PERSPECTIVES on Science and Christian Faith

JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

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John Wesley and the Eighteenth Century *Therapeutic Uses of Electricity*

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

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Perspectives on Science and Christian Faith

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The field of science and religion is vibrant with research papers, books, conferences, courses, and controversies on many different topics. Today, the journals which publish on this theme have an overabundance of material. The competition for limited space places heavy responsibility on those who appraise these manuscripts.

In evaluating manuscripts we are dependent on the intellectual integrity of authors and peer reviewers. The latter are the unsung heroes who decide what the reader will see in *PSCF*. The task of the editor is to find reviewers who know the field and are able to grasp the positive and negative features of the work. I have sought (not always successfully) to choose reviewers for their different perspectives on a manuscript. Too much agreement among referees may be bad, or at best neutral. One would hope that editorial decisions to publish would be reasonably stable and that unsuccessful authors would be provided reasons why their work is not acceptable. Reviewers need to be balanced in their judgment and timely in their evaluation.

The literature on peer review is fragmentary and the process is in need of serious study. For now, although we think that some of the operating details might be substantially improved, we know of no feasible alternatives to the system.

Potential authors are generally appreciative of the comments of our reviewers. Writers need to take their critical comments seriously rather than countering that they have been misunderstood. Referees are there to detect the unproven assertion as well as the awkward phrase. Their task would be markedly eased if authors followed journal guidelines on length and had their work read by a non-specialist before offering it for publication in *PSCF*. Authors, reviewers, and editors must stand together in crafting articles that will attract and inform our readers. We owe our referees a hearty note of thanks.

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In This Issue

One of the more contentious issues among Christians involves the paradox between individual Christian pacifism, as taught in the Bible, and the temporal conflict between good and evil in its political and military manifestations. This is no idle issue for those who serve in the military, work on military technology, or who have legislative responsibility for national security. In our lead article, political scientist Mark T. Clark offers a historical study of Christian response and a proposal that he hopes "will yield a common ground upon which Christians can unite."

It has been commonplace to assume that evangelical clerics of the past were antagonistic or at best neutral toward the scientific enterprise. English evangelist and father of a worldwide church, John Wesley proves to be the exception. Two articles offer different perspectives on Wesley's interaction with science. The first indicates the many ways that Wesley incorporated scientific ideas in his sermons and biblical system. H. Newton Malony then focuses on Wesley's medical interests, especially his pioneering use of electrotherapy. These studies and others of recent years suggest that evangelical attitudes toward science follow a wider spectrum than previously believed.

In our first Communication, Tsukuba Science City residents Darryl Macer and Tim Boyle offer an analysis of the ways that Japanese scientists interact with Christianity. They have found "several times as many Christians among scientists and academics in Japan as there are in the public at large." Geologist William F. Tanner then examines some of the myths and challenges of the Genesis flood narrative.

We offer an unusually large number of letters reacting to articles in earlier issues. The Book Review section is headed by Richard Bube's Essay Review of Bruce Reichenbach and Elving Anderson's *On Behalf of God: A Christian Ethic for Biology.*

The Paradox of War and Pacifism

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This article examines the paradox of war and pacifism in the Bible, where paradox means apparent contradiction. The examination includes a review of the major positions Christians have taken on the paradox historically, from that of pacifism, to qualified participation, to the crusade. Borrowing from the natural and social sciences, as well as the science of biblical hermeneutics, a resolution of the paradox is put forth. Essentially, the resolution fits closest with the tradition begun by Augustine of qualified participation, known as the "Just War" doctrine. However, the resolution also offers a unique critique of the "Just War" doctrine, and lays the basis for further study.

One longstanding and troubling debate in the history of Christianity has been the dispute over the paradox of war and pacifism found in the Bible. From the earliest records to the many debates in the 1980s, Christians and non-Christians have debated whether a literal, or even metaphorical, reading of the Bible provides reasons for Christians to support, oppose, or qualify their participation in wars sponsored by the nation. Even today, national leaders, both Christian and non-Christian, publicly justify support for wars in terms familiar to many people that reflect this debate. Wars of defense are labeled "just" wars; wars of aggression are not.[1]

Given the nature of the positions adopted by different Christians, one would conclude that the Bible is contradictory on the issue of war and pacifism. Some scholars have even argued that the God of the Old Testament is a vengeful God, while the God of the New Testament is a loving God. I believe, however, that a careful reading of the biblical passages which treat the issues of war and pacifism (or nonretaliation, to be more precise), and a comparison of the results of this reading with the positions of many debate participants, reveal the issue to be more of a paradox than a contradiction, where paradox means an apparent contradiction. If so, then, the debate may be amenable to resolution.

I will attempt to bring forth the resolution in the following way. First, the essential positions of the paradox will be developed as fully as can fit in a short article; second, I will examine the historic resolutions that Christians have provided to the problem and offer a critique of each; and third, I will propose a new way to look at the problem which I hope will yield a common ground upon which Christians can unite.

The focus of this paper will be on the position Christians, as part of their larger society, can take. It will not address the specific concerns of Christians that live in a democratic versus a nondemocratic society. For the Christian, different problems emerge in a democratic society that do not appear in a nondemocratic one. The right to participate, the challenge of deciding when, where, and in what form Christian values ought to be made law, and the role of the Christian in a non-Christian government all deserve serious attention, but are not the emphases here. Obviously, such problems are not the lot of Christians in nondemocratic societies, and democracy is still, historically, a novel form of government, so one would expect that specific Christian solutions to these problems are still being worked out. Here, the focus will be narrowed to that which I hope all Christians in all societies can agree.

The Paradox

Pacifism: The principal support for the view that the Bible advocates pacifism comes from Christ's sermon on the mount. In Matthew 5:39-44, he states:

> But I say to you, do not resist him who is evil; but whoever slaps you on your right cheek, turn to him the other also. And if anyone wants to sue you, and take your shirt, let him have your coat also. And whoever shall force you to go one mile, go with him two. Give to him who asks of you and do not turn away from him who wants to borrow from you. You have heard that it was said, "You shall love your neighbor, and hate your enemy." But I say to you, love your enemies, and pray for those who persecute you.[2]

In addition, in Luke 6:27-35, from Christ's sermon on the plain:

> But I say to you who hear, love your enemies, do good to those who hate you, bless those who curse you, pray for those who mistreat you. Whoever hits you on the cheek, offer him the other also; and whoever takes away your coat, do not withhold your shirt from him either. Give to everyone who asks of you, and whoever takes away what is yours, do not demand it back. And just as you want men to treat you, treat them in the same way. And if you love those who love you, what credit is that to you? For even sinners love those who love them. And if you lend to those from whom you expect to receive, what credit is that to you? Even sinners lend to sinners, in order to receive back the same amount. But love your enemies, and do good, and lend, expecting nothing in return; and your reward will be great, and you will be sons of the Most High; for He Himself is kind to ungrateful and evil men.

This position seems extreme, especially to modern man. Seemingly, for any offense, the Christian is not to respond to even violent behavior directed at himself. If stolen from, the Christian is to offer even more than was taken in the first place. And rather than lend money to someone in need, we are, if called upon, to give it without expectation of return.

There are at least two fundamental assumptions to the pacifist position.[3] The first is that killing is always wrong. Murder is murder, whether in one's own society or another's society. If murder cannot be justified at home, then it cannot be justified in another country, whatever the reasons given for it. War ought therefore to be regarded as murder on a mass scale.

A second assumption of the pacifist position is that resisting evil with force is wrong. Evil should never be resisted with physical force, but with the spiritual force of love. The Christian and Old Testament Hebrew is never to retaliate, nor repay evil with evil, for vengeance belongs to God (Deuteronomy 32:35). Paul seems to confirm this in Romans 12:19-21.

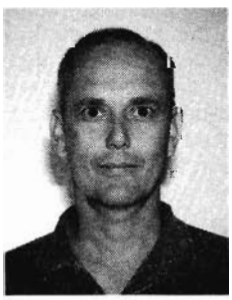
> Never take your own revenge, beloved, but leave room for the wrath of God, for it is written, "Vengeance is Mine, I will repay, says the Lord." But if your enemy is hungry, feed him, and if he is thirsty, give him a drink; for in so doing you will heap burning coals upon his head. Do not be overcome by evil, but overcome evil with good.

Private and public capacities do not alter the command that "Thou shall not kill." What a private citizen cannot do in his neighborhood, he cannot do in another country, simply because he holds political office and responsibility.

War: Support for the position that the individual has a responsibility to fight in wars directed by the leaders of his nation is more complicated. Generally, support is derived from a study of ancient Israel as depicted in the Bible and by New Testament injunctions to obey authority. In examining ancient Israel, we will examine three distinct periods: (1) the pre-Theocratic, (2) the Theocratic, and (3) the Monarchic. We will also consider the legitimacy of Gentile nations in waging war.

(1) Pre-Theocracy

The first record of war before Israel was formed is taken from Genesis 14, where Abraham battles four kings for abducting his relative, Lot. In the



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account, Abraham trained 318 men for battle, defeated the coalition of four kings, retook Lot, and stole all the defeated enemies' goods. Upon his return from battle, he is met by the king of Salem, and priest of God, Melchizedek. Abraham gives the king a tithe of his spoils of war and Melchizedek replies in verses 19-20: "Blessed be Abraham of God Most High, Possessor of heaven and earth; And blessed be God Most High, Who has delivered your enemies into your hand."Here, even before Israel is formed as a nation, God is depicted as not only sanctioning the war, but also as the source of victory for the yet-formed nation.[4] Later, in Genesis 15:16-21, God promises Abraham (still Abram) that the promised land will be given to his descendants after 400 (or so) years of slavery in Egypt. Genesis 15:16 says: "Then in the fourth generation they shall return here, for the iniquity of the Amorite is not yet complete." The prophecy is that after 400 years, the evil of Canaan would reach a peak, and they would be displaced.

(2) Theocracy of Israel

A theocracy is a unique form of government in which God himself is recognized as the supreme civil ruler, and his laws are taken as the statute book of the kingdom. Israel's theocracy existed from the period of Moses, Joshua, and the twelve judges, as the appointees and agents of Jehovah. Two types of warfare occurred during Israel's theocracy: wars of extermination;[5] and limited wars. Wars of extermination are often cited by non-Christians as a reason to reject the Bible. However, the wars of extermination were specific to the period when Israel was a theocracy.

The wars of extermination were also specific to the enemies Israel faced.[6] Typically, such a war required that Israel's soldiers put to the sword not only all the able-bodied men under arms, but all the men, both young and old, including the elders, sometimes the women and children, and even at times all the farm and domesticated animals, the crops and material possessions, and even the city itself.

One famous war of this type is the one recounted in the destruction of Jericho. Joshua 6:20-27 says:

> So the people shouted, and the priests blew the trumpets, and it came about, when the people heard the sound of the trumpet, that the people shouted with a great shout and the wall fell down flat, so that the people went up into the city, every man straight ahead, and they took the city. And they utterly destroyed everything in the city, both man and woman, young and old, and ox and sheep and donkey, with the edge of the sword. And they burned the city with fire, and all that was in it. Only the silver and gold and articles of bronze and iron, they put into the treasury of the house of the Lord. Then Joshua made them take an oath at that time, saying "cursed before the Lord is the man who rises up and builds this city Jericho; with the loss of his first-born he shall lay its foundation, and with the loss of his youngest son he shall set up its gates." So the Lord was with Joshua, and his fame was in all the land.

In this case, not only was everything except the riches destroyed, but a curse was put on the city so that no one would attempt to rebuild it. Other examples of such wars can be cited:

1. With the Benjamites of Gibeah, Judges 19:22-30.
2. With Jericho and Ai, Joshua 8:18-26.
3. With Makkedah, Joshua 10:28.
4. With Lachish, Joshua 10:32.
5. With Eglon, Joshua 10:35; Debir, verse 39; and all the cities of the Negev and Shephelah, verse 40.
6. In the northern campaign against Hazor, Madon, Shimron, and Achshaph, Joshua 11:11-14.

While these wars of extermination are difficult to come to terms with, they nonetheless were for a purpose. According to one biblical scholar:

> In every case the baneful infection of degenerate idolatry and moral depravity had to be removed before Israel could safely settle down in these regions and set up a monotheistic, law-governed commonwealth as a testimony for the one true God. Much as we regret the terrible loss of life, we must remember that far greater mischief would have resulted if they had been permitted to live on in the midst of the Hebrew nation. These incorrigible degenerates of the Canaanite civilization were a sinister threat to the spiritual survival of Abraham's race. The failure to carry through completely the policy of extermination of the heathen in the Land of Promise later led to the moral and religious downfall of the Twelve Tribes in the days of the Judges (Judges 1:1-3, 10-15, 19-23). Not until the time of David, some centuries later, did the Israelites succeed in completing their conquest of all the land that had been promised to the descendants of Abraham (cf. Gen.15:18-21).[7]

There were, of course, other wars fought during the theocracy of Israel, which did not involve wars of extermination.[8]

(3) The Monarchic Period

After Israel's rebellion against the theocracy, the nation was given the right to be ruled as a monarchy. The monarchy of Israel was different from other monarchies throughout history, in that God directly appointed Israel's civil rulers (a claim, of course, imitated by other monarchies) and appointed a prophet to keep the king's ambition in check (neither wanted nor allowed in other monarchies).[9] Perhaps the monarchy of David best illustrates the type of warfare waged by ancient Israel. Four distinct phases can be detected during David's lifetime:

1. **Cave of Adullam** (I Samuel 22:1-2). During this period, David was considered an outlaw and hunted by King Saul. Although presented the opportunity several times, David never attempted to take the life of the king.

2. **Civil War** (2 Samuel 2:8-5:5). After Saul died, the house of David fought the house of Saul for control of the throne.

3. **Defensive Wars** (2 Samuel 5:17-25; I Chronicles 18:1; 2 Samuel 21:15-22). Because of David's previous successes, the neighboring Philistines attacked Israel to preempt any aggressive moves. David brilliantly defeated them and removed the Philistines as a threat, but did not annihilate them.

4. **Empire Building** (2 Samuel 8:1-15; 12:26-31). David later conducts a series of aggressive wars by conquering the Moabites, Arameans, Ammonites, Edomites, and Amalekites, but does not eradicate them.

The monarchic period includes civil, defensive, and aggressive wars. Notably absent was a rebellion against the divinely sanctioned authority of King Saul.

Gentile Nations also Raised Up Through War

In a general statement from Nebuchadnezzar's dream, it is revealed that God rules over all nations, not just Israel alone. In Daniel 4:7, it is disclosed that "This sentence is by the decree of the angelic watchers, and the decision is a command of the holy ones, in order that the living may know, that the Most High is ruler over the realm of mankind, and bestows it on whom He wishes, and sets it over the lowliest of men." Twelve months later, Nebuchadnezzar's sovereignty is removed from him for a time (Daniel 4:32).

