the historical Jesus" fundamentally misses the point. In his own "intentionally audacious" words (p. 43), "the historical Jesus of modern authors conceals from us the living Christ." Not that a critical study of the gospels or attempts to understand Jesus historically are without value. But the New Testament writers were not attempting to give us sources for the writing of history, and a scientific history, even if accessible to common people, would have no power to awaken saving faith anyway. The purpose of the apostolic writers was the proclamation of Jesus as Lord and Savior. They were not concerned with Jesus merely as an "historical" (*historisch*) figure, but with his "historic" (*geschichtlich*) meaning.

Kähler saw more than a methodological error involved in the emphasis of the "life of Jesus" movement. There was also the doctrinal error of downplaying or rejecting the divinity of Christ. Of course, he also wanted to insist upon the humanity of Christ, but argued that the attempt to discover a human Jesus who does not differ in any essential way from other humans fails to grasp the Christ whom the whole Bible proclaims.

Many people today know "The Quest of the Historical Jesus" of the nineteenth century only through Albert Schweitzer's book with that title. While Schweitzer's book is an indispensable survey, Kähler's work is really more important for a critical theological treatment of the "quest." His prose is profound, but also lively: A sentence like "Just suppose that the art of modern historiography was able to carry out a spectral analysis on the Sun of our salvation" (p. 61) gives a hint of that.

Kähler's arguments continue to be extremely relevant, especially for those concerned with christology, today. Both "liberals" and "conservatives" will find his book provocative. Of course, many of his references and arguments assume familiarity with theologians of a century ago. Braaten's detailed introduction gives a good survey of the necessary background, as well as an analysis of Kähler's thought.

Reviewed by George L. Murphy, Pastor, St. Mark Lutheran Church, Box 201, Tallmadge, OH 44278.

THE PSYCHOLOGY OF HUMAN FREEDOM by Malcolm R. Westcott. New York: Springer-Verlag, 1988. 227 pages, index. Softcover; $34.00.

Human freedom is usually taken for granted as a given when most discussions about it are presented. There are three assumptions which usually unite such discussion and literature: first, commitment to some form of free will doctrine; second, that life goes on in the context of social organizations; third, the belief that free will is desirable and society should inhibit its expression as little as possible. The implication is that when this is done, people have the opportunity to be creative.

This rather comprehensive book is divided into five main parts: I. Context; II. Psychological Studies: the Natural Science Variations; III. Ethical Considerations; IV. Psychological Studies: the Human Science Variations; V. Further Facets of Human Freedom.

Westcott states that he has three goals to pursue: The first is to describe what has been learned about human freedom through psychological research. The second is to provide a conceptual and methodological critique of the large body of that research which has been conducted within the framework of a positivistic natural science experimental psychology. The third goal is to offer a contrasting human science approach to the study of human freedom and illustrate its use in empirical study.

Considering the enormity of these goals, the author presents information about each. Each chapter follows a similar format: the plan, issues and conceptions, review of literature, and an overview or summary. Westcott lists 10 full pages of references.

It is impossible to give a comprehensive review of the author's work in a short review, but some of the flavor of his attitude becomes apparent in Chapter 9, "Loose Ends, Missed Opportunities, and Possible Futures." In this chapter, he discusses some of the implications of cross cultural effects and concepts of human freedom, privacy, and individualism. As these aspects strongly influence western cultural practices, they also influence concepts of freedom. Gibbs concept of "optative freedom," meaning the capacity to be the organ to choose what to do, implies that decisions are possible only in situations where there is both time and resources to allow such choices. If people spend all of their time taking care of themselves, they have few choices to make. Thus third world concepts of free will can become very different from ours.

Political philosophies likewise affect what a person feels is free will. Whenever there is a rigid pattern of thought that forces evaluation of all aspects of life to be explained or justified according to that pattern, concepts of free will are distorted.

To give some understanding of the frame of reference of the author in discussing all of these topics, this summary may help. Westcott suggests three levels of questions about free will. First, metaphysical, concerned with universal truth about free will and the consequent relationship between it and responsibility, usually the arena of philosophers, who have spent much time discussing it. Second, the role of free will in expression of human behavior, the arena of psychologists, who have not done much in this area, either by design or neglect. The third relates to the origins and consequences of experience, another area of empirical psychology that has not received much attention.

Lines of argument about free will relate to several questions, namely, theological conceptions about the nature of God and man's relationship to Him; a second view relates to morality, for if there is not free will, there can be no judgment about behavior; the third view relates to reflexivity, that determinism must itself be determined. Limitations and explorations of each of these areas are presented.

This book is one which is stimulating and helpful to anyone interested in the human condition. While it is abstruse in some ways, it is quite understandable to anyone with a degree of background in the history of philosophy and psychology. I would suggest that it is aimed at the serious reader, and the high cost ($34) of the paperback would deter others from purchasing the book!

Reviewed by Stanley Lindquist, Professor of Psychology Emeritus, California State University, Fresno, 93710, and President, Link Care Foundation.

MORALITY AFTER AUSCHWITZ: The Radical Challenge of the Nazi Ethic by Peter J. Haas. Philadelphia: Fortress Press, 1988. ix, 257 pages, index. Hardback; $19.95.

The author of this book, a Jewish professor of religious studies at Vanderbilt University, studies the Holocaust as a problem in moral theory. He asks "how it was that a whole society could participate in an ethic of mass torture and genocide for well over a decade without any significant or sustained opposition from political, legal, medical, or religious leaders." And he answers by challenging our understandings of the problem of evil and the nature of morality: "What is reflected in these people ... is not the banality of evil but the human ability to redefine evil. Europeans committed what we judge to be heinous crimes under Nazi rule not because they were deficient in moral sensibility, and not because they were quintessentially evil and brutal people, but because they were in fact ethically sensitive. They were fully aware of what they were doing and displayed principled acquiescence. The difference is that for them such deeds were simply no longer understood to be evil."

In successive chapters, Haas traces the intellectual background of the Nazi ethic; shows how this ethic was articulated as it moved from its sectarian and partisan context to reign over an entire continent; examines how such an ethic took on institutional expression; and finally, draws our attention to the reactions of military adversaries, survivors of the persecutions, and dissenters such as rescuers. Haas does not provide new historical evidence; rather, he reconsiders previously published materials and studies them in a different light. His most significant accomplishment, then, is to suggest a new theoretical perspective on the nature of morality and the problem of evil for students of a variety of social phenomena.

From his study Haas draws the conclusion that evil and good, immorality and morality alike, are defined by and relative to their social and cultural context. This context, he insists, is so extensive and comprehensive that it determines individual actions. He seems, in other words, to depict both support for and opposition to Nazi authority in fatalistic terms as simple acquiescence to one's circumstances. By implication, he suggests, any ethical evaluation from outside of a particular moral context be-

comes problematic (e.g., the Nuremberg trials). But these conclusions are simply not warranted by empirical evidence and by Haas' own theoretical perspective. There is no reason to conclude that the process by which evil was redefined by the Nazi ethic precluded the operation of alternative ethics. And so the ethical relativism which he presumes is a mistaken implication of this otherwise insightful study in the social and cultural origins of human evil.

In truth, the author fails to seriously consider these contentions in the light of the presence of altruistic activities even in those societies and regions in which the Nazi policies received a high measure of popular support. In their study of gentile rescuers of Jews, Samuel P. Oliner and Pearl M. Oliner (*The Altruistic Personality*) discovered, in addition to ethics of concern and care, an ethic of universal regard for human life which moved these people to help those in need and to resist their persecutors. These ethics, they insist, operated in the same social and cultural context in which the Nazi ethic was defined by its partisans. It seems, one may conclude, that moral agents have an integrity which makes possible the imputation of moral responsibility. It is the same integrity that makes possible theoretical, ethical, and theological reflection, both by those who are proximate to and those who are distant from the objects of their concern. Indeed, this study, and the lives of those who struggled against the evils it portrays, stand in testimony to this very possibility.

Reviewed by Gregory A. Bezilla, Department of Political Science, Columbia University, New York, NY 10027.

REPRESENTING GOD IN WASHINGTON: The Role of Religious Lobbies in the American Polity by Allen D. Hertzke. Knoxville: The University of Tennessee Press, 1988. 216 pages. Softcover; $14.95.
PRAYER, POLITICS & POWER: What Really Happens When Religion and Politics Mix? by Joel C. Hunter. Wheaton, Illinois: Tyndale House Publishers, 1988. 202 pages. Softcover; $5.95.

How effective are religious lobbies in securing the legislative programs and administrative personnel that they want in Washington? That was the question Allen Hertzke, professor of political science at the University of Oklahoma, sought to answer. His research included original interviews and case studies as well as data analysis. His research included Catholic, Jewish, mainline Protestant groups, evangelical, fundamentalist, and pacificist.

Hertzke concluded that the effectiveness of lobbies is more in directing attention to the issues they think important rather than in securing legislation or administration appointments. Many religious leaders seem more concerned about being "prophetic" in having a national forum for their arguments than in successfully facing the political realities in Washington today. They would rather make a point than get a part of their program and some of their personnel in key positions. There is a tension, Hertzke states, "for some religious leaders between 'witnessing' to their religious values and making a political impact."

In other cases the religious stance seems subordinated to one's political alignment. An unidentified "legislative director" characterizes some of the "mainstream Protestants" as "totally secularized people who could not give a damn about religion. They are shadows of a religious past, echoes without authority. Secular liberals would agree with everything they stand for, but the nagging question: why are they religious at all? ... With the Catholics you have a real sense of debate. But in the mainline churches there is no sense of debate. They are thoughtless, predictable fools...."

Joel Hunter's book is more limited to evangelicals but discusses other forms of religious political action as well as lobbying. A key thrust of his book is a plea for more realism and intelligence and less shrillness and emotionalism on the part of politically-active Christians. The media tend to focus on the bizarre and colorful and ignore the quiet buildup of political alliances and reasonable persuasion.