Other passages treat the issue of God raising up Gentile nations through war. In Daniel 1:1-2, God delivers Judah into Babylon's hands:

> In the third year of the reign of Jehoiakim king of Judah, Nebuchadnezzar king of Babylon came to Jerusalem and besieged it. And the Lord gave Jehoiakim king of Judah into his hand, along with some of the vessels of the house of God; and he brought them to the land of Shinar, to the house of his god, and he brought the vessels into the treasury of his god.

God is also depicted as setting up Cyrus the Great in Isaiah 44:28.

The New Testament confirms the authority given to men to establish and govern their respective societies. In Romans 13:1-2, Paul writes:

> Let every person be in subjection to the governing authority. For there is no authority except from God, and those which exist are established by God. Therefore, he who resists authority has opposed the ordinance of God; and they who have opposed will receive condemnation upon themselves.

These periods in the Old Testament reveal that war was waged and the responsibility of citizens was to fight for their nations. Moreover, wars were fought throughout Israel's history, under three separate forms of government, not just when it was a theocratic state. Further, by modern standards some wars were extremely vicious, involving the killing of all the inhabitants and destroying the enemy's possessions. And not only Israel, but even Gentile nations waged war, and God's hand was evident in bringing forth the victory, even against Judah.

Historical Attempts to Resolve the Paradox

Historically, Christians have adopted many positions on war. However, three broad positions encompass the range of choices made over the millennia: (1) pacifism, (2) qualified participation, and (3) the crusade. A brief examination of the three positions is warranted here.

(1) Pacifism:

The argument is that historically Christianity was originally pacifist.[10] After the closing of the New Testament canon, historians note that there is no evidence that Christians served in the Roman army. Indeed, in 174 A.D. the famous heretic Celsus reproached Christians for their failure to serve in the military and defend the empire.

> If all men were to do the same as you, there would be nothing to prevent the king from being left in utter solitude and desertion and the force of the Empire would fall into the hands of the wildest and most lawless barbarians.[11]

Between 180-313 A.D., both Eastern and Western Christianity repudiated Christians participating in warfare, though some were allowed military service if arms were not taken up. By the time of Constantine's conversion to Christianity (ca. 312-313 A.D.), however, some Christians participated in the army. After Christianity was legalized in 380 A.D., only a small minority of Christians have subsequently refused military service.

Modern pacifists tend to follow ... [the] idea that participation in warfare is incompatible with the commands of Christ.

Some elements of pacifism were reborn during and soon after the Reformation. Contemporary pacifists account for a small minority of Christians today. They include the Anabaptists and their continental descendants: the Mennonites, the Amish, the Hutterites, the Swiss Brethren and the Quakers. All but the Quakers believe not only in pacifism, but also in complete social and political separation from the society. Although they do not deny the state the right to bear the sword, the separatists believe that Christians ought not to participate in the government at all. The Quakers, on the other hand, believe in participation, but are not allowed to take up arms, lest they resort to a "sub-Christian" ethic. But by suffering and patience, the Quakers are enjoined to reform the society in which they participate.

There are several reasons and traditions for their pacifism. Some believe that participation in war is completely incompatible with the commands of Christ. Tertullian was noted to have asked, "If we are enjoined to love our enemies, whom are we to hate? If injured, we are forbidden to retaliate."[12] Origen stated another reason. He believed that Christians, by their prayers and disciplined lives, are of more use to kings than are soldiers.[13]

Early on, there were other reasons to avoid military service. Christians during the early Roman Empire needed little reminder that they suffered persecution at the hands of the Empire. By not serving in the army they avoided additional persecution. Since the army did most of the persecuting of Christians, Christians would naturally be reluctant to enlist. Moreover, many early Christians believed that the coming of the Lord was very near and they did not want to be in the position of defending the very army that Christ would return to destroy. Finally, any government service involved some compromise with idolatry. Indeed, the very reason for much of the persecution of the early church was due to Christians who stubbornly refused to acknowledge Rome's pagan gods.

Modern pacifists tend to follow more closely the first idea, that participation in warfare is incompatible with the commands of Christ. Since official persecution (with minor exceptions) ceased by 380 A.D. there have not been the same historical reasons to justify pacifism. Perhaps the best expression of the sentiment of contemporary pacifism is found in a Dunker tract of about 1900 that notes:

> in support of the principles of nonresistance the following scriptural facts: Christ is the "Prince of Peace" (Isa. 9:6). His kingdom is "not of this world" (John 18:36). "The weapons of our warfare are not carnal" (II Cor. 10:4). We are to "love our enemies" (Matt. 5:43). We are to "overcome evil with good" (Rom. 12:21). We are to "pray for them which despitefully use us and persecute us" (Matt. 5:44).[14]

(2) Qualified Participation (The Just War Doctrine):

The most longstanding and widespread attempt to resolve the paradox follows the tradition of the "Just War" doctrine. The "Just War" doctrine was first developed by Augustine (354-430), who became Bishop of Hippo. Until his conversion to Christianity, Augustine was steeped in pagan philosophy, especially neo-platonism and Manichaeism. Against the attack by pagan philosophers that the sack of Rome was due to the moral corruption of Christianity, Augustine penned his famous defense, *The City of God.* In it, Augustine was the first to articulate the notion of the type of war Christians can participate in. Essentially, he wrote that for a Christian to participate in a war, that war had to be deemed as "just." Perhaps the best summary statement of Augustine's development of the "Just War" principles is the following:

> The just war is to be fought under the authority of the state, and is to limit its goals to the restoration of justice or the preservation of peace. Moreover, the just war — in order to be just — must be a last resort, entered into only after all methods of solving disputes non-violently have been exhausted. Further, the just war must be fought "justly," that is, with special care taken to protect non-combatants,

and with the level of violence strictly limited to the minimum necessary to accomplish the goal of "justice," that is, the restoration of peace or the preservation of justice.[15]

[Augustine] wrote that for a Christian to participate in a war, that war had to be deemed as "just."

With modifications as to intent in war added later by Thomas Aquinas, there are seven generally accepted tenets of the "Just War" doctrine. They are divided into two types of arguments. The first, *jus ad bellum*, are the principles that establish the "justness" of the war itself; the second, *jus in bello*, are the principles that establish just conduct in the war itself:

Jus ad bellum (Justness of War):

(1) **Competent authority:** A war must be declared by politically responsible authorities and not by private individuals.

(2) **Probability of success:** A war should not be undertaken if there is no obvious hope for success.

(3) **Last Resort:** A war must be a last resort after sincere efforts have been made to resolve the controversy peacefully.

(4) **Just Intent:** The object of a war must be peace and reconciliation and not the unlimited destruction of the enemy state.

(5) **Just Cause:** The war must be an act of defense in response to armed aggression.

Jus in bello (Justice in war):

(6) **Proportionality:** The good brought about by a war should outweigh its evils in cost and destruction to both sides and the means used should be proportional to the harm caused.

(7) **Discriminate means:** Military actions should not be waged that directly intend to take the lives of noncombatants (i.e., civilians or innocents).[16]

Throughout history, some have sanctioned the "Just War" doctrine, while others have condemned it. Some have used it to support almost every war their country has fought in, and others have used it to oppose every war their country has fought in. From the time of Augustine until approximately 1000 A.D., most Christian soldiers were required to do 40 days of penance for fighting in a war and killing enemy soldiers, however "just" the war was declared. After Thomas Aquinas, a Christian soldier was given the responsibility to not fight in an unjust war.[17]

Modern day application of the "Just War" doctrine has led to many problems with the advent of nuclear weapons. In 1983 the Catholic Bishops issued a paper that renounced nuclear war, but allowed for the interim acceptability of nuclear deterrence in the pursuit of a better means of preserving the peace.[18] In 1986, the Methodist Bishops went further and not only renounced nuclear weapons as well as nuclear deterrence, but also renounced defenses against nuclear weapons, specifically the U. S. Strategic Defense Initiative.

Perhaps the complexity of the problem of reconciling nuclear deterrence and the "Just War" doctrine may be best summed up by a provisional study document of the World Council of Churches, issued in 1958, that stands to this day:

> Christians must never consent to [the] use [of nuclear armaments] in all-out war... We are agreed on one point: This is that Christians should openly declare that the all out use of these weapons should never be resorted to. Moreover, that Christians must oppose all policies which give evidence of leading to all-out war. Finally, if all-out war should occur, Christians should urge a cease fire, if necessary, *on the enemy's terms*, and resort to non-violent resistance. *We purposely refrain from defining the stage at which all-out war may be reached* (emphasis added).[19]

Such a position is not likely to simplify the problem or help Christians make decisions during a crisis about whether the war is just or not, nor whether to support nuclear deterrence in peacetime or not. Indeed, it is more likely to add to the confusion that already exists.

(3) Crusade:

A third alternative in the resolution of the paradox that Christians have attempted (primarily in the middle ages) has been the crusade. The crusade is fundamentally different from the above two positions. According to one scholar:

> A crusade was to be fought under the authority of the church or of a charismatic religious leader, but not by the state itself, although it might potentially be conducted by a theocratic state. The goal of the crusade was not to be limited to restoring peace or preserving justice; the goal instead was

> to uphold, preserve, or expand the dominion of the church itself against the threats, real or imagined, of its enemies.[20]

The crusades began first in the late eleventh century at the instigation of the Byzantine Emperor Alexius Comnenus (1081-1118) in an attempt to regain territory lost to the Seljuk Turks. But Alexius lacked workers. He appealed to Pope Urban II with some arguments for help that remain to this day unknown to historians. At the Council of Clermont in 1095, the Pope gave an eloquent speech in favor of a crusade against the infidels. The reasons were probably twofold: first, because many Christians were irked by Turkish (i.e., Muslim) control over Jerusalem; and second, because Alexius promised to reunite Eastern and Western Christianity under the authority of the Pope.[21] This speech gave Europe its first ideology of expansionism.

The appeal was accepted by a wide array of people in Europe. Not only the aristocracy, but also the townspeople and the peasantry accepted the rationale for a crusade for many reasons, not the least of which was the horrible living conditions in Europe at the time. But the crusades had a downside to them; principally, the fact that the character of the armies sent on the crusades were never very "Christian" by any standard. Beginning with the first crusade and throughout subsequent ones, and despite the appeals of priests and the nobility, many in the peasant army sought to purge themselves for this "holy" mission by killing and torturing the Jews of northern Europe as a prelude to waging war on the Muslims.[22] Few of the crusaders ever made it to the holy land, and those who did left little by way of improvement either to the situation in Europe or in Jerusalem. The rationale for the crusades was extreme, and the results were too. Today Christians have little tolerance for this form of resolution to the paradox of war and pacifism.[23]

Resolving the Paradox

Historical attempts at resolving the paradox have taken three forms. However, in practice, contemporary Christians for the most part reject the crusade. Of the two remaining resolutions, pacifism and qualified participation, the vast majority support the latter. One of the problems with the "Just War" doctrine, however, is that it does not seriously address the concerns of the pacifists, especially with respect to Christ's sermon on the mount. One of the principal problems of the pacifist position is that it fails to address the concerns of the "Just War" adherents that Christians are to obey authority and participate in the life of the state. The two extreme positions, however, are the pacifist and the crusader. As will be demonstrated below, they are based on similar logical fallacies and abuse of biblical hermeneutics. Once corrected, the paradox can be resolved.

The biblical principles of warfare are for the state and the biblical principles for nonretaliation are for the individual.

The historical attempts at resolving the paradox of war and pacifism are similar in some respects to how Christians have historically resolved other paradoxes.[24] However, borrowing from the tools of good biblical scholarship (hermeneutics) and the methodology of the natural and social sciences, there are certain methodological tools for addressing the problem of paradox resolution. Of the five principles or tools available, two are important here:

1. Establish the true frame of reference, or point of view, of a given passage or passages; and

2. Establish the correct definition of a given system or systems under consideration.[25]

The first thing to note about all passages that treat the issue of the justifiability of war, do so with regard to the state, not the individual. All passages that treat the principles of nonviolence (nonretaliation) do so with respect to the individual, and not the state. The point of view and the systems under consideration are different in each case. In other words, the biblical principles of warfare are for the state and the biblical principles for nonretaliation are for the individual. In the former, the system in view is the state system, that is, the system of states in the international community and their relations among one another. In the latter, the system in view is the individual within the state and their relations among one another within that system.

The problem one encounters when applying the morality of nonretaliation (the morality given to individuals) to the morality of the state is what is called in political theory the "cross-level" fallacy.[26] Just as in the natural sciences, one must regard the paradox of light as both a particle (photon) and energy (wave — electromagnetism), yet not impute the results of one study onto the other, so also it is important to separate the systems under consideration. With two different systems under consid-

eration, we should regard those passages that treat one without application to the other, unless specifically warranted by scriptures — i.e., the morality or right to warfare may be okay for the state against other states, but not for individuals against one another within the state, and the morality of nonretaliation may be okay for the individual within the state, but not for the state itself.

Several theorists have identified that the state system is fundamentally different from the system of individuals within a state, and each has different conditions.[27] Within a state, there exists the condition of *authority*. Among individuals, when confronted by a wrong, the victim can appeal to the governing authorities for a just resolution, so long as the wronged individual's morality is nonretaliation. There is scriptural support for the condition of authority within a state, and the right of the state to execute vengeance on behalf of individuals. According to Paul in Romans 13:1, 3-4:

> Let every person be in subjection to the governing authorities. For there is no authority except from God, and those which exist are established by God... For rulers are not a cause of fear for good behavior, but for evil. Do you want to have no fear of authority? Do what is good, and you will have praise from the same; for it is a minister of God to you for good. But if you do what is evil, be afraid; for it does not bear the sword for nothing; for it is a minister of God, an avenger who brings wrath upon the one who practices evil.[28]

Violence as a way of life is abhorred.[29] But while the individual should not retaliate, he is allowed to appeal to the authorities for a just settlement. In Acts 25:9-11, Paul uses the appeal process when confronted with an unjust charge against him:

> But Festus, wishing to do the Jews a favor, answered Paul and said, "Are you willing to go up to Jerusalem and stand trial before me on these charges?" But Paul said, "I am standing before Caesar's tribunal, where I ought to be tried. I have done no wrong to the Jews, as you also very well know. If then I am a wrongdoer, and have committed anything worthy of death, I do not refuse to die; but if none of those things is true of which these men accuse me, no one can hand me over to them. I appeal to Caesar."

Here, Paul does not deny the state the authority and the right to execute him if he had done evil. But he also avails himself of the governing authorities.

For the international system, there exists no higher human authority than the state itself. In other words, if a state is wronged by another state, there is no higher authority to which it may appeal. Technically, this condition is called *anarchy*. Anarchy within the system of states compels states to seek self-help methods for redressing grievances, such as diplomatic remonstrances, embargoes, coalitions, alliances, and the ultimate form, war. The history of nations engaging in warfare, empire building, counter-hegemonic coalitions, and even border disputes testifies to the effectiveness of this act in precluding the rise of a universal tyrant. Nationalism today remains the principal force in the fractionalization of international politics. The downfall of the Soviet Union, in addition to the many empires throughout history, is due in no small measure to this phenomenon.