Hunter offers evangelicals wise counsel. Does "your" candidate offer "a stable and predictable philosophy" and record, or is he a political opportunist who says what you want to hear? On the importance of integrity and character, Hunter points out that the problem is not "person" vs. "issues," but that "the person *is* the issue." "A morally good person can make a poor official," but "we can't expect the opposite to be true." Hunter warns against the emotionalism of demonstrations and counsels the "separation of confrontation and thinking." American society has become so accustomed to the politics of confrontation that Christians can offer a contrast in quiet, persistent reasonableness. What this country needs more than pressure politics, according to Hunter, is a demonstration of a Biblical lifestyle.

An important stress of this book is that there is no "Separation of Sin and State." We live in a fallen world and should expect sinful people to act according to what they are. Do Christians wish to exercise political power or are they merely seeking to fulfill their civic responsibilities?

> Christians have a distinct worldview that has its basis in a purpose beyond this world. The people in the world and of the world will not agree on this basis, so there will be conflict (John 16:33). The conflict is legitimate. In a world where people search for meaning and answers to that search are different, disagreements are inevitable. The conflicts, though, can be opportunities to witness. They are also our opportunities to model restraint in the use of power.

Reviewed by William H. Burnside, Professor of History, John Brown University, Siloam Springs, AR 72761.

CROSSFIRE: Faith and Doubt in an Age of Certainty by Richard Holloway. Grand Rapids, MI: Eerdmans, 1988. 175 pages. Paperback; $10.95.

Religious faith can have no objective certainty. Religious claims can have no naturalistic or rationalistic explanation. We cannot know the truth of God outside the circle of faith since it is self-attesting and self-authenticating. The data of religion is always mediated through individuals who are not directly accessible to us. Therefore, we must accept a large degree of mystery and uncertainty about God; hence, the role of faith.

Faith is essential to any religious belief and is inevitably accompanied by doubt. Doubt cannot be eliminated without eliminating the need for faith. Thus, a tension exists for the Christian, a tension which finds expression in many ways. It may be expressed as the paradox of a God who "places impossible demands upon us, yet offers us full acceptance." It may be expressed as the two different ways of seeing the world: "objective consciousness" (which is detached, clinical, and neutral), or "contemplation" (which is passionate and attached). There are two kinds of good, two ways of acting within the world, two ways of handling the "conflict created by the demands of Christ and the insistent pressures of human culture."

Holloway sees Christians caught in a crossfire between belief and doubt represented by two extreme responses to Christ, those of fundamentalist Christians and of accommodationist Christians. Fundamentalists "exalt revelation against reason, authority against free consent ... accommodationists do the reverse." Fundamentalists "cut themselves off from Christ's impact on history," accommodationists "cut themselves off from Christ's abiding presence in revelation" (p. 151). Holloway's main point seems to be that we must learn to live with less certainty than do either the fundamentalists or the accommodationists.

Holloway, Bishop of Edinburgh since 1986, is a graduate of Union Theological Seminary and previously served in Boston's Church of the Advent. Other books written by Holloway include *Beyond Belief* and *The Killing*. Quotations used in the book suggest that Holloway was positively impressed by the writings of Albert Schweitzer and Richard Niebuhr. I found this book difficult, perhaps frustrating is a better word, to read and to review. This is most probably because Holloway appears to have a worldview significantly different from mine. He appears to develop his arguments from an existential perspective with a strong emphasis on experience.

My primary problem is our strongly differing views of Scripture. For example, Holloway says, "it is dangerous to claim uniqueness for Christianity ... it is possible to affirm the unique nature of the experience for those who have entered it (God revealed through Christ) without engaging in corresponding denials of other avenues of revelation" (p. 52). In several instances, Holloway appears to deny the obvious interpretation of Romans 1:19-20. On sin, Holloway states that the Bible gives us many examples of human sinfulness but "does not really give us an explanation for it" (p.93). Concerning the deaths of Ananias and Sapphira in Acts 5, Holloway describes Peter as a "self-righteous and sadistic bully" who caused Ananias death due to a heart attack because of his verbal assault (p. 130). As a final example, Holloway says ... "there is practically no real evidence for the life of Jesus outside the New Testament" (p. 48).

Holloway has written a book which certainly stimulated my thinking. I read the book three times before I decided to review it. The book certainly has some important points worth thinking about. I would suspect that *Crossfire* might prove frustrating to many *Perspective* readers because of Holloway's view of Scripture and his existential worldview.

Reviewed by Bernard J. Piersma, Professor of Chemistry, Houghton College, Houghton, NY 14744.

CREATION: The Story of the Creation and Evolution of the Universe by Barry Parker. New York: Plenum Press, 1988. xiii + 295 pages, index. Hardcover; $22.95.

Acclaimed science writer and physicist at Utah State University Barry Parker has now published his third book on modern physics. This expository essay traces the history of our present cosmology from Hubble's discovery of the expanding universe to present attempts to solve stubborn problems in cosmology. While amply illustrated with black and white diagrams, charts and even photographs of physicists and their labs, it is the quality of Parker's prose which lifts the material from deadening detail or boggling complexity. Consequently this lengthy survey of the history of cosmology is both quite informative and still makes a "good read"—even for a non-physicist.

The weakest and briefest chapter, "The Emergence of Life" attempts to conclude the story of creation by sketching out the formation of life on earth and even the possibility of "extra-terrestrial intelligence." He acknowledges that the jump from a primordial soup of nucleic acids and protein to cells is speculative but reasonable and "most scientists accept it." He then states that the "rise"—I take some objection to this phraseology—to intelligence took another three billion years, presumably because we are now here. Parker's account here does not in any way reflect the skepticism of recent critics such as Robert Shapiro (1986) or Thaxton et. al (1984).

However, in more familiar grounds Parker has an uncanny feel for describing the scientist's search for consistent mathematical solutions to theoretical problems, as well as experimental support for such theories that enable the reader to share the excitement of the pioneers in the field. Yet, the book does not glibly pass over difficulties which remain. Parker contends that larger accelerators and telescopes are needed to further understand the re-

lated problems in particle physics and cosmology, but for the most part he allows proponents of various theories to speak their views without editorial criticism.

Despite its title, this book is largely about the history of physics, its discoveries, personalities and the difficult quest for theoretical and experimental congruence. Two sections deal with larger religious/philosophical questions. The "reflection" at the end of the triumph of the standard model—including Hawking's quantum "solution" to the singularity problem of cosmology—asks what existed before time = 0. Or did even "time" exist? Parker does not delve into these difficult issues (mysteries?) except to note that these remain problematic in even modern cosmology and to note that "a creation of some sort is forced upon us." Finally, Parker's concluding paragraph of the book addresses the question of the lack of reference to God in a book about creation. Despite the fact that some physicists are theists their scientific explanations must *derigueur* endeavour to function without a God-hypothesis. But even if scientists were "someday able to explain creation itself in an entirely satisfactory scientific way—there is still something that is left unexplained ... the basic laws of nature ... who created these laws? There is no question but that a God will always be needed."

But is this really the Achilles heel of secular cosmologies, or its only fundamental susceptibility to the need for a deity? Differing answers to this thorny issue need not detract the profit this book repays to its readers.

Reviewed by Marvin Kuehn, 48 Carling St. Hamilton, Ontario L85 1M9.

STAR WATCHING by David Block. Chicago, Illinois: Lion Publishing Corporation, 1988. 160 pages. Hardcover.

"An exploration of the universe and its meaning" reads the flyleaf of this lavishly illustrated book (over seventy colour plates). David Block is described as "one of the world's leading astronomers of the younger school" and also quite evidently a devout Christian. This survey of the heavens begins with our solar system and extends to the farthest known regions of the universe with many interesting sidelights on the way. These sidelights embellish the main theme by describing the discovery of the missing record of Halley's Comet, speculating on the star of Bethlehem, and by explaining the electromagnetic spectrum for the non-specialist.

This descriptive pictorial essay celebrates the grandeur of the universe and periodically reflects on the meaning that can be found in contemplating its secrets. Block echoes Psalm 8 in contemplating the size of the galaxies, the place of humans and their relation to God. He "sincerely [believes] that the universe is as vast as it is, so that we might indeed search for its Creator. But in the end the amazing truth is that the Creator has sought us out" and therein lies man's significance. The large amazing galaxies were indeed created by an amazing and yet personal God. Accordingly, Block goes on to suggest that intimations of this personal deity might follow from the observer dependent nature of our present science. Note, this suggestion is not fleshed out into an argument. The overwhelming purpose of this book—beyond the impressive educational content of explaining stars, planets and black holes to interested non-specialists—seems doxological. It is not apologetically aimed at secular or hostile audiences.

Block explores the meaning of the universe more directly in the concluding chapters which focus on the Big Bang and an appeal to the delicate "tuning" of the universe. For instance if the electromagnetic force were only slightly weakened or strengthened chemical reactions would cease. Similar examples of apparent design or fortuitous constraints are followed by a personal confession that Block sees this "as the finger of God" which created a perfect early universe to make life possible.

Block concludes his book with a challenge to the claim that physics and cosmology make God improbable or superfluous. He enlists the aid of Robert Jastrow and Barrow and Tipler to take the wind out of the sails of the ship of scientific atheists. Once again the merits or difficulties of a theocentric view of cosmology are not systematically explored. Philosophers looking for a meaty dissection of the anthropic principle or Hawking's "solution" of the problem of creation must look elsewhere. Yet the suggestions of Block are not dismissed lightly by sensitive readers (awed gawkers perhaps) who have marvelled at the wonders of the worlds depicted in this slim volume. I believe that Block's book is one needed tome to augment the otherwise sterile discourse of cosmology which fails to heed the message of Scripture—the heavens declare the glory of God!