While the individual should not retaliate, he is allowed to appeal to the authorities for a just settlement.

The Bible posits God as the source for the distinct conditions at the level of the state and the international system. As noted above, authority was established within a state to restrain evil, and the individuals within the state were given a morality of nonretaliation and the right of appeal to the governing authorities to execute vengeance. For the international system, Genesis 11 depicts God as dividing people into different nations, tribes, and tongues also for restraining evil, this time as unlimited tyranny. In Daniel 10:20-11:1, God's angels are shown to be engaged in human warfare to prevent the domination of the world by one power. The purpose for such engagement is explained in Zechariah 1, for there is no peace for God's people when the unbelieving nations are at peace with one another. And in Matthew 10:34, Jesus Christ is depicted as coming to bring war, not peace, for war will not cease until unbelief ceases.

Earlier it was shown that the Old Testament supports the right of states to engage in warfare. While the New Testament writings (and the Old) emphasize individual conduct within a state, neither Christ nor any of the apostles repudiated the right of states to engage in war. In Luke 14:31, Christ acknowledges the fact of kings engaging in warfare, without either condoning or condemning it: "Or what king, when he sets out to meet another king in battle, will not first sit down and take counsel whether he is strong enough with ten thousand men to encounter the

one coming against him with twenty thousand?" Further, Christ predicts the necessity of future wars (again, without either condoning or condemning them) as a natural condition and a prelude to end-times prophecies in Matthew 24:5-7:

> For many will come in My name, saying, "I am the Christ," and will mislead many. And you will be hearing of wars and rumors of wars; see that you are not frightened, for those things must take place, but that is not yet the end. For nation will rise against nation, and kingdom against kingdom, and in various places there will be famines and earthquakes.[30]

A stronger support emerges from John 18:36, where Christ answers Pontius Pilate by saying, "My kingdom is not of this world. If My kingdom were of this world, then My servants would be fighting, that I might not be delivered up to the Jews; but as it is, My kingdom is not of this realm." Coupled with Matthew 26:53, where Christ claims that he could readily call forth some 12 legions of angels at a moment's notice, the *right* to fight is not disputed, but the *time* and *place* are. According to Zechariah 14, Psalm 149, Joel 2, I Thessalonians 3:13, and Revelation 19, Jesus Christ and all the raptured saints will return to exterminate the reprobates. When his kingdom is of this world, he will fight, but not until that time.

Neither Christ nor any of the apostles repudiated the right of states to engage in war.

In Matthew 8:10 Christ praises the faith of a non-Jewish believer, who was a centurion in the Roman army. More importantly, Christ did not tell the centurion that a condition of discipleship was that he not engage in military activities (similarly, another centurion, Cornelius of Caesarea received high praise for his faith, in Acts 10). John the Baptist was confronted with a more acute opportunity to inform believers that military service was anathema to discipleship, were that the case, in Luke 3:14:

> And some soldiers were questioning him, saying, "And what about us, what shall we do?" And he said to them, "Do not take money from anyone by force, or accuse anyone falsely, and be content with your wages."

Rather than explicitly instructing them to get out of military service, or opt for noncombat duty in the service, John instructs them to act justly within their sphere of service, and to not abuse their position of power. Indeed, John's instructions will be considered later as a crucial component of how Christians ought to behave in warfare.

Paul uses military service frequently as an analogy for the Christian way of life. For example, in 2 Timothy 2:3-4, Paul says: "Suffer hardship with me, as a good soldier of Christ Jesus. No soldier in active service entangles himself in the affairs of everyday life, so that he may please the one who enlisted him as a soldier." In this case, as in the many others Paul uses, two assumptions emerge: (a) that military service was well known and understood, for the utility of an analogy loses its force if not; and (b) no qualification was given to military service in the analogies. If military service, with the implication of potential for fighting in a war, was objectionable to the Christian way of life, one would expect Paul to qualify the analogy somewhat. Paul, and the many other authors, never used an objectionable analogy. Indeed, when some behavior or action is detestable, the most frequent way to illustrate it is to compare and contrast the godly versus the ungodly behavior. Yet nowhere is military service deemed ungodly in the Bible. Indeed, the role call of honorable godly service is given in Hebrews 11:32-34, where strong, godly believers are intimately associated with distinction in warfare:

> And what more shall I say? For time will fail me if I tell of Gideon, Barak, Samson, Jephthah, of David and Samuel and the prophets, who by faith conquered kingdoms, performed acts of righteousness, obtained promises, shut the mouths of lions, quenched the power of fire, escaped the edge of the sword, from weakness were made strong, became mighty in war, put foreign armies to flight.

Critique of Positions Held

There are several problems that emerge from the study of the various positions adopted by Christians over the centuries. Each will be taken in turn. The principal problem with the crusade is that the church incorrectly identifies itself with the function of the state, and a theocratic one at that. Under Israel's theocracy, and to a lesser extent with it as a God-directed monarchy, there is a one-to-one correspondence between the spiritual health of the people and the physical well-being of the nation. In other words, a proposition and its corollary are warranted for the nation of Israel, particularly as a theocracy: *spiritual health equals national health,* and its corollary, *spiritual warfare equals physical warfare* (i.e., combat).

Since the New Testament, however, Christ has declared that his kingdom is not of this world. Unlike Israel, where one nation was called out from among the many nations of the earth to be the caretakers of God's word and to be his missionaries to the world, since then only a small minority of believers are called out from every nation, tribe, and tongue (Revelation 5:9; 14:6). There is more focus on the individual rather than on group or national identity (Acts 10:35). Because individuals in this age comprise this "holy" nation (I Peter 2:9), and Christ's kingdom is not of this world, *spiritual warfare does not equal physical warfare* (see Ephesians 6:12). It is therefore a mistake, and not a benign one, to misidentify the cause of the church[31] with that of the state. Crusades cannot be justified by scriptures.[32]

The principal problem with the crusade is that the church incorrectly identifies itself with the function of the state, and a theocratic one at that.

Pacifism, on the other hand, misidentifies the morality of the individual with the justification for (or morality of) the behavior of the state. It too, though for different and more benign reasons, commits the cross-level fallacy by generalizing from individual to collective morality and violates principles of biblical hermeneutics. And the argument from historical evidence that early Christians were pacifists is weaker upon closer examination than at first glance.

Many non-Jewish believers, one can infer, were in the Roman military, and some were recorded in scriptures, yet no command was given them to leave military service. Neither Christ, nor John the Baptist, nor any of the Apostles, when given the chance, told (or implied to) such believers that military service was incompatible with discipleship or the Christian way of life. Typically such believers were praised for their faith and, in only one case, were enjoined to act justly in their profession and be content with their wages.

As to the historical records for Christians in military service, it is not surprising that no records have been found, for at least two reasons. First, in the early period, most of the Christians lived in the Middle East and not in Rome. Moreover, Christianity was a religion of the minority for some time and records kept from that period are not as likely to remain as those primarily from the majority religion. Second, and more importantly, as Christianity spread to Europe and Asia, the Roman Empire increasingly made persecution official policy under the various Caesars for anyone who would not publicly worship the Roman gods.[33] Indeed, so scarce are the historical records that there exists only one recorded statement of official persecution, despite its widespread historicity: "Punishments were also inflicted on the Christians, a sect professing a new and mischievous religious belief."[34]

Political separation, a concomitant proposition of many contemporary pacifists, is a separate problem and will not be treated here. However, there is reason enough for separation or dissension in certain cases, and many early Christians availed themselves of it. The rule seems to be that the Christian has the right, indeed the obligation, to refuse to obey a law that would force him into an ungodly act (for example, as a condition of service in the Roman military, the obligation to worship Roman gods; or in the former Soviet Union, the requirement to sign an oath of atheism). Ungodly laws of *compellence*, as opposed to laws of *allowance* (i.e., laws that permit ungodly activity) require the Christian to dissent from obedience.[35] To extend this right of dissension to the entire sphere of citizenship, however, seems strange.

Pacifism ... misidentifies the morality of the individual with the justification for (or morality of) the behavior of the state.

There are several problems with the "Just War" doctrine that are not as easily susceptible to resolution, but nonetheless deserve some attention. First, implementing the "Just War" doctrine as it now stands requires superhuman wisdom. No Christian will ever have enough facts, or time, to know all the evidence regarding a country's decision to go to war. At the highest levels, decisions to go to war are shrouded in ambiguity and much more will that be the case in the society at large. Second, the "Just War" doctrine sets a standard that was not always followed by Israel under God's direction, either as a theocracy or as a monarchy. It is difficult to see how it can be applied to any lesser system of government. And third, nothing man can do is fully just, but rather under sin (even the study of theology). Finally, perhaps the most important reason

to re-evaluate the "Just War" doctrine, is that to a great extent most nations go to war for reasons other than the "justness" of it. If justice were the sole determining criterion, given our limitations, more, not less, wars might be fought.[36]

Of the principles of *jus ad bellum*, several are problematic from a scriptural standpoint. The one most supported by scriptures is that the war must be declared and conducted by *competent authority*. The sweep of scriptures supports the authority of government as an instrument to keep evil in society in check. When authority breaks down, as it has in Lebanon and in Somalia, the resultant anarchy allows for the emergence of all kinds of evil and impairs the function of the Church. Exactly how authority is established and maintained is not discussed and seems, therefore, to be left to individuals in the nation to work out for themselves. The principle of competent authority would rule out Christians serving as mercenaries, and make problematic the fighting of revolutionary wars.[37]

Most nations go to war for reasons other than the "justness" of it.

The other four principles have problems associated with them. The idea of *probability of success* seems more an idea of prudence than one of "justness." Now, it is claimed by "Just War" theorists that there is a close association since, without prudence, one can involve a nation in a war that leads to excessive misery for its citizens if it cannot be won.[38] However, the problem can be examined in a different way. Surely, it would make no sense for a small nation to go on the offensive against a much stronger nation. But can it be unjust for that same small nation to take every precaution, and fight if need be, if that larger nation attacks the smaller? As a matter of prudence, it may make sense to find some form of accommodation, but the results cannot always be known beforehand. Indeed, during the winter war between the Soviet Union and Finland, tiny Finland decided to defend itself against a much larger adversary. Who could have known beforehand that a million invading Soviet soldiers would suffer some 200,000 casualties attempting to conquer the little country? In the end, the Soviet Union achieved its stated limited war aims (i.e., territory from Finland north of Leningrad), but what kind of result would have ensued had Finland not fought? From the behavior of the Soviet Union in the aftermath of World War II in Eastern Europe, it can be safely assumed that the arrangement by which Finland was restrained in its foreign policy but allowed domestic sovereignty would not have held for long. Finland's decision to fight, though in many ways not prudent at the time, nonetheless saved its citizens from a worse fate in the future.

War as a *last resort* is ideal in a perfect world, but would be difficult to determine in some cases. For example, at the outset of the 1967 Arab-Israeli war, the dawn preemptive strike by the Israeli Air Force on Egypt may not have appeared to citizens as a choice of last resort, but intelligence analysis provided strong evidence that an Arab surprise attack was to be launched just a few hours later. How much more suffering, indeed loss, would the Israelis have sustained had their leadership not authorized a preemptive strike? Surprise attack, in contrast to preemption, is not only militarily sound, but often the surest way to victory[39] and is extremely difficult to prepare against. Should the Israelis have waited for their Pearl Harbor in order for the war to be more just?

The last two principles of *jus ad bellum* are fraught with the same kind of difficulties. How does one judge the *just intent* of the leadership of one's country? Further, while peace and reconciliation may be appealing goals, the soundest victories have been by the destruction of the system of the enemy state (viz., Nazi Germany and Imperial Japan). There are some governments with whom reconciliation is not only impossible, but perhaps more dangerous to attempt (e.g., Saddam Hussein's regime under which it continues to seek nuclear weapons capability). *Just cause* has come to mean defensive versus aggressive wars. But like the above, the difficulty is in the details. Did Israel launch an aggressive (unjust) war in 1967 and wage a defensive (just) war in 1973? Which outcome do the Israelis prefer? Which was the least damaging to Israeli society?

As for the principles of *jus in bello*, there is more scriptural support for them.[40] Indeed, from Luke 3:14 it appears that the biblical mandate for "justness" extends to the sphere of responsibility of the individual. As Michael Walzer notes, German General Rommel disobeyed a general order to execute all prisoners of war, and history has praised Rommel's decision:

> It would be very odd to praise Rommel for not killing prisoners unless we simultaneously refused to blame him for Hitler's aggressive wars. For otherwise he is simply a criminal and all the fighting he does is murder or attempted murder, whether

> he aims at soldiers in battle or at prisoners or at civilians ... But we do not view Rommel that way: why not? The reason has to do with the distinction of *jus ad bellum* and *jus in bello*. We draw a line between the war itself, for which soldiers are not responsible, and the conduct of the war, for which they are responsible, at least within their own sphere of activity.[41]

Pursuing limited war, using discriminate means, and avoiding unjust acts all conform to the biblical view of war. The only time Israel ever pursued wars of extermination occurred during its theocracy and, according to prophecy, will occur again during the Second Coming. But at no other time were wars of extermination encouraged or advocated. And when it was (and will be) used, it was under God's personal direction.

Conclusion

In the attempt to resolve the paradox of war and pacifism, it seems that several conclusions emerge. First, the two extreme positions, the pacifist and the crusader, commit the cross-level fallacy and violate principles of hermeneutics, however benign the intention. Upon closer examination, there is little support for these positions as fully biblical ones. Each, taken logically to the extreme, distorts the role of the Christian as a member of his society. In the pacifist, it requires him to disengage from the society in which he lives. In the crusader, it requires him to so identify the function of the church with that of the state that he becomes more involved in it than with his call to Christian service (indeed, causes him to confuse the two).

The "Just War" doctrine also has several problems, but is perhaps the closer of the three positions held to that which can be gleaned from scriptures. The principal problem with the doctrine is with the principles of *jus ad bellum*. Except the stipulation that war must be declared by competent authority, adherence to the other principles, besides the problems noted above, requires the Christian to make a decision that puts him above the authority of the state, yet does not provide him the means (knowledge and wisdom) to make that decision. Further, it goes beyond biblical mandates to not obey authority in very specific and fairly certain cases (viz., ungodly laws of compellence).

On the other hand, the principles of *jus in bello* (justice in war) seem warranted. Perhaps this is understood by society, for a great many international laws of warfare stem from these ideas.[42] And these principles have the virtue of giving the individual both the responsibility and the capability to make informed decisions within his sphere of responsibility.