Reviewed by Marvin Kuehn, 48 Carling St., Hamilton, Ontario L85 1M9.

CHRISTIAN BELIEF IN A POSTMODERN WORLD: The Full Wealth of Conviction by Diogenes Allen. Louisville, KY: Westminster/John Knox Press, 1989. 238 pages, index. Paperback; $15.95.

Allen is Professor of Philosophy at Princeton Theological Seminary, a Fellow of the Center of Theological Inquiry at Princeton, a member of the American Philosophical Association, and author of several books on philosophy/theology topics. This book is a sound, careful Christian apologetic to postmodern culture. Arguing that we should believe Christianity because it is true, Allen defends this "audacious" claim by showing how foundations of modern thought, formed by the mistaken philosophical presuppositions of the Enlightenment and the narrow mechanical understanding of the physical world held by Newtonian science, have collapsed as a result of both modern science and recent studies in his-

tory and philosophy. We are in a period of revolutionary cultural change, perhaps the greatest since the rise of science in the 16th century. It is time to analyze the old, mistaken philosophical assumptions and reconsider the truth and implications of Christianity.

As a framework Allen has chosen the old simile of "the two Books of nature and of Scripture" which can give us a witness to God. The first nine chapters of the work make up two parts with these headings. This device emphasizes that at the outset of the scientific tradition there was a more balanced understanding of the nature and sources of human knowledge than has resulted from modern presuppositions shaped by materialism and rationalism. Throughout the work the author considers issues and arguments relevant to someone aware of the history of Western philosophy. Occasionally the discussion gets too complex for all but the philosophically alert, due mainly to the difficulty of the issues.

However, for the most part Allen has made a simple, clear path through the tangle of history and philosophy which led modern culture into its present absurd mindset. He recognizes the central part played by science and describes clearly its historical and epistemological origins, nature and limitations.

The first five chapters, comprising "The Book of Nature, discuss what we really learn from the rise and development of science and give a sound critique of the presuppositions behind modern rejection of the possibility of God. Modern science and critical philosophy both suggest that the question of God as the transcendent source of the world is very open indeed. This question is clearly raised by both the order and the existence of nature—topics treated carefully to avoid the historical errors of natural theology or the classical philosophical straitjackets of Hume and Kant. Those trained in physical or biological sciences but interested in philosophical issues will value Allen's insights.

Part I ends with a crucial chapter emphasizing that "To treat the issue as though it were raised simply because the world's existence and order are not explained by its members and thus as a desire simply to satisfy our curiosity, is to isolate it quite artificially from other concerns we have as rational agents." Human beings must order their choices; their deep aspirations cannot all be satisfied by this world; they have profound intimations of both beauty and excellence in the world, the source of most human creativity; and they suffer unexplained affliction in that same world. These facts of experience make a search for God as the reality beyond our world eminently reasonable.

Part II, "The Book of Scripture," opens with an examination of faith in biblical terms. First, faith is considered in its radical character as a positive, life-changing response to the grace of God, transcending the dimensions of mere bodily and mental life in the world. Such faith is then shown to be reasonable philosophically, especially in terms of its epistemological character as realism, not subjective existentialism. This part of the work is more difficult and I suspect remains partly a closed book to those who are not in fact seekers after God. (When has it been otherwise?) Part II closes with two chapters giving a philosophical examination of the meaning and character of the self-revelation and Incarnation of God in Jesus Christ, and the nature of divine agency in a world also described in limited terms by science.

Part III is a discussion of "Christianity and Other Faiths," since the author believes that for many people a major block to examining the truth of Christianity is the existence of other faiths. These chapters are based on two previously published essays. The thesis, that the unique truth of Christianity does not exclude the possibility of some truth in other religions, is explored thoughtfully. Allen concludes that there is a clear mandate to proclaim Christ as Savior for all humanity, but the spirit in which we do so must reflect conformity of our own hearts to the Good News. The last chapter, which considers aspects of the Bhagavad-Gita as interpreted by Simone Weil, is an effort to do some "Christian theology of other faiths." I found it a bit extraneous to the book's main goals, and less convincing. Many Christians actually meeting communities associated with other religions may see their errors more easily than their truths. But these two final chapters are more tentative, really forming a postscript to the main body of the work. Those interested in a sound philosophical apologetic should add this book to their libraries.

Reviewed by Walter R. Thorson, Professor of Chemistry, University of Alberta, Edmonton, Alberta, CANADA T6G 2G2.

NON-VIOLENCE: THE INVINCIBLE WEAPON? by Ronald J. Sider. Dallas, TX: Word Publishing, 1989. 118 pages, forward, end notes, bibliography, and index. Soft cover.

Sider is a professor of theology and chairperson of Evangelicals for Social Action. His interest in non-violence is based in part on first-hand experience. In January of 1985 he was with a bus load of Witness for Peace volunteers who broke a blockade by U.S.-funded contras of a northern Nicaraguan town, San Juan de Limay. His concern for social and political issues is also reflected in his books *Nuclear Holocaust and Christian Hope*, and *Rich Christians in an Age of Hope*.

Non-violence has two parts and five chapters. The first part reviews non-violent actions as far back as the Jews' successful effort to force Pilate to remove standards which had the emperor's likeness on them. He recounts many other historical non-violent actions, then discusses at some length the contributions of Martin Luther King and Mahatma Gandhi to current movements which embrace some of their principles. Part one concludes with detailed accounts of the role of non-violence in Nicaragua and in the Philippines.

In the introduction, Anthony Campolo predicts that American students will show ever-increasing willingness to take part in organized non-violent movements. In the second part, Sider uses his persuasive skills to enlist all interested Christians, including students, in the support of non-violence. That would include helping bring about Christian Action Groups which could serve as mobile non-violent forces. The key role of churches would be setting up and maintaining training camps for volunteers. He sees the church training 5,000 volunteers by 1995 for a worldwide Christian Peace Brigade. To facilitate this he spells out criteria and general principles of intervention applicable to the assignment of Christian Peacemaker Teams, or CPT's.

Sider is realistic in his expectations, observing that although non-violent teams have intervened successfully in many conflicts, they are not going to replace military forces, and they don't perform well in such arenas as guerrilla hit-and-run warfare. However, he cites as perhaps the greatest value of non-violent confrontations the world-wide media attention they attract. He gives this publicity much of the credit for the reluctance of Congress to continue supporting the contras. One "victory" he points to was the world-wide reporting of the kidnapping by the contras of 56 Witness for Peace volunteers. That, he feels, had a powerful effect on world opinion.

The book takes a highly controversial stance, and many readers will have difficulty keeping an open mind while reading it. It is challenging, informative, stimulating, and disturbing. It is well worth the time it will take to read.

Ralph C. Kennedy, Retired, John Brown University, Siloam Springs, AR 72761.

WOMEN IN MINISTRY: FOUR VIEWS by Bonnidell Clouse & Robert G. Clouse, eds., Downers Grove: Inter-Varsity Press, 1989, 250 pages, paperback.

All the contributors in this book have at least two things in common. All are thorough-going evangelicals and all seem to be committed to the inerrancy of scripture.

This book opens with a brief history of the subject. R. G. Clouse makes a statement that might cause some readers concern: "The Protestant attitude toward women ministers was based not so much on New Testament texts as on the medieval Catholic approach" (p. 10). The book then presents four views each of which is responded to by the other three contributors.

The traditional view is presented by Robert D. Culver. Culver sees feminism as the source of much of the confusion surrounding this subject. He sums up the traditional view by examining 1 Cor. 14:34-37 (Women are to keep silent in the churches) and 1 Tim. 2:8-15 (Women are to be submissive because Eve was created after and from Adam and was first to be deceived). The male leadership view is presented by Susan T. Foh and differs only slightly from the preceding one. Foh believes that subordination does not necessarily mean inferiority and that function can be separate from essence. In response to the male leadership position, Alvera Mickelsen makes the point that traditionalists are rather selective about which scriptures they consider universally binding (p. 118).

The plural ministry view is presented by Walter L. Liefeld. I find this view to be very close to the one to be examined next. However, Liefeld has a good summation of the problems, asks good questions, and makes the point that we should extend toleration and not misrepresent those who differ with us on this rather complicated subject.

The equalitarian view is presented by Alvera Mickelsen. Mickelsen calls our attention to the number of famous women who have served the cause of Christ and enriched the church throughout history. Traditionalists might feel that this portion of her argument confuses what "was" with what "should have been."

Mickelsen locates a shift in male vs. female roles in the church with the reign of Constantine, who has been a favorite "whipping boy" for historians and theologians. She believes the instructions about hair styles (I Cor. 11:10) involve the prevalence of homosexuality in early Corinth (p. 197). Her bottom line is: "to make 1 Timothy 2:12 a universal principle for all women for all time is clearly contrary to the principles taught by our Lord" (p. 204).

The afterword is written by Bonnidell Clouse who makes the point that whatever our personal feelings may be more and more women are becoming involved in ministry.

This is a worthwhile book, well written, and interestingly argued. You may not find all of the answers to this problem but certainly most of the questions are posed. I came to faith in a very traditional setting. I now attend a mainline, female ordaining church, and am married to a wonderful Christian lady who is an elder. It gives one pause. At least there are more serious questions to be wrong on today in the church than this one.

Reviewed by Ralph MacKenzie, MA Candidate, Bethel Seminary West, San Diego, CA 92115.

CONVICTED: New Hope for Ending America's Crime Crisis by Charles Colson and Daniel Van Ness. Westchester, IL, Crossway Books, 1989. 111 pages. Paper.

Because I know how little attention American Christians give to men and women behind bars, I am delighted when a book comes out that may attract the attention of a few more people. This book is basically an extended

sermon, a challenge to tackle America's crime problem by an approach which Colson and Van Ness label "Restorative Justice." Both of these men were trained as lawyers and both have been involved with Christian ministry to prisoners through Prison Fellowship, which Colson founded, and its criminal justice reform arm, Justice Fellowship. They have a good understanding of the subject and they present their ideas well.

The book does a good job of identifying problems with the criminal justice system and some of their roots in mistaken (unbiblical) views of human nature and justice, but I fear its suggestions may be simplistic. There are some—not Colson and Van Ness—who assert that all a criminal needs to do is to be converted to be rehabilitated. If that were true, the Apostle Paul would not have had to chide the recipients of his letters about their sexual immorality, thievery, falsehoods, etc. It takes more than conversion to rehabilitate—and I think it may take more than the prescription of this book to solve our crime problem, although I whole-heartedly agree with what Colson and Van Ness say needs to be done. They just haven't worked out the problem completely yet.

Their recommendations are rooted in the Scriptures and based upon the realities of the criminal justice system, yet I was uneasy about the impression left by the book that they have found the "solution." I was disappointed that the book was more a tract than a serious study. It did not address the nagging questions that pop to mind. Why haven't the authorities tried these concepts more? What attempts have been made that didn't work so well—and why? With our society as desperately pressed as it is by the current crime problem, the authorities have eagerly grasped at every straw that portends any hope for coping with this problem. But that larger goal was not the purpose that the authors had in mind. They are more interested in getting initial attention for the subject by a larger audience, one that might be put off by the mass of detail consideration that it will take to fully work through the problem.

I would encourage all Christians to consider what Colson and Van Ness have to say. It is important.

Reviewed by D. K. Pace, The Johns Hopkins University Applied Physics Laboratory.

THE POWER BEYOND by Jack Grazier. New York, NY: Macmillan, 1989. 302 pages, index. Hardcover; $17.95.

How many books are released with such a variety of endorsements? With *The Power Beyond* came positive comments by Roman Catholic healer Francis MacNutt, the senior editor of *The New Republic*, Willard Scott of the *Today* Show, Bob Schuller, and a professor at Fuller Theological Seminary. What kind of book could get rave reviews from such an assortment of people?

The subtitle of this book, "In Search of Miraculous Healing," designates the topic of the work; the authors search for supernatural healing. It is not long, however, before the author discloses his findings—he believes that supernatural healings can and do occur, and provides testimony from many individuals and from his own life as documentation of that fact.

The author is a self-described skeptic, a newspaper editor from Erie, Pennsylvania, who with the greatest of hesitance attended a healing service by Charles and Frances Hunter. The author and his wife sought the ability to have a child, which had eluded them and their doctors for some time. What they received was "Slaying in the Spirit" in which they were overcome during the healing service, falling to the floor. Soon afterward Mrs. Grazier became pregnant with their first child.

This is not a simple-minded testimony to the power of faith healers, as might at first be supposed, but rather a detailed analysis of faith healing in denominations from Roman Catholic to Pentecostal (even healing attributed to an African charm is mentioned). The analysis includes a probing of why some people are not healed, including the author's superb description of being hospitalized as a child in almost total isolation from parents and friends for two years. This wrenching account rules out superficial generalities—why was he not healed, in spite of many prayers including his own? The author does not provide a complete answer, but a partial tentative possibility.

Most healings are not instantaneous, says Grazier, but instead may occur gradually or in phases. An entire chapter (six) is given to how false healers con their audiences. It is admitted that sham exists, and that many claiming miraculous healings have been fooled or have fooled themselves.

Grazier considers some of the criticisms of faith healing carefully, particularly those offered by Louis Rose (a clinical psychologist) and William Nolen (a medical doctor), who concluded no genuine miracles could be found when those supposedly healed were evaluated afterward. Their arguments are considered in detail, and rebutted effectively. Instances of sham and psychological manipulation are contrasted with the many documented cases described in the Grazier book. The author concludes, "For the believer, no proof is ever needed; for the disbeliever, no proof is ever enough."

This is a very readable book, one difficult to put down (particularly if you believe in supernatural healing). I am tempted to say it is an inspirational book, but there are some very rough edges theologically (God swears at one point!). Little is said of the author's religious faith, and one almost gets the impression that the object of one's faith is relatively unimportant. The language, occasionally including expletives, also keeps me from thinking of it as a devotional book.

Many Christians and others will remain skeptical after reading this book, but those who rule out the supernatural intervention of God (and other spiritual beings)

should carefully examine the evidence that Grazier provides so they will at least be knowledgable in what they question. This may be one of the most credible presentations of the topic, partly because the author wholeheartedly advocates a view to which he has arrived apparently with great hesitancy.

Reviewed by Donald Ratcliff, Assistant Professor of Psychology and Sociology, Toccoa Falls College, Toccoa Falls, GA 30598.

BIBLE AND ETHICS IN THE CHRISTIAN LIFE by Bruce C. Birch and Larry L. Rasmussen. Revised and expanded edition. Minneapolis: Augsburg, 1989. 239 pages, Scripture index. Paperback; $12.95.

The rationale for this collaboration between a scholar of Old Testament and a Christian ethicist may be easily summarized on the basis of the authors' own conclusions: (1) "Christian ethics is not synonymous with biblical ethics"; (2) "the Bible is nonetheless formative and normative for Christian ethics." And the difficulties of the task implied by these propositions may be readily perceived from the authors' own examination of the various issues attending (and in a sense prior to) the use of the Bible in Christian ethical reflection.

With clarity and precision Birch and Rasmussen examine the central concepts which chart the moral life. They invite the reader to approach moral problems in the manner of the early Christian communities—to consider the moral life within the life of the community of faith. Indeed, their examination of the concept of moral agency and its communal context is reason enough to commend this book as an introductory text. It is lucidly written, with obvious sensitivity to students who are new to these issues.

There are, however, certain weaknesses of this book which should prompt teachers considering it to seek supplementary readings (Oliver O'Donovan's demanding *Resurrection and Moral Order* comes immediately to mind).

1. The authors express their appreciation for recent trends in theology and biblical studies, most importantly the hermeneutical theories associated with feminist and liberation theologies. Yet they fail to examine the many criticisms which may be made of these positions (e.g., a "hermeneutics of suspicion") and, in particular, fail to consider their implications for theology as a science.

2. The authors observe that our decisions are necessarily informed by a variety of extra-biblical and non-religious sources, most notably the natural, human and social sciences. And they recommend that we remain open to these authorities. Yet they fail to examine the claims of these secular authorities and so neglect the serious difficulties which attend them. How can such sources determine our moral obligation, for instance, to the human fetus or to the urban poor?

These difficulties are remarkable in view of the authors' professed confidence in the power of the Bible to form the Christian community and inform its actions. The implication is that Birch and Rasmussen are bound by certain assumptions of modern scholarship which prevent them from mending the divide between biblical studies and theology. Indeed, they advance their own proposals on the use of the Bible only by ignoring their warrant in theology. They object, for instance, to some theories of inspiration on the ground that they restrict the freedom of God; their concern is that such theories may blind us to the activity of God in the present. But how is divine agency intelligible? How does the God of the Bible speak to us today? Of course, there are no easy answers to these questions. The difficulties will only pass when the wall that divides theology from biblical studies is surmounted.

Reviewed by Gregory A. Bezilla, Department of Political Science, Columbia University, New York, NY 10027.

ALPHA & OMEGA: Ethics at the Frontiers of Life and Death, by Ernle W. D. Young. Menlo Park, California: Addison-Wesley Publishing Company, Inc, 1989. 2100 pages, index. Hardcover.

Medical ethics is focal point for the living out of the Christian faith in this imperfect and fallen world. The author of this book is Chaplain to the Medical Center and an Associate Dean of Memorial Church at Stanford University. He left South Africa, the land of his birth, in 1973 under ban by the government for his activities toward an integrated society. As Chaplain, Young has the unique opportunity of being a personal participant in many challenging case histories, the only way to develop a relevant and responsible perspective on medical ethics. This is not a theological treatment of the issues and there is little if any reference to the Bible, God, Jesus Christ or the Church. The author makes it plain that it is his purpose to appeal to reason, not to any special revelation, and assures the reader that he "need not be concerned that this book is a pretext for some thinly veiled evangelical enterprise or that it will claim to settle complex moral questions, once and for all, by appeal to revelation from some supernatural authority" (p. 12).

On the other hand the perspectives developed and discussed certainly have their base in a Christian worldview, and they serve to illustrate the great complexity in attempting to express such a worldview in the midst of the real problems of the real world. The Bible does provide us with guidelines, not simplistic solutions, but how to live out those guidelines in specific cases is frequently an enormous challenge. The evangelical Christian reader, who might not agree completely with the author's disclaimer concerning revelation, will still, therefore, benefit from the challenges summarized in this book. It is written for a general audience, with or without a medical background.

In Part I of the book, "Setting the Stage," the author lays the foundation for dealing with issues in medical ethics. In Part II, he considers issues particularly relevant to the beginnings of life, and in Part III those issues related to the end of life. Here are the basic topics discussed: genetic engineering, new reproductive technologies, abortion, perinatology, critical and terminal care, assisted suicide, and the AIDS crisis. In a final Part IV, the author considers the reasons that these medical issues tend to proliferate with time, and then the directions that medicine should be taking to help meet some of them. Young begins by rejecting the question, "Are we playing God?" as the most important one to ask, in view of the fact that in all areas of life human beings are constantly exercising their creativity and responsibility to do things that in past years might have been attributed to God alone. He prefers a perspective in which "The crucial question is not about limits to human inquiry and action, but rather about how responsibly to use what freedom we have."