But what of the tradition of conscientious objection to military service? Would such a reading of scriptures rule out the possibility of avoiding military service for reasons other than to disobey an ungodly law of compellence? I believe it is important to allow for such a possibility, not simply on humanitarian grounds. Comparing the law of liberty (I Cor. 6:12; 10:23; and James 1:25) with the law of love (Rom. 14:1-13), one can reasonably allow for some to not serve in armed combat if such persons' conscience cannot allow them to do so. Furthermore, some ought not to be put in combat situations for psychological reasons. It makes sense to preclude those from military service who have a history of cruelty, or a tendency toward other kinds of evil. Others, who may for other reasons struggle with cowardice, probably ought to be excluded from military service, especially combat, for the sake of morale.[43]

The problem of the paradox of war and pacifism in the Bible, and its resolution, may lead to a better analysis of the Christian's responsibility to the state. Further, the resolution to the paradox, the separation of systems for consideration in light of scriptural passages that treat each, may also lead to a re-examination and evaluation of the role of the church in society. It is to be hoped that this analysis will, at the very least, provide common ground upon which Christians can unite and renew dialogue on so important a topic. ✚

Notes

[1]The most recent one was found in President George Bush's appeal to support Kuwait in Operation Desert Storm. It was widely seen, both at home, and among many members of the United Nations, as a just war of defense.

[2]*New American Standard Bible*, reference edition (Chicago: Moody Press, 1973), p. 7. All scriptures cited throughout will follow this translation.

[3]See, for example, Norman Geisler, *Christian Ethics* (Grand Rapids, Michigan: Baker, 1989), pp. 221-225.

[4]See Gleason Archer, *Encyclopedia of Bible Difficulties* (Grand Rapids, Michigan: Zondervan, 1982), pp. 90-91.

[5]I have here labeled these as wars of extermination to distinguish them from genocide (which is the systematic destruction of a racial, political, or cultural group) since they were limited in extent; and from unlimited wars, since the latter term implies no limit in extent, method, or means. Nor do they fit the modern conception of total war, which implies the entire nation working on behalf of the war effort.

[6]Even so, the extermination was always *limited* to the extent of reprobation. Sometimes the reprobation extended only to the adults, other times to all human life, and other times to human life and soulish life (birds and mammals) that had significant contact with reprobate humans, and still other times to human life, soulish

life, the material possessions and the agricultural land of the reprobates.

[7]Archer, op. cit., pp. 158-159.

[8]See Judges 4, 7, 11, and 14, for example.

[9]Indeed, the priests and prophets of other ancient, as well as more modern, societies served the interest of the state and were frequently paid well for their services, or were fired (or worse) if they failed to support the king.

[10]While this is the general argument, there is a sizeable body of evidence that demonstrates that many early Christians staked out positions that supported the right of the state to engage in war, and that Christians were obliged to fight in them. See Keith B. Payne and Karl I. Payne, *A Just Defense: The Use of Force, Nuclear Weapons, and Our Conscience* (Portland, OR: Multnomah Press, 1987), p. 331.

[11]Cited in Robert Culver, "Between War and Peace: Old Debate in a New Age,"*Christianity Today*, October 24, 1980, p. 30.

[12]Cited in Ibid., p. 31. The context can be found in Rudolph Arbesmann, Emily Joseph Daly, and Edwin A. Quain, trans., *Tertullian: Apologetic Works and Minucius Felix Octavius* (Washington, D.C.: The Catholic University of America Press, 1962), p. 94.

[13]Paraphrased in Culver, op. cit., p. 31. The context can be found in Henry Chadwick, trans., *Origen: Contra Celsum* (London: Cambridge University Press, 1980), p. 509.

[14]Ibid., p. 34.

[15]Ronald A. Wells, ed., "Introduction," *The Wars of America: Christian Views* (Grand Rapids, Michigan: William B. Eerdmans, 1981), p. 8.

[16]For a discussion of these principles, but one critical of "just war," see Ronald E. Santoni, "The Nurture of War: 'Just War' Theory's Contribution," *Philosophy Today*, Spring 1991, p. 86.

[17]Paul Ramsey, *War and the Christian Conscience: How Shall Modern War Be Conducted Justly?* (North Carolina: Duke University Press, 1961), p. 115.

[18]For a thorough analysis of this decision, see Judith A. Dwyer, ed., *The Catholic Bishops and Nuclear War* (Washington, D.C.: Georgetown University, 1984); Michael Novak, *Moral Clarity in the Nuclear Age* (Nashville, Tenn.: Thomas Nelson, 1983); James E. Dougherty, *The Bishops and Nuclear Weapons* (Hamden, Conn.: Archon Books, 1984); and Francis Schaeffer, Vladimir Bukhovsky, and James Hitchcock, *Who Is For Peace?* (New York, N.Y.: Thomas Nelson, 1983).

[19]Ramsey, op. cit., p. 96.

[20]Wells, op. cit., pp. 8-9.

[21]Robert S. Hoyt and Stanley Chodorow, *Europe in the Middle Ages* (New York: Harcourt, Brace, Jovanovich, 1976), pp. 319-320.

[22]1096 is considered the end of the golden age for Jews living in northern Europe.

[23]Donald Secrest, Gergory G. Brunch, and Howard Tamashiro, "Empirical Investigation of Normative Discourse on War: The Case of the Donagan-Aquinas Thesis," *Journal of Peace Research*, November 1991, p. 398.

[24]For example, on the resolution of the paradox of free will and predestination, various denominations will come down on one side or the other; that is, some will emphasize predestination and others will emphasize free will. Other paradoxes have had similar resolutions: heaven and hell; the Trinity; the deity of Jesus Christ, etc. As will be detailed above, there is good reason to keep the tension of the paradox. For example, in free will and predestination, it keeps one from going to the extremes of legalism or antinomianism.

[25]Hugh Ross, *Keys to Analyzing Scriptures* (Pasadena, CA: Reasons To Believe, 1980), P8001.

[26]The "cross-level" fallacy comes from the study of "individual" and "ecological" fallacies, applied to the study of the origins of war. In the particular theory called "Realism," several distinct levels of analysis were noted: at the level of the individual; at the level of the state; and at the level of interstate relations. At each level, distinct independent variables were examined for their relation to the causes of war. More importantly, often these distinct variables were found to be mutually exclusive; thus, for the purposes of analysis, the separation. See J. David Singer, "International Conflict: Three Levels of Analysis," *World Politics*, April 1960, pp. 453-461; Shibley Telhami, *Power and Leadership in International Bargaining: The Path to the Camp David Accords* (New York: Columbia University Press, 1990), pp. 18-44.

[27]Hans J. Morgenthau, *Politics Among Nations: The Struggle for Power and Peace*, 3rd edition (New York: Knopf, 1960); See also Kenneth Waltz, *Man, State and War: A Theoretical Analysis* (New York: Columbia University Press, 1959); and Telhami, op. cit., passim.

[28]See also Genesis 9:6 and Acts 25:11.

[29]See Leviticus 19:17-18; Matthew 26:52; and John 18:10-11.

[30]See also Mark 13:7-8.

[31]The role and mission of the church as a corporate entity of believers is not considered here except as far as its fallacious identification with the state has been used to justify crusading warfare.

[32]The critical error of the crusaders was the presumption that conversion was through state legislation rather than through personal repentance; similar to the Muslim error that if one lives in an Islamic state, one is therefore a Muslim.

[33]Eusbius, *The History of the Church from Christ to Constantine*, G. A. Williamson, trans. (Harmondsworth, Middlesex, England: Penguin Books, 1965).

[34]Gaius Suetonius Tranquillus, *The Twelve Caesars*, Robert Graves, trans. (Harmondsworth, Middlesex, England: Penguin Books, 1957), p. 221.

[35]The situation of when and where, and indeed whether, believers may dissent from "unjust" rulers, though important, will not be considered here. Such a discussion would have to accommodate the recent development of "liberation theology" as well as many less radical positions.

[36]Compare the "justness" of the Persian Gulf war and the "justness" of intervening in Yugoslavia on behalf of the Bosnians or the Croats. In both cases a weaker nation was/is under attack. Yet, in the former, U.S. interests in precluding a dominant hostile power in the Persian Gulf that would control a sizeable fraction of the world's proven oil reserves made for a more compelling reason to intervene than humanitarian interests alone, as demonstrated by the latter. Were "justness" a compelling reason to fight wars, then one might expect intervention in the former Yugoslavia, Somalia, Armenia, and Tibet, to name just a few. In the case of Tibet, all the specific atrocities cited by the Bush Administration regarding Iraq's invasion of Kuwait are present in China's invasion and occupation of Tibet, yet no call to arms has been forthcoming.

[37]For a discussion on the concerns of Christians in the American Revolution of 1776, see George Marsden, "The American Revolution: Partisanship, 'Just Wars,' and Crusades," in Ronald A. Wells, ed., *The Wars of America: Christian Views* (Grand Rapids, Michigan: William B. Eerdmans, 1981), pp. 11-24. The moral struggle was more important to these Christians on the issue of rebellion against established authority than on the issue of legitimate warfare against a hostile nation.

[38]See Michael Walzer, *Just and Unjust War: A Moral Argument with Historical Illustrations* (New York: Basic Books, 1977), passim.

[39]See, for example, the discussion of surprise attacks in Alex Roberto Hybel, *The Logic of Surprise in International Conflict* (Lexington, Massachusetts: Lexington Books, 1986).

[40]In 1939, C. S. Lewis similarly took issue with theologians on the issue of the just war doctrine, preferring elements of *jus in bello*. See William Griffin, *Clive Staples Lewis: A Dramatic Life* (San Francisco, CA: Harper and Row, 1986), p. 159. I am currently working on further research into the biblical idea of *jus in bello* and its use by modern nations in their laws relating to military conduct.

[41]See Walzer, op. cit., pp. 38-39.

[42]See, for example, Section VI, "Armed Conflicts," in Gerhard von Glahn, *Law Among Nations: An Introduction to Public International Law*, 5th edition (New York: MacMillan, 1986), pp. 583-794.

[43]Deuteronomy 20 discusses this and other possible exceptions. Here, I am interested only in those cases where Christians ought to make allowance for other Christians. Whether such exceptions should be made law for the entire society is a different matter.

Call for Papers and Program Proposals

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The University of Toronto, Canada

July 26-29, 1996

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John Wesley's Vision of Science in the Service of Christ

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John Wesley (1703-1791) was a pioneer of the 1730s British evangelical movement. While best known for his role as founder of Methodism, his intellectual interests included a lifelong engagement with the ideas and activities of the natural philosophers (scientists) of his day. He encouraged his preachers to become conversant with science, incorporated scientific topics in his sermons and other writings, and used electrotherapy apparatus in his medical clinics. Science correctly understood was to serve the cause of Christ rather than be feared.

The eighteenth century challenged Christians to adapt their ways to new ideas. Many intellectuals in John Wesley's England embraced a widening gap between the natural and the supernatural, natural law and providence, and rational faith and piety, which had roots in the mechanistic interpretations of nature epitomized by Sir Isaac Newton's accomplishments. This study offers an analysis of Wesley's interaction with natural philosophy and the challenges which the new understanding of nature brought to believers.

Wesley's intellectual horizon included a lifelong interest in the progress of science and the ways that science could serve Christian purposes. Although he occasionally dabbled in the field or recommended projects to others, Wesley never had the interest (or time) to devote to serious experimental study and should not be compared with contemporary scientist-clerics such as Joseph Priestley, Stephen Hales, Bishop Samuel Horsley, or William Derham. Mainly, he focused on science to serve his grand purpose of furthering the gospel and helping the sick. He also wrote inexpensive works on natural science for his constituency. Wesley's sermons and other writings point to an enthusiasm for the natural world as "God's World" which could be exploited for humanitarian as well as traditional religious purposes.

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Wesley's student days at Oxford indicated a more than ordinary attention to science. He was interested in such disparate questions as the nature of "vacuums," the Chain of Being, and the ability of animals to reason.[1] In later travels, he would meet and comment on the work of many individuals working in science. He was particularly concerned with unusual natural phenomena and would often speculate on their causes. An insatiable reader, Wesley read scientific works throughout his life, often from the back of his horse. From his own reading and the advice of others, he developed "short" lists of scientific works for his correspondents, schools, and lay preachers. These collections included older works by John Ray, Cotton Mather, and Jonathan Edwards as well as current works by Benjamin Franklin, Charles Bonnet, John Hutchinson, and Oliver Goldsmith. Wesley followed the debates that swirled around the various interpretations of Newton's ideas. In the famous Clarke-Leibnitz controversy he would side with Clarke on one question[2] but at another point in the debate would support Leibnitz.[3]

Wesley's view of the natural world and the position of nature in God's economy was never listed in one place or integrated into a system. In drawing together his ideas from various sources, we recognize that our understanding will be tentative and

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incomplete — an appropriate response to one who dealt with challenges in context rather that from a "confession."

Wesley's Intellectual Roots

In examining Wesley's interaction with natural philosophy, it is instructive to examine several features in his background which influenced his response to the *Book of Nature*. Wesley never offered a reason for his interest in natural phenomena and scientific activity. John English has suggested that his curiosity may have been stimulated as a child by the "gentlemanly" scientific interests of his father and older brother Samuel, members of the Spalding Gentlemen's Society, which also included Alexander Pope and Sir Isaac Newton in its number.[4] Wesley early recognized the impact of the revolution in science on public life and the influence for good and evil that it could offer to Christianity.[5]

Wesley's ideas on the philosophical foundation of scientific and religious knowledge guided his approach to a wide spectrum of questions. He studied and commented on works by John Locke, Rene Descartes, Nicholas Malebranche, John Norris, Isaac Newton, George Cheyne, Peter Browne, David Hartley, David Hume, and Thomas Reid as well as an eclectic range of theological sources.[6]

The Power and Limits of Empiricism and Reason

Wesley assimilated and adapted the ideas of John Locke, Peter Browne, and John Norris in forming an epistemology which valued "spiritual" senses as well as those in the physical domain.[7] Orthodox theologians Thomas Bray, William Law, Isaac Watts, Bishop Butler (in part), and William Cowper all affirmed the need for empirical verification expressed in Locke's *An Essay Concerning Human Understanding* (1690). Wesley's practical bent, aversion to metaphysical speculation, and emphasis on facts before theory follows the tradition of Francis Bacon, Locke, and Newton. He singled out Bacon for praise for his emphasis on the inductive method.[8]

Brantley has described the multifaceted nature of Locke's influence. "Wesley mastered the *Essay*, followed its principles, spread its message, reconciled it with his faith, and incorporated it into his philosophical theology."[9] "The Lockean language of experience ... enabled him [Wesley] to raise his ineffable experience of grace to graceful and cogent expressions of methodology."[10]

Wesley had an almost obsessive concern with "the littleness of human knowledge" in both the natural and supernatural.[11] Two influences on this question were Peter Browne's *The Procedure, Extent, and Limits of Human Understanding* (1728) which Wesley praised[12] and Robert Boyle's *The Skeptical Chemist* (1661) from which he would quote on the lack of knowledge of the properties of the metal antimony in his *Remarks on the Limits of Human Knowledge* (1763).[13] The limits on physical knowledge found parallels in theology for those who felt that some scriptural passages were "above reason." Locke had described such propositions as those which cannot be derived from the normal method of discerning truth. Boyle's *Things Above Reason* (1691) followed orthodox Anglican thought in asserting that truths such as God's nature, how God made the world out of nothing, or how he unites an immaterial soul to a human body and maintains that union are "incomprehensible truth."[15]

The Organic World

During the early part of Wesley's life England was basking in the triumphs of Newton's physics and the focus was on the physical side of nature. Wesley proved an exception to the rule as his curiosity about nature extended over the spectrum from organic to inorganic — from animal psychology to comets — from man to polyps. Philip Ott

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notes that the images that Wesley used to relate body and soul were derived from the Cartesian school and reflect similar seventeenth and eighteenth century physiologies.[16] The link between thinking and acting that was popularly thought to involve some sort of "animal spirits" was held by such Wesley sources as Descartes, Malebranche, Norris, Locke, and Dr. John Cheyne. Later Cheyne moved toward David Hartley's vibratory theory of motion. Both notions are found in Wesley's writings.[17]

Wesley was impressed by the fact that the natural world — from dust to man — could be arranged in a gradation of infinitesimally different organisms. This Chain (or scale) of Being concept, held by a long line of thinkers from Aristotle to John Locke, has been viewed as a precursor to the concept of evolution.[18]

High Church Influence

One pervasive influence on Wesley's attitude toward science derived from his High Church Anglican roots. Many High-Churchmen rejected the Newtonian natural philosophy espoused by latitudinarian Low-Church leaders, which they associated with deism and atheism. Richard Olson has argued that High-Church antiscientific attitudes represented a concern that the theories and practices of the new science would either directly or indirectly bring harm to the practitioners and those who read their work. This harm came from "the pridefulness and moral insensitivity that seemed to accompany scientific theorizing, or from attempts to extend scientific approaches to inappropriate domains — especially to religious and closely associated moral issues."[19] It was natural that Wesley would be inclined toward the novel system of Francis Hutchinson who offered an aggressive High-Church response to the linking of suspect Low-Church theology and Newtonian science.