A major emphasis of the book is the exposition and testing of the four major ethical principles that guide the physician and others involved in medical ethics: "*beneficence*, which requires the physician to do everything possible to preserve life; *nonmaleficence*, imposing on the physician the duty not to harm and to alleviate suffering; *autonomy*, which allows patients or their surrogates ... to be party to the decision-making process; and *justice, distributively understood*, which mandates the equitable allocation of our limited resource" (p. 28). These are certainly the major practical foci in a system of medical ethics based on a Christian worldview.

The author develops the challenge that is encountered in being faithful to all four of these principles in a number of different situations, including a number of case histories, to provide a sense of the personal and specific rather than only the abstract and general. One of the lessons learned is that "no moral principle can or should ever be absolutized ... But principles have to be balanced against one another" (pp. 36, 37). As part of a case history in the chapter on critical and terminal care, the author summarizes the variations that may be desirable: "Beneficence does not require physicians to attempt the impossible. Nonmaleficence does allow for the introduction of compassion and choice into an otherwise sterile and highly technological environment. And justice would not have been served by expending close to $ 2,000 a day on intensive care to prolong the process of Jerry's inevitable demise," which Jerry had already accepted and desired to realize.

It is unfortunate that the author continues the misleading convention, in speaking of the fetus, of asking whether or not the fetus is human or potentially human, and almost ignoring the fact that the actual issue is whether or not the fetus is or should be treated as if it were a human person. He is certainly not alone in this practice, and it is a constant source of amazement how many of our skilled and trained ethicists persist in confusing the issue with language misuse at this point.

This is an excellent book for a Christian study group, who would like to come to a better understanding of the intricacies of medical ethics in our day, to prepare for the possibilities of such issues in their own lives, and to trace out the implications of biblical guidelines in the actual situations encountered.

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

GOD THE ECONOMIST: The Doctrine of God and Political Economy by M. Douglas Meeks. Minneapolis: Fortress Press, 1989. xiii, 257 pages, indexes. Paperback; $12.95.

This provocative study is premised on the claim that "according to the faith shaped by the biblical traditions, the metaphor *Economist* is a decisive and fully appropriate way of describing the character and work of God." The author seeks to recover a premodern and biblical understanding of economy which may serve as an ideal by which to model our contemporary economy. Central to this premodern sense of economy, and absent in the author's view from Liberal and Marxist theories, is the notion of the household as the site of economy, the site of human livelihood. The community, as a household in its fullest and most extensive sense, should protect and provide for its members, not by the moral logic of the market or by the authority of the state, but by mutual care on the basis of shared understandings of human livelihood. Only when the church responds in this manner to her God will she prove responsible to the triune God who has revealed himself in the calling of Israel, in the coming of Jesus Christ, and in the life of the Apostolic community.

The most interesting and rewarding pages in this study are concerned with the seeming absence or distortion of God in contemporary economic theories. Meeks argues convincingly that there are implicit concepts of God, or rather idols, in both Liberal and Marxist economic theories and in the anthropological models on which they are premised. At the same time he criticizes contemporary moral and political theologies for neglecting the reality of the triune God in economic life. These omissions and distortions arise, he claims, both from some of the dominant doctrines of God in the Western traditions of Christianity and from an uncritical appropriation of secular economic thought.

The main weakness of this book is the absence of an articulated alternative to conventional economic and theological teachings, preferably one that is already evidenced in history, to give weight to its criticisms. Meeks is reluctant, apparently under the influence of feminist and liberation theologies, to commend any historical examples of the household as the center of stewardship and concern for neighbor. In the absence of any concrete example the author's vision may seem an

idealistic protest or a utopian fantasy. Indeed, this omission is all the more curious for his concern that the moral logic of the market and the authority of the state are threatening civil society (the institutions of church, family, school, and so on) as the seminary in which Christian morality is nurtured.

In spite of this shortcoming, this study serves as an engaging introduction to the theological issues attending to political economy. The author, a professor of systematic theology and philosophy at Eden Theological Seminary, is a translator and collaborator of Jurgen Moltmann, whose influence is evident in these pages. This book is well written and assumes no special knowledge of political economy on the part of the reader; and it is supported by extensive bibliographical references. Most of all, it is biblically informed and theologically astute in a manner which recommends it to all who are concerned with developing a Christian response to economic questions.

Reviewed by Gregory A. Bezilla, Department of Political Science, Columbia University, New York, NY 10027.

IS THERE A CHRISTIAN ETHIC? by Lucien Richard. Mahwah, NJ: Paulist Press, 1988. 138 pages.

The author, professor of systematic theology at Weston School of Theology, begins his introduction by raising the question of whether there is specifically a Christian morality or ethic. The author enters the debate from the Roman Catholic tradition.

Chapter 1 deals with the relation of faith and reason. The author discusses "autonomous morality and the centrality of Jesus Christ." He includes particular reference to the view of Joseph Fuchs as influenced by Karl Rahner, who regards all ethics as Christian ethics. He compares the argument that ethics is "the expression of grace as mediated historically in and through Jesus Christ." Charles Curran's thoughts are presented as representative of some American Roman Catholic theologians. Here the statement that Christian ethics is an historically based science is somewhat meaningless without some inkling as to the author's understanding of the word science. The author concludes that "the concept of natural law has been the single and most continuous trademark of the traditional Roman Catholic understanding of morality."

Chapter 2 discusses Protestant positions. A form of Christocentrism is found at the beginning of the Protestant Reformation. More recently, Karl Barth's Christocentrism prevented his acceptance of natural theology and of natural law. Emil Brunner sees God's commandment "as embodied in the very fabric of common human existence." A mediating position is found in the theocentric approach of the American James Gustafson who thinks that the foundation of ethics must be reason and not religion, an empirical grounding, a historical point of view. Paul Ramsey, on the other hand, has been a steadfast proponent of the Christian ethics of love. The author concludes that it is on the role of the ecclesial community in ethics that Roman Catholic positions differ from Protestant ones.

Chapter 3 considers "Christian Ethics and The Ecclesial Community." This chapter is concerned primarily with "dialectical theology and the role of the church in ethics." The view of Adolph von Harnack and of Alfred Loisy are compared. Rahner is cited for his belief that the "Incarnaton is . . . the fulfillment of the evolutionary process."

"Specific Christian Ethics and the Role of Tradition" is the subject of chapter 4. Memory and imagination interacting with narration contribute to the emergence of Christian identity: "Images are more fundamental than ideas," like lenses through which we catch a glimpse of God.

Chapter 5 considers Christian identity and Christian ethics which are considered "intimately related." It begins with the doctrine of creation, "a central concern of theology today." The author begins his thoughtful discussion with the meaning of *ex nihilo* in the story of creation as "an act not of self-expansion but of self-limitation." The author concludes, "The distinctiveness of Christian ethics can only be the consequence of an ongoing Incarnation."

This is interesting, but difficult reading. The theological jargon and numerous quotations slow the reader. The author's own train of thought is too frequently interrupted by quotations that may be taken out of context.

Reviewed by Raymond J. Seeger, 4507 Weiherill Road, Bethesda, MD 20816.

DISCOVERIES FROM THE TIME OF JESUS by Alan Millard. Batavia, IL: Lion Publishing Co., 1990. 189 pages. Hardback; $22.95.

You don't have to be an archaeologist to appreciate this book. True to its title, this book presents archaeological and historical discoveries which relate to life in the time of Jesus. These include manuscripts, coins, monuments, artifacts, tombs, building remains, and archaeological sites. Three of the most intriguing discoveries are the remains from the Roman attack on Jerusalem in A.D. 70 including the "burnt house," the timbers of the "Jesus boat" found by Lake Galilee and a synagogue found in a town evacuated on the Golan Heights. A shepherd throws a stone in a cave and the Dead Sea scrolls are found, an explorer takes a walk and discovers a first-century town, archaeologists excavate a theatre and find an inscription with the name of Pontius Pilate. These are just a few of the many fascinating topics presented in this book.

The book is beautifully prepared with clear print, a few black and white pictures, many color photographs,

and appropriately placed white spaces. And unlike so many current books, this one is reasonably priced with its expensive paper and eight by ten inch size. A subject index and a list of references make the book more useful. The titles of the book's six divisions indicate its contents: daily life, rulers of the land, religion, death and burial, writers, and gospel records.

This book is a sequel to *Treasures from Bible Times*. Millard is qualified to produce tomes on these topics. He has studied in many universities, worked in the British Museum, been a librarian, lived in Israel, lectured widely, and taken part in many excavations. He has produced a beautiful book that serves as a fascinating introduction to the many discoveries made in recent years dating back to the time of Jesus.

Reviewed by Richard Ruble, John Brown University, Siloam Springs, AR 72761.

DICTIONARY OF CHRISTIANITY IN AMERICA by D. Reid (ed.). Downers Grove, IL: Inter-Varsity Press, 1990. 1305 pages. Hardcover; $39.95.

This volume is described on the cover as "a comprehensive resource on the religious impulse that shaped a continent." Indeed, it is comprehensive with one million words comprising 2,400 articles and 1,500 biographical entries. The 400 contributors are made up of some names familar to readers of *PSCF* including Norman Geisler, Charles Hummel, Peter Kreeft, Martin Marty, David Moberg, and Mark Noll. The 1,305 pages of double-columns are printed on high-quality acid-free paper—a feature which will surely delight librarians. The thousands of cross-references make it easy to find your way around. A few charts and visual aids help clarify the prose.

A short description of this book's contents: "lore about North American religion and culture." Thus, the coverage extends beyond the borders of the United States and includes information about Canada. Topics covered range from Christopher Columbus to the Crystal Cathedral, church architecture to the electronic church, Jim Bakker to Karl Barth, Ronald Reagan to Sweet Daddy Grace.