Wesley lived during a period where the scriptures were taken at face value. Evidence supplied by miracles, fulfilled prophecy, and ancient records was eagerly adapted to endorse the theory of plenary inspiration of the Bible. High-Church conservatives found no fundamental discrepancy between the Old Testament and "modern" natural science. Biblical criticism had yet to make an impact on literal interpretation. High-Churchmen based their theology on the tenets of St. Augustine which emphasized those aspects of Christian faith most difficult to defend on rational grounds — original sin, the incarnation, vicarious atonement, and redemption.

A hundred years before, Francis Bacon had offered advice about going to the Old Testament for science. "Some of the moderns have indulged this folly with such consummate inconsiderateness, that they have endeavored to build a system of natural philosophy on the first chapter of Genesis, the book of Job, and the other parts of Scripture, seeking thus the dead amongst the living."[20] Until the late eighteenth century, there was little reliable scientific evidence to offset the story of early Genesis allowing Wesley to avoid the science-Bible battles of a later day.

The mechanistic triumphs of seventeenth century natural science had offered an impersonal deity who ruled through unchanging natural laws. As Wesley grew up, he faced a new picture of God's ways with man. Now God's care was expressed in ordinary natural processes rather than through one who would intervene in nature to save an individual sinner. Order and a tangible, consistent way of viewing nature and society were preferred to the transcendent mystery of classical Christianity. Wesley's struggles with this new movement and his personal quest in coming to terms with reason and piety reflect the modern dilemma.

Wesley's Integration of Natural Philosophy and Christianity

John Wesley recognized the accomplishments of the new science and sought to bring its power to serve the church. In typical Wesley fashion he never gathered his thoughts on this subject in one place. Our analysis is further complicated (but made more interesting) by the diverse ways that science both served and influenced his ministry. In seeking to trace and define Wesley's "integrative" strategy, I will examine the place of natural phenomena in his sermons, his views on apologetics, and his interest in the application of science for the benefit of humankind.

One tradition has viewed Wesley as holding negative views toward science.[21] In a recent paper, I have shown the opposite to be the case, if one examines the entire corpus of his work and pays attention to the context of his alleged antiscience remarks.[22] His enemies were deism, atheism, materialism, and intellectual pride — not natural philosophy! Wesley linked scripture and nature in a non-confrontational way emphasizing the values and limits of each mode of God's revelation. This attitude characterized nineteenth century Methodism which remained friendly toward science even with the publication of Darwin's *Origin of Species* (1859).[23]

Scripture and Nature

Wesley's published sermons reflect an active and appreciative interest in the natural world and scientific progress. He summed things up in *God's Approbation of His Works* (1782).

How small a part of this great work of God is man able to understand! But it is our duty to contemplate what he has wrought, and to understand as much of it as we are able.[24]

This speculative sermon drew on sources ranging from Lucretius, Thomas Burnet, and John Hutchinson to Chambers's *Cyclopaedia*; it detailed a pre-fall world without "violent winter" or "sultry summer," "pain," "weeds," and without predators — an interpretation which endures in some religious circles today.

The written sermons were designed primarily for "*nurture* and *reflection*" over against the goals of "*proclamation* and *invitation*" for the oral sermons.[25] His written sermons contain a wealth of scriptural references to natural phenomena and scientific information. Often this material would illustrate and embellish the discussion of a particular passage.[26] Wesley would also use natural phenomena as an analogy for spiritual themes.[27] In other instances, he would speculate on the state of nature before the "fall" or in the world to come.[28] His favorite scientific topics were astronomy, electricity, earthquakes, physiology, and volcanoes. Some of the sermons went far beyond Wesley's claim that in providing "plain truth for plain people" he "abstain[ed] from all nice and philosophical speculations; from all perplexed and intricate reasonings; and as far as possible from even the show of learning."[29]

In Wesley's day there was little geological or biological data to add to the scriptural account of the creation period. Orthodox Christians generally read this portion of the Bible in literal fashion. Wesley felt that scripture did not provide a *scientific* account of nature: "the inspired penman in this history [Genesis] ... [wrote] for the Jews first and calculating his narratives for the infant state of the church, describes things by their outward sensible appearances, and leaves us, by further discoveries of the divine light, to be led into the understanding of the mysteries couched under them."[30] His comment on Gen. 1:3 notes, "He made the stars also, which were spoken of only in general, for the Scriptures were written not to gratify our curiosity but to lead us to God."[31] Yet he happily noted, "I was strengthened in the belief of the holy word, which had so great congruity with these [scientific] truths."[32] It is interesting that the order of creation in his *Survey of the Wisdom of God in Creation* (1763) only roughly follows that of *Genesis*, and there only with respect to the creation of animate nature.

Wesley would occasionally use the "two books" to support and interpret one another. He invoked Ecc. 3:11 to argue a "static view" of nature: "So that all things are still as they were at the beginning."[33] He also used the "Chain of Being" concept to emphasize the unity of creation and the inability of anything in nature to act independently of God. He provided a gloss to improve Gen. 1:31 by inserting the italicized phrase in the text: "when he saw everything he had made, *all in connection with each other*, behold it was very good."[34]

Wesley articulated a prominent place for God as Creator and Sustainer in his *Sermon on the Mount III* (1748).

> The great lesson that our blessed Lord inculcates here ... is that God is in all things, and that we are to see the Creator in the glass of every creature; that we should use and look upon nothing as separate from God, which indeed is a kind of practical atheism; but with a true magnificence of thought survey heaven and earth and all that is therein as contained by God in the hollow of his hand, who by his intimate presence holds them all in being, who pervades and activates the whole created frame, and is in a true sense the soul of the universe.[35]

Wesley always described nature as wholly dependent on God — a voluntarist God who works above the "laws of nature."[36]

In his *On the Education of Children* Wesley encouraged parents to combat the "natural atheism of their children." He chided them for "ascribing the works of creation to nature" or "chance" or "good or ill fortune." "Nothing comes by chance: that is a silly word: there is no such thing as chance."[37]

Sermons From Nature

Christian tradition has found a further role for the natural world. Medieval, Renaissance and Puritan natural theology taught that nature was a book which illustrated spiritual themes and offered "moral emblems" and "types of things to come."[38] The eighteenth century offered many examples. Wesley's Lincoln College student, James Hervey's *Meditations and Contemplations* (1748) found that every page of nature is rich with "sacred hints," "lively sermons," and "excellent lessons."[39] John

Newton thought that a thorough knowledge of scripture was the best preparation for a firsthand understanding of the book of nature. "The Lord has established a wonderful analogy between the natural and spiritual world ... Almost every object they see, when they are in a right frame of mind, either leads their thoughts to Jesus, or tends to illustrate some scriptural truth or promise."[40]

Wesley's sermons exhibit a mind deeply saturated with scriptural texts. These often appear as metaphors of things in nature: "leaf shaking in the wind," "grace seasoned with salt," and "he maketh the clouds his chariots." Much less frequently, he borrowed metaphors from his reading or those of his own inventions. He was not averse to linking faith and nature. "We will learn a lesson of faith and cheerfulness from every bird of the air, and every flower of the field."[41] His *Survey of the Wisdom of God in Creation* was designed to lead the reader to see the power, wisdom, and goodness of God, and increase man's happiness.[42] Yet, Wesley was sparing in the use of typology, metaphor, and emblem. His *Minutes* for 1749 contained the injunction to his preachers, "Beware of allegorizing or spiritualizing too much."[43] Wesley opposed interpreting scripture by "any allegorizing method." "No other ideas are to be affixed to the words of scripture than such as occur to one who looks at the thing spoken of."[44] His reticence to engage in such rhetorical devices stemmed from the nature of his typically untutored audience, not from a lack of writing skills.

Wesley and The Apologetic Tradition

John Wesley ministered in an age when scientists and clerics sought to use Sir Isaac Newton's triumphs to serve the cause of religion. Newton's followers were primarily found among Low-Church latitudinarians, the dominant force in early eighteenth century Anglicanism. Newtonian natural theology sometimes took antithetical paths and it is ironic that one who wanted his work to support both general and special revelation would be later exploited by the deists who advocated a creator-mechanic over an active providence. Those who invoked the name of Newton in developing views of science and religion often had little understanding of his science and the central place that theology held in his natural philosophy.[45] Wesley, though a contemporary of Newton, would have learned about his nation's hero more from hearsay and the works of his disciples and opponents than from the writings of one who was inordinately reticent to reveal his thoughts on nature or Christianity.[46] High-Churchman Wesley, put off by the acclaim accorded to Newton's accomplishments, suspicious of the theology of many Newtonians and the direction that Newtonian apologetics were taking, would have a natural affinity for the views of John Hutchinson (1674-1737), a fellow High-Church partisan who led a forceful opposition to Newton's ideas.

Wesley might disagree with the metaphysics that claimed Newton's name but would give him his due in experimental physics ...

Wesley was ambivalent about Isaac Newton, at times harshly critical, but later echoed the adoring rhetoric of the day. The *Concise Ecclesiastical History* (1781) reflects his mature view. "The immortal man to whose genius and indefatigable industry philosophy owed its greatest improvements, and who carried the lamp of knowledge into paths of knowledge that had been unexplored before, was Sir Isaac Newton, whose name was revered, and his genius admired, even by his warmest adversaries."[47] Wesley might disagree with the metaphysics that claimed Newton's name but would give him his due in experimental physics, signaling a willingness to separate science from theological considerations and philosophy. Earlier, a July 21, 1758 *Journal* entry reported his reading of Needham's "discovery" of the spontaneous generation of life. Wesley said the "tract confounded all my philosophy" but thought it "highly probable" that this "particular class of animals" existed.[48] In this case Wesley may not have considered the theological implications of *natural creation* of life; still, this incident offers a further example of his willingness to allow science to speak without religious strictures.

Wesley and other High-Churchmen were attracted to the apologetic line of Bishop Joseph Butler's *The Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature* (1736).[49] Butler's work was a popular tool in combating deism and became a fixture at the English universities until the age of Darwin. Wesley affirmed Butler's concerns with the limitations of natural knowledge and emphasis on the importance of scriptural knowledge.[50] While Wesley found few deists in mines or fishing villages, he recognized their force in the intellectual life of his nation. He confronted them in his sermons, in his *Arminian Magazine*, and other works directed to a more literate readership.[51]

Wesley entered the apologetic fray at several key points. One question involved the deist view that man could arrive at the essential truths of religion by reason alone. Low-Churchman Richard Bentley's *Boyle Lecture* (1692) argued for man's self-sufficiency: "God hath endowed Mankind with powers and abilities, which we call Natural light, and Reason, and Common Sense: by the use of which we cannot miss the discovery of His Being; and this is sufficient."[52] Wesley joined Butler in valuing a limited role for natural theology by emphasizing the inherent uncertainty and limited power of human knowledge.[53] His sermon *The Case of Reason Impartially Considered* (1781) represents an attempt to find a middle ground between the extremes of undervaluing and overvaluing reason.[54] Wesley shared a commitment to the traditional evidences for theism but felt that Holy Scripture has a priority over the witness of nature.[55] The wisdom of God in creation was available to all men but insufficient to gain saving faith. Newton's triumphs derived "independently of revelation and Church tradition undermined this view."[56]

John Hutchinson, felt that Newtonian philosophy gave comfort to deists and dissenters by what he saw as excessive stress on God's *imminence* over His *transcendence*.[57] Curiously, Hutchinson's alternative system postulated a self-contained world without need for a divine agency that effectively supported the same pantheistic-materialistic accounts of nature which Boyle and Newton had sought to offset.[58] By the 1740s British natural philosophers were less concerned to demonstrate God's providence and direct role in nature's laws and the violation of these laws and turned instead to explanations based on active powers *imminent* in matter.[59] God's volition was no longer necessary. In an attempt to stem this anti-theistic flow Wesley turned to Hutchinson's full-blown anti-Newtonian system of scriptural science.

Hutchinson's approach was based on two concepts; (1) that all the operations of nature can be explained in terms of a *triune fluid* which appears as fire, light, and air, and (2) the notion that scripture (the Hebrew Language) "contained the indispensable key to all knowledge, both natural and spiritual."[60] Hutchinson's physico-theology was attractive to Wesley because his natural philosophy and theology were based on scripture. Difficult doctrines such as the Trinity were shown to be both scripturally based and empirically verified in nature — accomplishments which restored "the credibility of Church doctrine and the philosophical integrity of the Bible."[61]

Wesley often referred to Hutchinson's work, primarily in critical terms. In 1758 after conferring with a leading Hebrew scholar on Hutchinson's Hebrew treatment, he concluded "his hypothesis is unsupported by scripture; very ingenious, but quite precarious."[62] A 1770 *Journal* entry notes "his whole hypothesis, philosophical, and theological is unsupported by any solid proof."[63] Brooke has suggested that Wesley's skepticism of Hutchinson's system may have come from his aversion to *any system* of natural philosophy.[64] Yet Wesley inevitably referred to Hutchinson in his critical discussions on astronomy and adopted his unique translation of the early verses of Genesis.[65] It is not obvious why Wesley kept coming back to one whose system he rejected. Hutchinson's High-Church orthodoxy and good intentions appear to have won the day over what he knew was poor exegesis and highly idiosyncratic natural philosophy.

[Wesley believed that] the wisdom of God in creation was available to all men but insufficient to gain saving faith.