ASA members will be drawn to articles on "Creation Science," "Darwinian Evolution and the American Churches," "Psychology and Christianity," "Science and Christianity," and the "Scopes Trial." In sum, this is a substantial piece of scholarship. It's a good volume to have on your shelf when you want to know who Meletios Metaxakis was and you don't know anywhere else to look.

Reviewed by Richard Ruble, John Brown University, Siloam Springs, AR 72761.

GOSPEL FICTIONS by Randel Helms. Buffalo, NY: Prometheus, 1990. 154 pages. Paperback; $13.95.

The thesis of *Gospel Fictions* is that the four canonical gospels "are largely fictional accounts concerning an historical figure, Jesus of Nazareth." This thesis is not original. Helms acknowledges his debt to the literary approach of redaction criticism. He mentions the prior work of B. H. Streeter, Reginald Fuller, and Norman Perin. However, the succinctness and lucidity with which Helms writes makes this topic available to those who might be put off by more elongated and opaque approaches.

Helms' discussion concentrates on the most familiar narratives in the gospels: the stories of Jesus' birth, His agony in the Garden of Gethsemane, His betrayal by Judas, His crucifixion, death, and resurrection. Helms' thesis follows this line of thought. Based on oral tradition, the gospel narratives were composed 40 years after the events they describe. Oral tradition is unstable and open to mythical, legendary, and fictional adornments. Therefore, the gospel narratives have been embellished by the imaginations and archetypal conceptions of cultural mythology of their authors.

Helms believes that the four canonical gospels are not actual historical accounts but rather imaginative literature written to advance their authors' viewpoints. The are not about Jesus but about their writers' attitudes about Jesus. In examining the language, sources, similarities, and differences of the gospels, Helms concludes that their purpose was not to describe the past but to affect the present. The gospels are contrived, creative interpretations of doctrine, supreme fictions in the service of a theological vision.

The whole argument turns on this question: "Did the writers of the New Testament record history or myth?" Helms' preference for the word "fiction" rather than "myth" may be a euphemistic one. However, if the New Testament is based on either fiction or myth, the result is the same. In writing his book, Helms sees his role as a literary critic, not a debunker. It was not his purpose "to articulate a quarrel with Christian faith, or to call the evangelists liars." However, anyone anyone who alleges that the gospel narratives are fiction has done both.

A discussion of some of the same issues found in *Gospel Fictions* occurs in Paul Barnett's book, *Is the New Testament History?* (Barnett's book was reviewed in *PSCF* December 1988.) Barnett writes "from the conviction that there is a sound historical basis to the New Testament." The main points Helms makes are rebutted in Barnett's book. Another recent book which addresses some of the same issues is Ronald Nash's *Christianity and the Hellenistic World*. The classic writings of J. Gresham Machen, especially *The Virgin Birth of Christ*, are also conservative approaches to this topic.

Helms, professor of English at Arizona State University in Tempe, is the author of several books and articles on literature, psychology, and biblical studies. *Gospel Fic-*

tions, originally published in hardback in 1988, was released in paperback two years later.

Reviewed by Richard Ruble, John Brown University, Siloam Springs, AR 72761.

THE SEARCH FOR CHRISTIAN AMERICA, by Mark A. Noll, Nathan O. Hatch, and George M. Marsden. Expanded edition. Colorado Springs: Helmers & Howard, 1989. 199 pages, index. Paperback; $8.95.

How Christian is America's religious past? Was early America a distinct source of Christian values? How much Christian action is required to make a whole society Christian? Is the "Christian nation" concept harmful or helpful to effective Christian action in society? What are appropriate and inappropriate appeals to the Bible's authority in the arena of public policy? How should history inform our response to the challenges of our age? For these questions, and many others, the authors, distinguished historians of American religion, provide a careful and sensitive study of the issues.

The early chapters of this study center on a series of case studies of the early Puritan settlements, the Great Awakening of the colonial period, and the early years of the American nation between the Revolution and the Civil War. The authors conclude from their analysis that "early America does not deserve to be considered uniquely, distinctly or even predominately Christian, if [one means] by the word 'Christian' a state of society reflecting the ideals presented in Scripture. There is no golden age to which American Christians may return." However, they are careful to stress that the historical record "justifies a picture of the United States as a singularly *religious* country," insofar as there has been much commendable Christian belief, practice, and influence in the history of the United States and the colonies which formed the new country. The history of America, the authors seem to suggest, reveals a tension between the ideals of religion and the errors of the religious.

In the second half of the book the authors examine the implications of their inquiry for Christian action in a secular society. They argue that a "careful examination of Christian teaching on government, the state, and the nature of culture shows that the idea of a 'Christian nation' is a very ambiguous concept which is usually harmful to effective Christian action in society." In place of this ideal they propose that Christians pursue a course of action that concentrates on building and strengthening institutions for which there is a biblical mandate, including schools, universities, and the family. In their emphasis on Scripture the authors are firm. No course of action, however popular or prudential, should persist against that which transcends culture and which is the rule of faith and life.

It is the conviction of the authors that responsible historical study is essential to theological argument and positive Christian action. A distorted or overinflated view of America as a distinctively Christian nation carries the temptation to national self-righteousness and the danger of national idolatry. It is on this point that the consequences of this inquiry become most apparent to the evangelical tradition in America. The uncritical appropriation of history for our own purposes prevents us from establishing an independent scriptural position over and against the predominant values of the culture, a position which allows for selective approval and disapproval of the culture's various values. In the end we cannot avoid the conclusion that these temptations also have been our tendency: we ourselves are often partly to blame for the spread of secularism in American life, in that we have been prone to identify public institutions and partisan policies with Christian ideals.

It is precisely this thoughtful attention to the dangers which attend the abuse and neglect of history that recommends this work to the college curriculum. Teachers of American religious history will find it to be a cogent survey text and an impressive bibliography of primary and secondary materials; teachers in other fields will find in it an exemplary analytical framework for approaching a variety of moral and political problems. This new edition, which remains unrevised from the first edition (published in 1983 by Crossway Books), is augmented by an afterword and bibliographic note by Professor Noll. The publisher is to be commended for making this outstanding resource available once again for classroom use.

Reviewed by Gregory A. Bezilla, Department of Political Science, Columbia University, New York, NY 10021.

Letters

Lacking in Logic . . .

I would expect of a series on the misuse of words that an essay beginning with the sentence, "These terms ['creation' and 'evolution'] are consistently misused to advance certain theological or philosophical positions" would not be yet another example of the genre, but it is. I don't think Richard Bube has really analyzed the logical consequences of his theological or philosophical position, as advanced in this essay. He states that "the Bible tells us *that God created;* the answer to questions as to *how* God created must be sought ... in the universe He has made." That's something like saying that "the Bible tells us to do justice, but the answer to the questions about *how* to do justice must be sought in this world's political systems." Perhaps from organizations such as the National Socialist Party, which sought justice for its own members at the expense of the lives of other people. God forbid. The Bible not only commands justice, it tells us something about how to implement justice: "You shall do no murder." Justice and murder are not antonyms, but they are surely not orthogonal.

Similarly, while creation and evolution are not antonyms, they too are not orthogonal. The Bible not only tells us *that* God created, it also tells us something about *how* God created. In the same chapter that tells me, "You shall do no murder," hardly two whole verses away, the Bible also reveals to me something about *how* God created: "in six days the Lord made heaven and earth, the sea and all that is in them." On what basis can I with intellectual integrity and humility before God accept the one and reject the other? Richard Bube does not tell us.

Professor Bube seems to be of the opinion that evolution is a proven scientific fact. I used to think so too, before I started graduate studies. Judging from his credentials, however, I doubt that Richard Bube is any more qualified to comment on the scientific merits of biological evolution than I am. When I was still in grad school, and continuing while I taught at the University, I began to ask of anyone I meet who has done advanced research in any field, if there is any evidence *from his own area of expertise* in support of evolution. I also look for the answer to this question in every published book or journal article I read. So far I get only vague references to other disciplines. Is that what Bube calls "authentic science"? The curious thing is that my own specialty (information science) does have evidence that impacts the theory of evolution, and it is quite negative. Tell me, Richard, what evidence does *your* discipline bring to bear on the subject?

Tom Pittman
P.O. Box 6539
San Jose, CA 95150

. . . Or Filled With Incisive Wisdom?

The September 1990 "Word Maze" on Creation and Evolution is superb. From his decades of accumulated knowledge, Professor Bube has distilled incisive wisdom. Because of his (non-physical!) stature, surely this will encourage some of the misguided to investigate a little better; to think a little harder; to be led by the Spirit into a little deeper faith.

Thank you for encouraging some of us who are continually buffeted by extremists on both sides—some of us for whom Christ is powerfully the truth, as well as the way and the life.

I could write a book to document his conclusions. (Perhaps one day I will.) As it stands, Professor Bube's summary is—in my opinion—flawless.

Bob Bergh
University of California, Riverside
Dept. of Botany & Plant Sciences
Riverside, CA 92521-0124

Comments on Fraser's "A Christian Perspective on Time"

I was disturbed to realize how far from the accepted position of the American Scientific Affiliation the article by Brian Fraser, "A Christian Perspective on Time" has strayed (*PSCF*, September 1990, p. 177). Although the article expresses the ardent concern of Fraser to bear a Christian witness in science, with which we can all agree heartily, his approach would cause us to lose most of the advances we have made in this direction. Permit me to call the following specifics to mind.

1. He cites the philosophical writings of several non-Christian scientists, but instead of presenting them as such, he makes the usual mistake of introducing their words by saying, "Quantum theory, for instance, presents this picture of reality." Quantum theory does nothing of the kind. We must be very careful to discriminate between the results of authentic science and the philosophical speculation of scientists which they may claim to be based on their science, but in reality is not.