A further eighteenth century problem involved the perennial tension between providential and natural law explanations of phenomena — the way that God dealt with nature, society, and individuals. At the time of Newton's death a delicate balance was maintained between a general providence which created the world *ex nihlo* and established and maintained the laws by which it operated, and a special providence which produced miracles and intervened to fine-tune the workings of nature. This balance would swing in the direction of a watchmaker God who worked through the laws of nature rather than an interventionist deity.[66] Joseph Priestley's materialist world view was an extreme example of the use of Newton's ideas to argue for the *self-sufficiency* of matter and the laws of motion.[67]

John Wesley joined a growing High-Church and evangelical effort to counter this trend with an apologetic which gave greater emphasis on an *immediate* and *observable* providence. This natural theology would emphasize natural history and the biological sciences over astronomy and the mathematical sciences reaching a climax in Paley's *Natural Theology* (1802). In a 1753 letter to Dr. John Robertson, Wesley had commented on Andrew Ramsay's *Philosophical Principles of Natural and Revealed Religion, unfolded in a Geometrical Order* (1748-9), "The treatise itself

gave me a stronger conviction than ever I had before both of the fallaciousness and unsatisfactoriness of the mathematical method of reasoning on religious subjects."[68] His assertion, "we can have no idea of God, nor any sufficient proof of his very being, but from the creatures; and that the meanest plant is a far stronger proof than all Dr. Clarke's or the Chevalier's [astronomical] demonstrations," is telling.[69] Robert Boyle writing before the time of Newton had said essentially the same thing: "that the situations of the celestial bodies do not afford, by far, so clear and cogent arguments of the wisdom and design of the author of the world, as do the bodies of animals and plants."[70]

Wesley's appeal for a living faith over abstract theory offered an evangelical counter to the dominant rationalism of his age.

Wesley's view on providence took a radically different turn, first, by rejecting any distinction between particular (special) and general providence and then by focusing attention on the human dimension of providence over the physical. "For as a general providence (vulgarly so called) counterdistinguished from a particular, it is only a decent well-sounding word, which means just nothing."[71] He was even more explicit in his sermon *On Divine Providence*. "I hope to show it [General Providence] is such stark, staring nonsense as any man of sense ought to be utterly ashamed of."[72] Wesley agreed "that in the common course of nature God does act by general laws, but he has never precluded himself from making exceptions to them whensoever he pleases; either by suspending the law in favor of those who love him, or by employing his mighty angels; by either of which he can deliver out of danger them that trust in him."[73] Wesley saw no distinction between "usual" and "unusual events." Wesley's particular focus was on the "superintending providence which regards the children of men" rather than "that overruling hand which governs the inanimate creation."[74] He reserved the term *works of providence* to refer to the nations and individuals and *works of creation* to address the natural order.[75]

The preface to Wesley's *Survey of the Wisdom of God* notes his desire to "recite both uncommon appearances of nature, and uncommon instances of art ... for surely in these appearances also, the wisdom of God is displayed."[76] His *Journal* (1755) devotes several pages to speculation on the cause of a spectacular fall of rocks which he had seen in his travels. He considers various scientific causes before concluding that the cause could only be God, "who arose to shake terribly the earth; who purposely chose such a place, where there is so great a concourse of nobility every year; and wrought in such a manner, that they might see it and fear," an approach which would later be called God of the Gaps.[77] He (as did Newton) first considered scientific explanations before adopting a theological explanation. In his work on electricity he describes a lightening conductor but argues that use of such a device did not deny God's providence.[78]

The London earthquakes of 1750 and the destructive 1755 earthquake in Lisbon offered the clergy a golden opportunity to denounce the infidelity and immortality of the day. Wesley's pamphlet *Serious Thoughts on the Earthquake at Lisbon* (1755) forcefully spoke of a Divine visitation over against the notion that the event was "purely natural and accidental; the result of natural causes."[79] For Wesley "nature is the Art of God, or God's method of acting in the material world"; earthquakes emerge from the "hand of the Almighty, arising to such an effect."[80]

> All his providences, be they mild or severe ... are all designed either to wean us from what is not, or to unite us to what is worthy of our affection. Every pain cries aloud, "Love not the world, neither the things of the world." And every pleasure says, with a still small voice, "Thou shalt love the Lord thy God with all thy heart."[81]

His orthodox attitude toward angels, demons, witches and other supernatural beings went against the grain of enlightenment naturalism.[82] He saw the Devil as active in causing damaging natural events such as storms, wind, and fires as well as disease and mental instability. For Wesley "With my latest breath will I bear my testimony against giving up to infidels one great proof of the invisible world: I mean that of Witchcraft and apparitions, confirmed by the testimony of all ages."[83]

Wesley's sermon *Spiritual Worship* contains the core of his views on God's role in the natural world.[84] While affirming the orthodox view of God as creator and sustainer of all that is, he speculated that causal agency could be transferred to supernatural beings such as angels as well as humankind. Wesley, searching for some breathing room for human will suggested that God "imparts a spark of his self-moving nature to created spirits [human souls]."[85] He argued that man has "an innate principle of self-motion" because he was created in the image of God.[86] For

Wesley, "God is a Spirit: So therefore was man."[87] In the end, knowledge of the vital link between material and nonmaterial (body and soul) falls beyond the limits of understanding.[88]

Wesley's notion of secondary causes has a deist tone.

> Will you suppose that it derogates from the glory of the Divine presence, to represent the great engine of this visible world, as moving onward in its appointed course, without the continual interposture of his hand? It is granted, indeed, that his hand is ever active in preserving all the parts of matter, in all of their motions, according to these uniform laws: but I think it is rather derogatory to His infinite wisdom, to imagine that He would not make the vegetable and the animal as well as the inanimate worlds, of such workmanship, as might regularly move onward in this manner five or six thousand years; without putting a new hand to it ten thousand times every hour: I say *ten thousand* times every hour; for there is not an hour or a moment passes, wherein there are not millions of plants or animals forming in southern or northern climates.[89]

John English suggests that Wesley devised the notion of "spiritual senses" to appeal to the enlightenment demand for facts obtained through the physical senses. Spiritual senses would be complementary to physical senses by describing the knowledge that comes by faith thus offering a link to modern science.[90] Sara Miles argues that Wesley's notion of "spiritual senses" capable of *immediate* response to God's mediate revelation to man supported not only the contentions of those who believed in a continuing revelation to the people of God, but prepared the way for "a view of nature in flux which became the paradigm for Nineteenth Century natural history."[91] Wesley allowed reason a valid but very restricted role in describing human experience, assigning to faith the principle part in integrating the scattered forces of man's personal life. Wesley's appeal for a living faith over abstract theory offered an evangelical counter to the dominant rationalism of his age.

Wesley's Confronts Scientism

Wesley did not back off from a confrontation with the interpreters of science — especially where there was a presumption of materialistic determinism in human affairs or natural systems. His *Thoughts Upon Necessity* (1774) analyzed Dr. David Hartley's "sensationalist" view of brain function which Wesley admitted "is now adopted by almost all who doubt of the Christian system."[92] He agreed that Hartley's physiological scheme "contains a great deal of truth" but balked at his notion that "men have no more liberty than stones."[93] For Wesley the case turned on the point that necessity cannot exist "if there be a God in the world."[94] God has control over "matter and spirits, over our souls and bodies." "Cannot He cut off, or suspend, in any degree, the connexion between vibrations and sensations, between sensations and reflections, between reflections and judgements, and between judgements and passions or actions?"[95] God's free choice stands between man and materialistic necessity — between human freedom and man as a "wheel fixed in a universe consisting of "one immense machine."[96] For Wesley: "he is not only the true *primum mobile*, containing the whole frame of creation, but likewise the inward, sustaining, acting principle, indeed the only proper agent in the universe; unless so far as he imparts a spark of his active, self-moving nature to created spirits."[97]

Science in the Service of Humanity

Francis Bacon's concern that science serve humankind bore significant fruit in eighteenth century England. Problems such as the determination of longitude at sea, improvements in agriculture, bleaching, and the production of chemicals were practical outcomes. John Wesley was particularly interested in medical applications of the new science. At one point he encouraged the use of blood transfusions in normal medical practice.[98] His *Desideratum or Electricity Made Plain and Useful* (1859) described the properties of electricity and the therapeutic effects of electrical shocks. He bought four of these electrostatic machines for use in his medical clinics. When asked by the Dec. 12, 1760 *London Magazine*, "Why do you meddle with electricity?" He replied, "To do as much good as I can."[99]

Wesley's most enduring scientific interests were in the medical field. His *A Plain Account of the People Called Methodists* claimed "For six or seven and twenty years, I had made anatomy and physick the diversion of my leisure hours."[100] He experimented on his patients and himself often describing the results in his *Journal*. His *Primitive Physick or An Easy and Natural Way of Curing Most Diseases* first published in 1747 went through 23 editions in his lifetime. This work challenged contemporary medical practice for its obsession with theory and lack of interest in developing practical medical treatment. Wesley's listing of remedies encouraged experimentation and the use of alternative approaches.

Conclusion

Wesley engaged many of the issues of the Enlightenment which touched on Christianity. He maintained an active interest in the development of the new science valuing it for the benefits it brought to human happiness and the way that it could support religion, yet was unwilling to subscribe to the antiscientific sentiments expressed by leading Tory intellectuals of his day. He encouraged his preachers and broader constituency to gain an understanding of the new science from a world view which saw God as creator and sustainer and nature as both dependent on and (in concert with scripture) exhibiting some of the attributes of God. Wesley was alert to the problems that natural theology could pose for the Christian and sought to counter them in his voluminous publications. He pursued a middle road which considered both faith and reason. In assuming this position he offers a pattern for those, two centuries later, who seek to remain responsive to Christianity in a culture infinitely more attuned to science. Wesley's sometimes erratic views on theories of natural philosophy reflect the limitations of one who read widely but was hampered by a lack of time and associates with whom he could carefully hammer out his ideas. Margaret Jacob's description of the typical High-Churchman as offering "ignorant and obscurantist opposition to everything new and modern" could not be applied to Wesley.[101]

Wesley maintained a high view on the value of history in an age which deprecated historical knowledge, recognized the limitations of reason and scientific method in an age which deified reason, and offered a critique of the use of science when used to attack religion. Wesley did not invoke moralistic attacks on natural philosophy but disparaged those theories or activities which would directly or indirectly bring harm to humankind or keep one's eyes from God. He adroitly mixed rationalistic orthodoxy and pietistic theology with natural philosophy in ways that allowed his followers to appreciate and participate in the study of God's creation. He offered a response to modernity which constructively, but selectively engaged science from a perspective of theological conservativism.[102] ✤

Acknowledgment

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Notes

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[4]English, "John Wesley's Scientific Education," pp. 48-50.

[5]Sermon: "The Promise of Understanding," (1730) I.1-II.1 (BE 4:281-285). Richard G. Olson, "Tory-High Church Opposition to Science and Scientism in the Eighteenth Century: The Works of John Arbuthnot, Jonathan Swift, and Samuel Johnson," in James G. Burke, (ed.) *The Uses of Science in the Age of Newton* (Berkeley: University of California Press, 1983) provides insight into the science/religion context in which the young Wesley grew up.

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[7]"An Earnest Appeal to Men of Reason and Religion," (1744) 32-35 (BE 11:56-57), See also the Sermons: "Awake, Thou That Sleepest," (1742) I.11 (BE 1:146), "The Witness of The Spirit, I," (1746) I.12 (BE 1: 276) and "The Great Privilege of Those That Are Born of God," (1748) I.3-10 (BE 1:433-5).

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[23]See C. David Grant, "Evolution and Darwinism in the *Methodist Quarterly Review*, 1840-1870," *Methodist History* 29(1991), pp. 175-183.

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[25]Cf. Introduction, (BE 1:14).
[26]Cf. his early sermon "The Image of God," (1730) (BE 4:292-303) and one from late in his life "The Imperfection of Human Knowledge," (1784) (BE 2:568-586).
[27]Sermon: "On The Trinity," (1775) I.7-16 (BE 2:380-384).
[28]Sermon: "God's Approbation of His Works," ibid. I.1-14 (BE 2:388-397) speaks to the pre-fall world. See the sermon, "The New Creation," (1785) 1-18 (BE 2: 500-510) for his speculations on the world to come.
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[70]As quoted in Gascoigne, p. 232.
[71]Sermon: "Wandering Thoughts," III.1 (BE 2:132).
[72]Sermon: "On Divine Providence," 23 (BE 2:546).
[73]Ibid., p. 22 (BE 2:546).
[74]Ibid., p. 16 (BE 2:542).
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[95]Ibid.
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[98]*Survey (1777)*, 1:16-17.
[99]*The Letters of the Rev. John Wesley, A. M.* John Telford. London: Epworth Press, 1931. Volume 4, p. 123. Samuel J. Rogel, "Electricity: John Wesley's 'Curious and Important Subject'," *Eighteenth-Century Life* 13 (Nov. 1989), 79-90 summerizes Wesley's views on electricity. See also H. Newton Malony, "John Wesley and The Eighteenth Century Therapeutic Uses of Electricity," *Perspectives on Science and Christian Faith*, 47(1995) pp. 244-255.
[100]"A Plain Account of a People Called Methodists," 2 (Jackson VIII: 264).
[101]Olson, p. 27.
[102]John W. Haas, Jr., "Eighteenth Century Evangelical Responses to Science: John Wesley's Enduring Legacy," *Science & Christian Belief*, 6(1994), 83-102 describes ways that his ideas were adopted and transformed by later generations of Methodists.

John Wesley and the Eighteenth Century Therapeutic Uses of Electricity

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John Wesley (1704-1791) was the eighteenth century English divine who helped to pioneer the use of electricity for the treatment of illness. In 1760 he published The Desideratum, or Electricity made Plain and Useful by a Lover of Mankind and of Common Sense[1] *based on his use of electricity in free medical clinics which he had established for the poor in Bristol and London a decade earlier. Although not widely appreciated by either science or medicine, several historians have credited Wesley with being one of the most notable electrotherapists in the eighteenth century and with stimulating nineteenth century developments in psychiatry and general medicine. This essay reviews Wesley's applications of electricity to a wide variety of physical ailments. In the tradition of English parish priests, he combined treatment for illness with spiritual evangelism — a combination which characterized much of the Methodist movement, which Wesley founded. I have also detailed the reactions of physicians during Wesley's time and the theoretical/research developments which occurred after Wesley's death in 1791.*

John Wesley (1704-1791) was an eighteenth century English clergyman who helped to pioneer the use of electric shock for the treatment of illness. In 1760 he published *The Desideratum: Or, Electricity made Plain and Useful by a Lover of Mankind and of Common Sense* based on his use of electricity in free medical clinics, which he had established for the poor in Bristol and London a decade earlier.

In mid-October 1747, Wesley and a few friends went to observe one of "the Electrical experiments." Such public demonstrations were becoming very popular during this period. The words in his *Journal* show that Wesley was intrigued, but confused, about what he saw. He wrote:

> Who can comprehend, how fire lives in water, and passes through it more freely than through air? How flame issues out of my finger, real flame, such as sets fire to spirits of wine? How these, and many more strange phenomena, arise from the turning round in a glass globe? It is all a mystery: If haply by any means God may hide pride from man![2]

By 1753, Wesley's reaction had changed from perplexed curiosity to passionate conviction about the uses of electricity for human good. Having become excited by the therapeutic potential of Benjamin Franklin's demonstrations, Wesley reported in his *Journal* of November 9, 1756 that he obtained a portable electrical apparatus "on purpose." Out of a conviction that he had discovered a cheap and easy way to treat many diseases, he wrote:

> ... I ordered several persons to be electrified, who were ill of various disorders; some of whom found an immediate, some a gradual cure. From this time I appointed, first some hours in every week, and afterward an hour in every day, wherein any that desired it might try the virtue of this surprising medicine. Two or three years after, our pa-

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> tients were so numerous that we were obliged to divide them; so part were electrified in Southwark, part at the Foundry, others near St. Paul, and the rest near the Seven Dials. The same method we have taken ever since; and to this day, while hundreds, perhaps thousands, have received unspeakable good, I have not known one man, woman, or child, who has received hurt thereby.[3]

Several authors credit Wesley with playing a previously unacknowledged role in medical and psychiatric history and with being, along with Richard Lovett, Jean-Paul Marat, and James Graham, one of the four greatest electrotherapists of the 1700s.[4] Hunter noted that Middlesex Hospital in London had purchased an electrical machine to train physicians only seven years after the publication of Wesley's *Desideratum*. In an article entitled "A brief review of the use of electricity in psychiatry with special reference to John Wesley," he reported that by the later 1880s electrotherapy had

> ... become the stock in trade of many physicians... (and) by 1793 the citizens of London had subscribed toward the foundation of The London Electrical Dispensary ... with a view to afford a new benefit to the lower orders of mankind ... it is to administer electricity for all complaints in which its application may be useful.[5]

Over 3,000 patients were treated in this dispensary during the following decade.

This essay discusses Wesley's electrotherapeutic activity as a unique episode in the historical development of therapeutic theory. Although Wesley suggested in his book, *Primitive Physick: Or an Easy and Natural Method of Curing Most Diseases*, that electric shock was beneficial to over 20 maladies, he felt it was particularly effective in the treatment of nervous disorders.[6]

Of particular interest in this discussion will be the question of whether Wesley's ideas are related to the development of electroconvulsive shock treatment in psychiatry. At least one author, Hackman, is convinced that the two are completely unrelated.[7] Another author, Hunter, boldly asserted that "The spirit of electrical treatment of mental illness today is in direct contrast to Wesley's kindly and humanitarian efforts to bring hope, if not aid, to the sick and suffering with fairly innocuous electric currents and shocks."[8] He further contended that electroconvulsive shock treatment is

> ... a descendent of the crude and violent methods to which the insane were subjected before the great lunacy reforms of the mid-eighteenth century, when they used to be shocked into unconsciousness by excessive bleeding, holding under water, dropping from a height or spinning in a revolving chair, in order as it was hoped to shock them back into their senses.[9]

On the other hand, Stainbrook took the opposite point of view in contending that Wesley's application of electricity to sickness was a precursor to the psychiatry's electroconvulsive shock treatments of the insane.[10] Rogal advocated yet a third point of view. He proposed that the scientific and medical world of the eighteenth century was basically unaware of Wesley and that, even among those physicians who did react to him, their feelings were negative, rather than positive. Rogal concluded that acknowledging Wesley's influence would be among the last things they would do.[11]

The discussion will be divided into sections that consider the development of Wesley's interest in electricity, the equipment and method that he used, Wesley's reasoning that electricity was the God-given *vital elixir* of life, his application of electric shock to suffering and to illness, and the influence of Wesley on subsequent electrotherapy.

The Development of Wesley's Interest in Electricity

John Wesley was an "enthusiast" in that when he became interested in a subject he pursued it with great diligence and excitement. He had broad in-

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terests and was conversant across many fields. In his preaching and promotion of Methodist societies, he reportedly traveled over 50,000 miles each year by horseback across England, Scotland, Ireland, and Wales — always reading as he went! When given a carriage, Wesley boarded up one side and made a bookcase out of it so that he could have more access to a variety of books while he traveled.

In October 1747 [Wesley] went with some friends to see some [electrical] experiments and became puzzlingly impressed.

He was not only versed in classical and contemporary religious literature; he was well acquainted with some of the scientific and much of the medical writings of his day. While a student at Oxford, he read medical texts for pleasure. Later, he studied medicine seriously in the six months before becoming a missionary to Georgia where he hoped to provide treatment for the Indians alongside his evangelistic ministry. Much of this study later provided the material for his book, *Primitive Physick*. Although it contained several quaint folk-remedies, the book also included many treatments from the medical literature of his day.

In addition, Wesley was also knowledgeable about natural science and understood current thinking, In a five-volume text entitled *A Survey of the Wisdom of God in the Creation or a Compendium of Natural Philosophy*, Wesley summarized the theory of "the great Newton."[12] In fact, Wesley was so broad in his interests that some have considered him an expansive dilettante who was constantly seduced by the "new fangled."

It should come as no surprise, therefore, that Wesley should be among those who were intrigued by the public demonstrations of electrical phenomena, which were extremely popular in the second quarter of the eighteenth century in England. Frictional electrical machines had been improved to the point where they were portable and available for astonishing the public by igniting ether and brandy via sparks from fingers. Among the more dramatic demonstrations was the simultaneous leaping of a mile-long group of monks holding an iron wire connected to a Leyden jar which contained frictional electricity! One letter of the time contended that these public spectacles were "the universal topic of discourse. The fine ladies forget their cards and scandal to talk of the effects of electricity."[13]

Wesley became infatuated with what he heard about these demonstrations. As noted earlier, his *Journal* records that in October 1747 he went with some friends to see some of these experiments and became puzzlingly impressed.

Over the next several years, his interest became piqued by the letters of Benjamin Franklin to Peter Collison, a member of the British Royal Society of Science. These letters had been published in pamphlet form as early as 1751. Based on his well-known "kite experiment" and including a series of subsequent investigations, Franklin's reports excited Wesley. His *Journal* for February 17, 1753 stated:

> From Dr. Franklin's *Letters* I learned (1) that electric fire (ether) is a species of fire, is finer than any yet known; (2) that it is diffused, and in nearly equal proportions, through almost all substances; (3) that, as long as it is thus diffused, it has no discernible effect; (4) that if any quantity of it be collected together, whether by art or nature, it then becomes visible in the form of fire, and inexpressibly powerful; (5) that it is essentially different from the light of the sun, for it pervades a thousand bodies which light cannot penetrate, and yet cannot penetrate glass, which light pervades so freely; (6) that lightning is none other than electric fire, collected by one or more clouds; (7) that all the effects of lightning may be performed by an artificial electric fire; (8) that anything pointed, as a spire or tree, attracts the lightning, just as a needle does the electric fire; (9) that the electric fire, discharged on a rat or a fowl, will kill it instantly, but discharged on one dipped in water, will slide off, and do it no hurt at all. In like manner the lightning which will kill a man in a moment will not hurt him if he be thoroughly wet. What an amazing scene is here opened for after-ages to improve upon.[14]

His pursuit of knowledge about electricity had somehow turned from pure intellectual curiosity to a consideration of its possible usefulness to heal people.

Soon after reading Franklin's letters, Wesley himself became part of that "after-age improvement." His pursuit of knowledge about electricity had somehow turned from pure intellectual curiosity to a consideration of its possible usefulness to heal people.

How Wesley made this transition from curiosity to application is unclear. Although there was much written about electricity during this second quarter of the eighteenth century, there is no evidence that Wesley read John Neale's 1747 volume, *Directions for Gentlemen, who have Electrical Machines, How to proceed in making Their Experiments.* Richard Lovett, Wesley's later compatriot in electrotherapy, had not yet written his 1760 volume entitled, *An Appendix on Electricity rendered Useful in Medical Intentions,* nor do we know whether Wesley was aware of the correspondence between Peter Collinson and Benjamin Franklin regarding the application of electricity to physical illness. As early as 1748 Collison, who was the one to make Franklin's work known in England, wrote Franklin about three such instances. Further, in a later letter (1753) he reported to Franklin that the King had ordered the construction of an electrical machine for the treatment of rheumatism.

What is clear is that Wesley's motivation was strongly focused on physical health and on spiritual salvation among the common people to whom he ministered in his travels. Electricity became one of those inexpensive healing agents available for use by everyone.

By early 1753 Wesley procured an electrical machine and began to think about its practical application to the alleviation of human suffering. He experimented with the machine by shocking himself for lameness and neuralgia. A cure was certain, but gradual. He advised a person with a "stubborn paralytic disorder" to try the "new remedy." Immediate relief followed. He recorded in his *Journal,* "By the same means I have known two persons cured of an inveterate pain in the stomach, and another of a pain in his side which he had ever since he was a child."[15]

Added to this report was a hint of the disdain in which he held the medical practitioners of his day, who he felt were consumed with greed and committed to expensive drugs. Wesley said that they would probably ignore the value of electricity with these words: "Nevertheless, who can wonder that many gentlemen of the faculty (physicians), as well as their good friends of the apothecaries, decry a medicine so shockingly cheap and easy (i.e., electricity), as much as they do quicksilver and tar-water" (parentheses mine).[16]

In his desire to provide cheap and easy-to-use remedies for poor people, Wesley provided electric shock machines for all of his free clinics: three in London, one in Bristol. Based on what he termed "experiment," he noted 37 disorders (See Table 1, p. 250) in which he felt that electricity had been of unquestionable value in their cures. Although his claims may seem outlandish to modern ears, nevertheless, he advised caution in difficult cases and admonished those who administered the shocks to take care not to hurt their patients. In anticipating the later application of electricity to mental illness, Wesley noted that many of those who were helped were of "the nervous kind" and added, " ... perhaps there is no nervous distemper whatever which would not yield to a steady use of this remedy."[16]

Wesley's Equipment and Method

Before I discuss Wesley's theories about the nature of electricity and his rationale about its therapeutic effects, it seems helpful to describe the machine and methods which Wesley used. Figure 1, below, depicts one of four machines in Wesley's possession. It is displayed at the museum in the house next to the chapel on City Road, London where Wesley lived for the last 12 years of his life.

Woodward described this machine thusly:

> It consists of a hollow glass cylinder (7½ in. long by 4½ in. diameter) supported on two wooden uprights. Through it runs a metal bar to which a handle is attached, by means of which the cylinder can be freely rotated. A leather pad (to which is firmly attached a piece of black silk) is pressed against the cylinder. It is controlled, very simply, by a thumbscrew. On an attached platform (8 in.

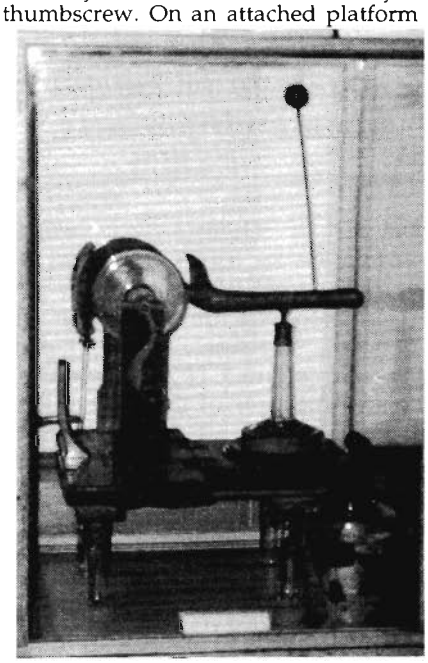

Figure 1. **An electrostatic machine used by Wesley. Photo taken in the Wesley Chapel, London by J. W. Haas, Jr.**

long by 5 in. wide) and mounted on a glass insulating column, is a metal arm with a thin rod (9½ in. long) attached to it, at the end of which is a small metal ball 1 in. diameter. The whole "machine" is mounted on four glass insulating legs (4½ in. in height).[18]

Presumably the patient caught hold of the ball and as the metal arm made contact with the rotating cylinder, got a shock — the intensity depending upon the vigor with which the handle was turned. It is important to note that this was a "friction" machine which discharged electric current in one discharge and was not a "continuous current" apparatus such as became possible after Allessandro Volta developed the first electric battery in 1799, eight years after Wesley's death. Continuous current apparati are those used in electroconvulsive shock treatment. This does not mean that it was impossible to administer harmful shocks with friction machines. By storing up current in Leyden jars, which were available to Wesley, it was possible to vary the amount of shock administered. Also, some machines had attached "wands" with insulated handles, which could administer varying amounts of shock dependent on the distance the wand was held from the area of the body toward which it was directed. Current could be built up by turning the handle. More powerful shocks jumped greater distances.

Wesley advised more frequent, weaker shocks and admonished his assistants to be careful not to harm their patients.

The first part of Wesley's *Desideratum* reviews all the information he could gather on electricity. The approach he used was typical for scholars of his day. "He anchored himself to the traditional forms of Oxford instruction — abstract, extract, and summation — from which he proceeded to advance his role as an explicator of the phenomenon ..."[19] He asserted: "To throw all the Light I can on the Subject, I subjoin a few Extracts from several other Writers."[20]

One of those whose thinking he reviewed was his contemporary J. P. Marat (1743-1793), the eccentric Frenchman who was one of the more influential electrotherapists of the eighteenth century. Marat distinguished among five methods, three of which Wesley might have used. The first method, Marat termed *l'electrisation par bains* in which the patient would sit in an insulated chair and hold a conductor from the machine (e.g., the metal ball) while the handle was turned to generate current. The body was thus bathed with the warmth of electricity. The second method was a variation of the first and was labeled *l'electrisation par impression de souffle*. In this method the conductor was placed on the affected body part, which then received a focused sensation of a gentle warm breeze. The third method was termed *par frictions*. This method did not use the machine but, instead, involved rubbing flannel which had been wrapped around the affected part with a metal plate attached to a glass handle. The fourth method, *par etincelles*, drew sparks from the affected organ by attaching an uncharged metal wand to the affected body part which, in turn, was connected to a conductor from the machine. The last method listed by Marat was called *par commotions*. In this procedure a strong discharge was sent across the diseased body part. Occasionally this method induced heart attacks, convulsions, blindness, and sometimes death.[21] This is the friction method most akin to later psychiatric electroconvulsive continuous-current shock treatment. It was not used by Wesley.

Although I will discuss what was happening in these treatments in the next section, it can be stated here that there were two basic processes involved in these treatments: attraction and repulsion. It was assumed that the human body was a conductor of electricity and that it would attract current as well as repel it, if the body was attached to some other conductive material. In general, it was theorized that where a body part was not functioning or was paralyzed, electricity was deficient and, thus, attraction treatment was needed. In this procedure the person was positioned in an insulated chair and then connected to the friction machine by holding onto a metal connection as in Marat's *l'electrisation par bains* method. On the other hand, it was theorized that where a body part was feverish or infected, electricity was excessive and thus, withdrawal treatment was needed. In this procedure the person was positioned in an insulated chair and then sparks were drawn from the infected part as in Marat's *par etincelles* approach.