2. He follows this set of quotations with the words, "Is this the kind of universe God would make for us?" This is not a meaningful question, for it is not likely that we finite creatures are able to ascertain what the almighty God should have done. If we wish to be faithful to Him and His creation, we must look at it and attempt to see,

through the pursuit of authentic science, how God has acted and is acting in His creation.

3. Meanings are not derived from science; human beings ascribe meaning to scientific results based on their own value systems, faith commitments and worldviews. Therefore it is not possible for us to deduce the appropriate structures of scientific models of the physical universe by reference to relational theological statements given to us by the revelation of God for a totally different purpose.

4. Fraser writes, "The Bible does not leave us wondering about the properties of God's physical creation." But that is exactly what the Bible does do. It tells us how to obtain the meaning and significance of those properties as they related to God and to us, but it tells us absolutely nothing about the detailed physical mechanisms that prove useful to us in attempting to describe God's continuing free activity in the physical creation. If we wish information about those properties, we must turn to authentic science.

5. Again Fraser writes, "Modern theoretical physics seems to want to change that clear picture." What any authentic theoretical physics wants to do is to provide models of reality that can be used to describe what is known and predict what is not yet known—nothing more, and nothing less. Anything else would fall into the category of pseudoscience.

6. Finally Fraser calls specifically for "a physics that is concordant with the values in the Bible ... a 'scriptural physics.' " Such a call is regrettably a call for pseudoscience. Any attempt to subject science to theology results in pseudoscience, just as any attempt to subject theology to science results in pseudotheology. I am sure that Fraser has the best of intentions, but the consequences of following this advice would be very unfortunate indeed.

Richard H. Bube
Dept. of Materials Science & Engineering
Stanford University
Stanford, CA 94305

Editor's Note

John R. Armstrong has written us requesting that we print the following correction related to his review of the book *Toward a New Philosophy of Biology: Observations of an Evolutionist* by Dr. Ernst Mayr, found on page 134 of our June 1990 issue of *Perspectives*:

> "A statement in my review of Dr. Mayr's book needs to be retracted. The author has written graciously to express profound admiration for the ethical teachings of Christ; he would therefore never suggest, as I wrote in my review, 'that Western culture must jettison its Judeo-Christian values in order to adapt and survive natural selection pressures.' Misreading pages 85 and 86 in his book, I had received the impression that he did: it was an honest error, not an intentional violation of the Ninth Commandment. Misunderstandings between Christians and humanists are tragic enough without my addition to potential innuendo. Now that I understand his actual position, the statement must be deleted, and my apologies extended to the distinguished zoologist."

John R. Armstrong
B1, 4515 Varsity Drive N.W.
Calgary, Alberta, Canada T3A 0Z8

The Mind/Body Debate

I would like to respond to several points in Dr. Dembski's rather substantial paper on the mind-body problem and cognitive science ("Converting Matter into Mind," December 1990 *Perspectives*). First, artificial intelligence (AI) and cognitive science are not distinguished in the paper but they are not the same. AI is not constrained to devise models that represent the findings of cognitive psychology and the neurosciences. Consequently, AI is not bound to model the mind of human beings, and largely does not attempt to. (Scan the titles of the MIT AI Lab bibliography; very few would have anything to do with mind modeling.) Perhaps "knowledge engineering" would be a better descriptor than AI in that the emphasis is on what can be done to automate that which we attribute to cognition, perception and actuation in humans and also animals.

For cognitive science, it would be a medieval saving of the phenomena to consider models of mind and simulation ("the exhaustive imitation of behaviors requisite for intelligence" [p. 208]) to be a spurious distinction. Whether Zenon Pylyshyn is correct or not about computation being the right model (if any), he is not merely attempting to imitate mental behavior. Some of the models of early science were inadequate in capturing the richness of that which they modeled, but were nevertheless an attempt to express its inherent rationality. Perhaps computation is the wrong form of representational theory for mind, but to settle for ways of accounting for mental activity without understanding its underlying rationality is to fail to do science.

In Hans Moravec's book, *Mind Children*, while some materialist presuppositions are evident (namely, references to Richard Dawkins' blind watchmaker), it is unfair to criticize his predictions of "Human Equivalence in 40 Years" (p. 68) on philosophical grounds since he gives a scientific basis for it. (Moravec is director of the mobile robot lab; Raj Reddy is director of the Robotics Institute.) He extrapolates computing power per dollar in time and estimates the amount of computation in the human brain. The issue here is not how information-theoretic analyses of neural behaviors relate to intelligence or personhood but instead how much is going on, by computational measure, in the brain. The curve fit is fairly good, and by 2030 A.D., 1014 bits/s (at $1,000) equals his estimate for brain activity. The real issue is whether, given this much computational power in a PC, it could be made to satisfy reasonable criteria of intelligence.

The more substantial point Dr. Dembski addresses, however, is the underlying mind-body assumptions of

Moravec's (and others) prophecies. Even Moravec, though showing no Christian leanings, tends to hold views similar to Donald MacKay in that he does not identify the person with a body but with a pattern—"the *process* going on in my head and body, not the machinery supporting that process. If the process is preserved, I am preserved. The rest is mere jelly" (p. 117). MacKay's view, like Michael Polanyi's ("Life's Irreducible Structure," *Science* 160, 1968) or my own ("The Mind-Brain Problem..." *JASA*, December 1986) is a multi-level or hierarchically-based explanation.

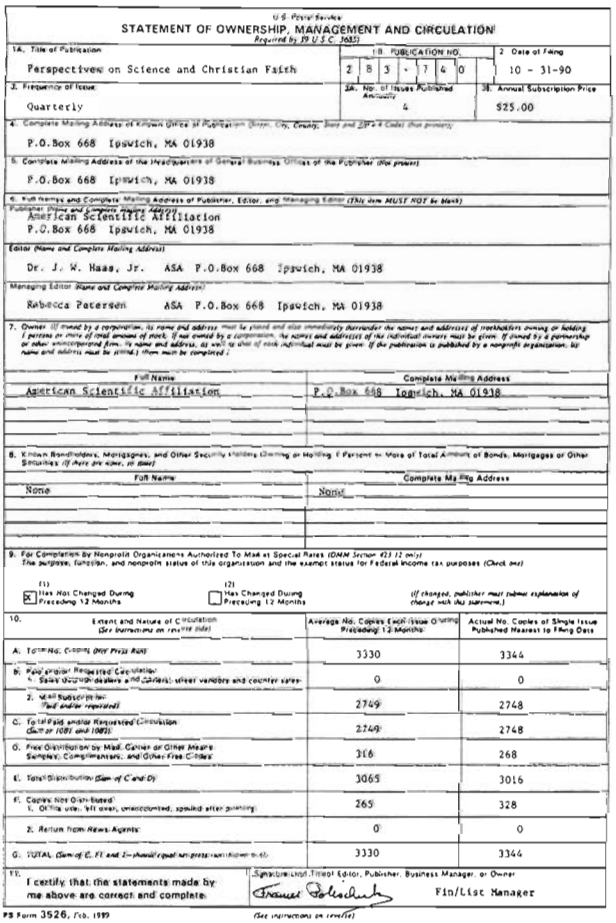
Though words such as *emergence* can be used to describe the relationship between levels, the description Dr. Dembski gives of *supervenience* does not accurately describe these multi-level views. Lower levels do not constrain higher levels in a way that results in reductionism. A particular higher level need not result from a lower level. The lower-level constraints are necessary but not sufficient to determine higher levels. A higher level is free to be organized within the constraints of the lower level, but these constraints by no means determine what the higher level is. Levels are related by the appropriate representational theory; a causal theory relates structural and behavioral levels but a functional or teleological theory is needed to relate behavior to function. Dr. Dembski's "semi-materialism" is not epiphenomenalism without causation.

MacKay's free will argument, based on self-referencing logic, addresses the Parable of the Cube problem and the relationship of God's (presumed) determination of the physical world without freedom of will, though the author did not address it. In my view, the mind is as real as the brain (or body), but does not exist in our space-time apart from it. Our awareness of our mind is independent of our knowledge that it is related to or sustained by our body. Consequently, we know in the most immediate, existential way of the reality of something that is not material in itself. But it does not necessarily follow that mind exists non-materially in the same way that matter exists materially. That is, why must we assume that our explanation for the soul (like our explanation for the body) is best understood according to a structural theory; why not a functional (or other) theory instead? Our understanding of the *ontology* of the mind/body is not independent of *epistemology*, for it is us as minds/bodies who are contemplating it. Sorting out epistemological distinctions between mind and body from ontological ones is central to the issue. That is why *states* or *patterns* of matter are as real as the matter that embodies them, while also being dependent upon them. This approach is not materialism, not semi-materialism, nor spiritualism.

The material body/non-material (spiritual) soul/mind dualism creates plenty of its own problems. How does the spiritual relate to the physical? Are they differentiable or simple substances? Is there a separate "spiritual physics" or are we to assume that spiritual/physical interactions are ultimately unknowable? By what mode do these spiritual entities exist? The problems posed by physical/spiritual dualism encumber us with the kind of questions that preoccupied the medievals (such as Aquinas) and Platonic Greeks. In contrast, the biblical or Hebrew perspective, such as from the Apostle Paul, viewed the soul (*nephesh*) as primarily his vitality, his life—never a separate "part" of man. (*I Believe in the Resurrection of Jesus*, George Eldon Ladd, Eerdmans, 1975.) Paul shrunk back from a non-embodied state of existence (2 Corinthians 5:4) in acceptance of full creaturehood as the way God upholds our existence in this age. Even in the age to come, we will be embodied "with a heavenly body." This is far from being a disembodied spirit or immortal soul, a doctrine of the Orphic sect, the spiritual ancestry of Plato. Instead, the biblical affirmation is that we will be a resurrected body in a renewed world.

Finally, after saying all this, I commend Dr. Dembski for challenging our thinking on this difficult topic. It is important and he has presented much with which to stir up our thinking in our common quest for knowing the truth about the nature of our existence.

Dennis L. Feucht
5275 Crown St.
West Linn, OR 97068



U.S. Postal Service
STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION
(Required by 39 U.S.C. 3685)

1A. Title of Publication	1B. PUBLICATION NO.	2. Date of Filing
Perspectives on Science and Christian Faith	2 8 3 - 7 4 0	10 - 31-90
3. Frequency of Issue	3A. No. of Issues Published Annually	3B. Annual Subscription Price
Quarterly	4	$25.00

4. Complete Mailing Address of Known Office of Publication (Street, City, County, State and ZIP+4 Code) (Not printers)
P.O.Box 668 Ipswich, MA 01938

5. Complete Mailing Address of the Headquarters or General Business Offices of the Publisher (Not printer)
P.O.Box 668 Ipswich, MA 01938

6. Full Names and Complete Mailing Address of Publisher, Editor, and Managing Editor (This item MUST NOT be blank)
Publisher (Name and Complete Mailing Address)
American Scientific Affiliation
P.O.Box 668 Ipswich, MA 01938
Editor (Name and Complete Mailing Address)
Dr. J. W. Haas, Jr. ASA P.O.Box 668 Ipswich, MA 01938
Managing Editor (Name and Complete Mailing Address)
Rebecca Pacersen ASA P.O.Box 668 Ipswich, MA 01938

7. Owner (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of 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.) (Item must be completed.)

Full Name	Complete Mailing Address
American Scientific Affiliation	P.O.Box 668 Ipswich, MA 01938

8. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages or Other Securities (If there are none, so state)

Full Name	Complete Mailing Address
None	None

9. For Completion By Nonprofit Organizations Authorized To Mail at Special Rates (DMM Section 423.12 only)
The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes (Check one)
(1) [X] Has Not Changed During Preceding 12 Months (2) [ ] Has Changed During Preceding 12 Months (If changed, publisher must submit explanation of change with this statement.)

10. Extent and Nature of Circulation (See instructions on reverse side)	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)	3330	3344
B. Paid and/or Requested Circulation: 1. Sales through dealers and carriers, street vendors and counter sales	0	0
2. Mail Subscription (Paid and/or requested)	2749	2748
C. Total Paid and/or Requested Circulation (Sum of 10B1 and 10B2)	2749	2748
D. Free Distribution by Mail, Carrier or Other Means Samples, Complimentary, and Other Free Copies	316	268
E. Total Distribution (Sum of C and D)	3065	3016
F. Copies Not Distributed: 1. Office use, left over, unaccounted, spoiled after printing	265	328
2. Return from News Agents	0	0
G. TOTAL (Sum of E, F1 and 2—should equal net press run shown in A)	3330	3344

11. I certify that the statements made by me above are correct and complete.
Signature and Title of Editor, Publisher, Business Manager, or Owner
Fin/List Manager

PS Form 3526, Feb. 1989 (See instructions on reverse)

What is the **American Scientific Affiliation?**

We are a world-wide organization of scientists who share a common commitment to the Christian faith (as expressed in our statement of faith, found on the attached application form). Since 1941, we've been exploring any area relating Christian faith and science, and making the results known to the Christian and scientific communities.

For subscribers, *Perspectives on Science & Christian Faith* is an exciting introduction to controversial issues . . .

For members, *Perspectives* is just the beginning:

1. Our bi-monthly *Newsletter* highlights the work and witness of ASA members, reports of ASA activities, employment notices, and much more.

2. Our *Source Book* offers key books on science/faith at special member discounts, audio and videotape programs, and a Speakers Bureau.

3. Our *National Annual Meeting,* as well as many regional meetings, offers unparalleled opportunities for personal interaction with Christian colleagues. Our *Member Directory* puts you in touch with other Christians in your field and/or geographic area.

4. Our national *ASA Commissions* are addressing issues in problem areas from Bioethics to Science Education.

5. Our vision for the future includes a proposed PBS TV series, further distribution of our publication "Teaching Science in a Climate of Controversy," which has already been sent to over 50,000 high school biology teachers, and a lay-language Science-Faith publication.

INTERESTED? *Let us tell you more . . .*

MEMBERSHIP INFORMATION

WHO MAY 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 mathematics, engineering, medicine, psychology, sociology, economics, history, etc., as well as physics, astronomy, geology, etc. Full member dues are $45/year.

Associate membership is available to anyone 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. Associate member dues are $40/year.

Full-time students may join as Student members (science majors) or Student associates (non-science majors) for discounted dues of $20/year. Retired individuals, parachurch staff, and spouses may also qualify for a reduced rate. Missionaries are entitled to a 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. Payment of a yearly fee of $45 entitles "Friends" to receive all ASA publications and to be informed about ASA activities.

Subscriptions to *Perspectives on Science and Christian Faith* only are available at $25/year (individuals), $35/year (institutions) and $20/year (students).

An ASA Membership Application is attached.

Especially for Canadians:

The Canadian Scientific and Christian Affiliation was incorporated in 1973 as a direct affiliate of the American Scientific Affiliation with a distinctively Canadian orientation. For more information contact:

Canadian Scientific and
Christian Affiliation
P.O. Box 386, Fergus, Ontario, NIM 3E2

MEMBERSHIP/FRIEND OF ASA APPLICATION/SUBSCRIPTION FORM

(Subscribers complete items 1–3 only)

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

1. Name (Please print) _____ Date _____

2. Home Address _____ Office Address _____

_____ _____

3. _____ Zip _____ _____ Zip _____

Telephone: _____ Telephone: _____

Permanent Home Address (if applicable): I would prefer ASA mailings sent to:

_____ _____ home _____ office

_____ Zip _____ I give the ASA permission to publish my phone number in the Member Directory _____ Yes _____ No

Place of birth _____ Date of birth _____

Marital Status _____ Sex _____ Citizenship _____

If married, spouse's name _____ Is spouse a member of ASA? _____ Eligible _____

ACADEMIC PREPARATION

Institution	Degree	Year	Major

Field of Study _____

Area of Interest _____

Recent Publications _____

_____

Church Affiliation _____

What was your initial contact with the ASA? _____

If you are an active missionary on the field or on furlough or a parachurch staff member please give the name and address of your mission board or organization.

Name _____

Street _____

City _____ State _____ Zip _____

I am interested in the aims of the American Scientific Affiliation. Upon the basis of the data herewith submitted and my signature affixed to the ASA Statement below, please consider my application for membership. I understand that I may become an *Associate* if I do not qualify as a *Member* at present.

Statement of Faith

I hereby subscribe to the Doctrinal Statement as required by the 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 Apostles' 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)

Amount Enclosed _____ Category _____

Comments _____

_____

****

OTHER RESOURCES AVAILABLE FROM ASA

"Teaching Science in a Climate of Controversy"—the 48 page booklet that is putting ASA on the map is available from the Ipswich office for:

$6/single copy; $5.00/2-9 copies (same address); $4.00/10 or more copies (same address).

SEARCH: Scientists Who Serve God, brings scientific questions to the attention of pastors and the Christian public by focusing on the work of Christians in science. SEARCH is included within the Journal, but also sold separately as a reprint for personal distribution or study use. For a free copy, send a stamped, self-addressed envelope to ASA, Box 668, Ipswich, MA 01938. Multiple copies are 15 cents each plus $1.50 postage and handling. Prepaid orders only, please.

Gift Subscription to *Perspectives on Science & Christian Faith.* Give the gift of challenging reading for $20/year.

Back Issues of *Perspectives on Science & Christian Faith*
(formerly the *Journal of the ASA*)—
1963 through present (a few issues are out of print)

1980–1982	$2.00/each + .50 postage
1983–1988	$5.00/each + .50 postage
1989–	$6.00/each + .50 postage

Please send the following materials:

#	Item	Price
______	______________________________	__________
______	______________________________	__________
______	______________________________	__________

Please enter gift subscriptions for:

Name ____
Address ____
City ______________________ State ________ Zip ________

Name ____
Address ____
City ______________________ State ________ Zip ________

Name ____
Address ____
City ______________________ State ________ Zip ________

Sign Gift Card ____________________________________

Number of Gift Subscriptions ______ @ $20/each Total ________

****
****

TOTAL ENCLOSED: __________

NAME ____

ADDRESS ____

____

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, USA or Canadian Scientific & Christian Affiliation, P.O. Box 386, Fergus, ONT N1M 3E2, CANADA.

Central California	Chicago-Wheaton	Delaware Valley	Eastern Tennessee	Guelph, ONT
Indiana-Ohio	New England	NY-New Jersey	North Central	Oregon-Washington
Ottawa, ONT	Rocky Mountain	St. Louis	San Diego	San Francisco Bay
South Central	So. California	Southwest	Toronto, ONT	Vancouver, BC
Virginia-Kentucky	D.C.-Baltimore	Western Michigan	Western New York	

INDICES to back issues of *Perspectives* are published as follows:

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).

An on-line **subject index** is available on 5 1/4" IBM-compatible computer disks from the ASA Ipswich office for a nominal cost. Please write for details.

Articles appearing in *Perspectives on Science and Christian Faith* are abstracted and indexed in the CHRISTIAN PERIODICAL INDEX; RELIGION INDEX ONE: PERIODICALS; RELIGIOUS & THEOLOGICAL ABSTRACTS, and GUIDE TO SOCIAL SCIENCE AND RELIGION IN PERIODICAL LITERATURE. Book Reviews are indexed in INDEX TO BOOK REVIEWS IN RELIGION. Present and past issues of *Perspectives* are available in microfilm form at a nominal cost. For information write: University Microfilm Inc., 300 North Zeeb Rd., Ann Arbor, MI 48106.

ARTICLES

BOOK REVIEWS