Wesley's Reasoning about Electricity

Primarily, Wesley was a pragmatist. He applied what worked without much attention to explaining causation. He called himself an "experimentalist," but used that term in a far different way than it is used in modern science. Others called him an "empiric." They were probably more accurate. His recommendation of the use of resin for cold sores, as

recommended in his *Primitive Physick*, is an example of this approach. Dunlop notes this discovery: "As he sat beneath a tree and read a book, his tongue worried with a cold sore. A bed of resin fell on his page. Wesley applied it to the sore and effected a cure. From then on he cured other sores in this fashion."[22] Thus, his application of electric shock to disease and suffering was probably more an artifact of trial-and-error than of reasoned judgment.

His application of electric shock to disease and suffering was probably more an artifact of trial-and-error than of reasoned judgment.

Nevertheless, by the time he wrote his *Desideratum* Wesley had thought long and hard about the nature of electricity. He provided his readers with an extensive justification for thinking of electricity as the *elixir of life* which God provided to make creation function. Along with Richard Lovett, Wesley speculated that electricity was the source of "all motion in the Universe and that principle in air without which life or flame cannot exist ..."[23]

Lovett, a lay clerk at Worcester Cathedral, wrote a book on electricity four years before Wesley published his volume. Lovett's title bespeaks this conviction about the nature of the phenomenon. It was called *The Subtil Medium proved: or the wonderful power of Nature, so long ago conjectured by the most ancient and remarkable philosophers, which they called sometimes Aether, but oftener Elementary Fire, verified: showing that all the distinguishing and essential qualities ascribed to Aether by them and the most eminent modern philosophers, are to be found in Electrical Fire, and that, too, in the utmost degree of perfection.*[24] Lovett felt he had identified the *Materia Subtilis* of Descartes and the essence of Newton's *Aether*. Electricity was the "subtle," or integral but unseen, essence of life.

Wesley concurred. His book title *Desideratum* implied that electricity was "the thing to be desired." Wesley called electricity the "soul of the universe." He wrote in his first chapter that electricity was:

> ... the general principle of all Motion in the Universe: From this "pure Fire," (which is properly so called) the vulgar "Culinary Fire" is kindled. For in Truth there is but one Kind of Fire in Nature, which exists in all Places and in all Bodies. And this is subtle and active enough, not only to be, under the Great Cause, the secondary Cause of Motion, but to produce and sustain Life thro'out all Nature, as well in Animals as in Vegetables.[25]

Of course, Wesley went beyond Lovett in reasoning theologically that electricity was God-given. He said:

> This great machine of the World requires some such constant, active, and powerful Principle, constituted by its Creator, to keep the heavenly Bodies in their several Courses, and at the same Time give Support, Life, and Increase to the various Inhabitants of the Earth.[26]

It should come as no surprise, therefore, to read that he justified the application of electricity for human good as the intent of this creator God. He asserted:

> We know that the Creator of the Universe, is likewise, the Governor of all Things therein. But we know likewise, that he governs by second Causes; and that accordingly it is his Will, we should use all the Probable Means he has given us to attain every lawful End.[27]

The "second Causes" in Wesley's statement were the ways, discovered by human investigators, that electricity brought relief from human disease and suffering. He felt these were the laws of God which were intended to be used for "every lawful End."

Wesley's Application of Electricity to Suffering and Illness

In characteristic "experimental" fashion, Wesley tried electricity first on himself. I have already mentioned the cure of his own lameness soon after procuring his first machine. His *Journal* records at least two other occasions where he applied this remedy to himself, once when he was 70 and once when he was 80 years old. Hill describes these events. In 1773, while on one of his many preaching tours, Wesley had such a pain in his left side and shoulder that he had great difficulty even lifting his hand to his face. For several days previous he had been trying to recover from inflammation in his throat and mouth. He felt that the pain in his side and shoulder was a result of the earlier inflammation. After getting one of his assistants to electrify him, he felt much better and was able to preach in the evening. Ten years later he was electrified for cramp. Three months earlier he had contracted a cold while riding in an open chaise from one preaching appointment to another. This had resulted in a deep cough which would not dissipate. He tried to keep preaching but became very weak and was sent to bed. After

a night of rest coupled with some vomiting he felt better and set out for another town. Shortly after his arrival, he became feverish and had to lie down. His chest became tight and he experienced some violent cramps in his legs. He convinced a friend to electrify him in the legs and chest several times a day. A few days later he had no more fever, tightness in the chest, or cramps in his legs and was able to resume preaching. These examples indicate his personal experience and confidence in the method.[28]

This underlying assumption that electric shock was a stimulant was the primary rationale behind most of Wesley's treatments.

However, it is in Wesley's book, *Desideratum*, that we gain a complete understanding of electrotherapy. After thoroughly surveying the writing and research on electricity done up to that time, Wesley wrote in the second half of his book of practical applications. He introduced this section with these words, "I have been hitherto endeavoring to make Electricity plain: I shall endeavour in the second Place, to make it useful."[29]

Ascribing, as we might expect, electricity's usefulness to "the wise Author of Nature" (i.e., to God), Wesley contended that it "communicates Activity and Motion to Fluids in general, and particularly accelerates the Motion of the Blood in the human Body ... And it is certain many bodily Disorders may be removed, even by this safe and easy Operation."[30] This underlying assumption that electric shock was a stimulant was the primary rationale behind most of Wesley's treatments.

After detailing these assumptions, Wesley lists 37 ailments in which "Electrification has been found eminently useful." (See Table 1.) We can probably assume that this was not simply a list of conjectured cures because this list is followed by 49 paragraphs each of which describes a case in which the patient was electrified. The paragraphs, while mostly positive in their outcomes, do not read as outlandish claims. Often, the treatment is gradual and, sometimes, temporary. Some paragraphs include several reports of treatment. In several situations, such as cancers and scrofulous tumors, Wesley contends that electrification may have curative powers where no other medicines have been able to help.

As noted earlier, Wesley observed that a majority of these were of nervous disorders. However, he also noted that electricity seemed to him to be the "grand *Desideratum* in Physick, from which we may expect Relief when all other Relief fails, even in many of the most painful and stubborn Disorders to which the human Frame is liable."[31]

Several examples of the cures reveal the type of case material on which Wesley made his judgments.

> Anne Heathcot ... was seized, in May last, with what is commonly called an "Ague in the Head," having a violent Pain in her Head, Face, and Teeth. After trying abundance of Remedies, to no purpose, she was, in August, electrified thro' the Head. Immediately the Pain fix'd in her Teeth. She was electrified four Times more, and has felt nothing of it since.[32]

> William Jones, a Plaisterer, ... fell from a Scaffold on Thursday, Feb. 15 last. He was grievously bruised, both outwardly and inwardly, and lay in violent pain utterly helpless, till Saturday in the Afternoon, when he was brought (carried) by two Men to be electrified. After a few Minutes he walk'd home alone, and on Monday went to work.[33]

> A young Lady had been affected with Fits near seven Years, which seized her without any Warning, and threw her flat on her Face, quite insensible. These frequently returned twice in a Day. This was attended with almost continual Coldness in her Feet. Her Stomach also was much affected. She stood upon a Wire coming from the Coat of the Phial,

Table 1. **Disorders in Which Wesley Thought Electrification to be of Use**

Agues	King's Evil
St. Anthony's Fire	Knots in the Flesh
Blindness, even from a Gutta Serena	Lameness, Leprosy
Blood extravasated	Mortification (dead flesh)
Bronchocele	Palpitation of the Heart
Chlorosis	Pain in the Back, in the Stomach
Coldness in the Feet	Palsy, Pleurisy
Consumption	Rheumatism
Contractions of the Limbs	Ringworms
Cramp	Sciatica
Deafness, Dropsy	Shingles
Epilepsy	Sprain
Feet violently disordered	Surfeit (excessive eating)
Felons	Swellings of all Kinds
Fistula Lacrymalis	Throat sore
Fits, Ganglions, Gout, Gravel	Toe hurt
Head Ache	Tooth-Ache
Hysterics	Wen (tumor on the scalp, goitre)
Inflammations	

and to complete the Circuit, another Wire was laid upon her Head, by which means the Fire was conveyed to that Part. By this Means both the Fits and Coldness were gradually removed, and a complete Cure effected.[34]

E- T- taking cold, was seized with a sore Throat, which grew worse and worse for six Days. She then could not swallow even a Bit of Bread soaked in Tea. The same Morning she was electrified, so as to direct the Shock in a right Line thro' the Part affected. By the Time she got home she could eat any Thing. Two shocks more made a perfect Cure.[35]

Sarah Guilford, aged 37, ... was for upwards of seven Years so afflicted with Rheumatism in her right Side, that the Knee and the Ankle were wasted exceedingly. January 2d last she was electrified, and perfectly cured in one Ray. But it threw her into a profuse Sweat, particularly from those Parts which had been most affected.[36]

A person had rigid Knots in the Thigh like what appear in violent Cramps, but not so hard or painful. These were entirely dissipated in a Minute or two, only by drawing sparks.

One at Upsal, who had lost the Use of his Limbs from Cold, for several Years, was in some Weeks quite restored.[37]

Abigail Brown, aged 22, ... was from a Child frequently afflicted with a violent Head-ache ... she was electrified five Days successively, having one Wire applied to the fore Part, another to the hinder Part of the Head, and receiving seven or eight Shocks each Time. Hereby she was entirely cured, nor has found any Pain in her Head since, unless occasionally for want of Sleep.[38]

A Man, fifty-seven Years old, who had been deaf for thirty-two Years, was so relieved in a few Days, as to hear tolerably well.[39]

These case studies illustrate the variety of both the methods used and the ailments treated by electricity during the last half of the eighteenth century. They corroborate Wesley's observation that the majority of the cases are of the nervous, hysteric type. He asserted, "We know it (electricity) is a thousand medicines in one; in particular, that it is the most efficacious medicine in nervous disorders of every kind, which has yet been discovered."[40] It is important to remember, however, that Wesley's rationale for these effects was physiological, not psychological. He concluded:

It seems the Electric Fire in Cases of this kind and of many other Kinds, dilates the minute Vessels, and capillary Passages, as well as separates the clogging Particles of the stagnating Fluids. By accelerating likewise the Motion of the Blood, it removes many Obstructions.[41]

It is interesting, however, that none of the cases recounted by Wesley in the *Desideratum* refers to "the English Malady," or depression. Certainly, Wesley was aware of discouragement and feelings of hopelessness among the poor. There was a great debate in the eighteenth century about the nature of this disorder. It was so common that the French, among others, contended that the British were peculiarly susceptible to symptoms of morose melancholy. Wesley, however, was deeply influenced by the physician George Cheyne who wrote on depression in his volume, *The English Malady: Or, A Treatise of Nervous Diseases of all Kind* (1733). He had written his mother while still at Oxford about his admiration for Cheyne, who put great emphasis on diet and physical exercise. There was little, if any, ideas in Cheyne about electricity, however.

It is curious that, with all his concern for health, Wesley did not mention ["English malady" (depression)] in his books on electrotherapy or on general healing.

Post-hoc evaluation of Britain's poor social conditions and widespread poverty in these years of transition from rural to urban industrial economy might lead us to contend that depression would be largely exogenous not endogenous, environmental rather than temperamental. Such an analysis might explain the curious omission of this disorder from those which Wesley contended might be healed through electrification, though he said that electricity might be especially efficacious in nervous disorders. He was extremely sensitive to social conditions and worked long and hard to correct social injustice. Besides prescribing "plain and simple" remedies for physical illnesses in both the *Desideratum* and *Primitive Physick*, Wesley is credited with speaking out against slavery, debtors' imprisonment, poor working conditions, and unsanitary living conditions.

He encouraged his followers to be clean, hygienic, honest, frugal, temperate, and compassionate. Perhaps he felt that the "English malady" would be cured more in these ways than by electrification. The fact remains, however, that this "English mal-

ady" (depression) was widespread and it is curious that, with all his concern for health, Wesley did not mention it in his books on electrotherapy or on general healing.

A final comment on Wesley's approach to electrotherapy needs to be made. It concerns the treatment cautions he recommends. While the cases he reports seem to include the variety of methods noted earlier, in all treatment he advises against haphazard administrations of shock. His words of caution on the next-to-last page of the *Desideratum* are as follows:

> In order to prevent any ill Effect, these two cautions should always be remembered. First, let not the Shock be too violent; rather let several small Shocks be given. Secondly, do not give a Shock to the whole Body, when only a particular Part is affected. If it be given to the Part affected only, little Harm can follow even from a violent Shock.[42]

Wesley's Influence on Later Electrotherapy

In the early pages of his book, Wesley proclaimed that he was indebted to Franklin for the speculative part of *Desideratum* and to Lovett for the practical. Yet in one matter, he strongly disagreed with Lovett. Lovett contended that the use of electricity in treating disease would make no progress until and unless the medical community embraced it. Wesley adamantly disagreed with Lovett on this. He said that if society had to wait on the physicians to try it, society would wait in vain because physicians were too committed to making money by prescribing complex medications for which they charged much money. According to Wesley, physicians would not be interested in such a simple, cheap treatment as electrification until they "have more regard to the interests of their neighbors than their own. At least not till there are no more apothecaries in the land or till physicians are independent of them."[43]

However he never gave up hoping they would change and, in fact, depended heavily on them in *Primitiv Physick* for many of his recommended cures. Wesley concluded *Desiratum* with a somewhat sarcastic plea:

> Before I conclude, I would beg one Thing (if it be not too great a Favour) from the Gentlemen of the Faculty (i.e., physicians), and indeed from all who desire Health and Freedom from Pain, either for themselves or their Neighbors. It is, That none of them would condemn they know not what: That they would hear the Cause, before they pass Sentence: That they would not peremptorily pronounce against Electricity, while they know little or nothing about it. Rather let every candid Man take a little Pains, to understand the Question before he determines it. Let him for two or three Weeks (at least) try it for himself in the above-named Disorders. And then his own Senses will show him, whether it is a mere Play-thing, or the noblest Medicine yet known in the World.[44]

It should be obvious that John Wesley had already concluded the latter. But it must be remembered that he did so from a thorough study of the literature, prolonged reasoning and reflection, coupled with extensive pragmatic application both on himself and on others. His was not an uninformed assessment.

While his judgment about the willingness of physicians to use electrotherapy turned out to be somewhat overdrawn, his invitation to them to try it before passing judgment cannot be discounted. Turrell, writing 150 years later, agreed with Wesley that we "still need some lovers of mankind, who have some knowledge of the animal economy, to be diligent in making experiments on the subject."[45]

Nevertheless, Wesley was not without his critics. Joseph Priestly, the Unitarian minister who wrote a definitive book on electricity which Wesley reviewed in his *Desideratum,* opined:

> This account of the medical use of electricity by Mr. Lovett and Mr. Wesley is certainly liable to an objection which will always lie against the accounts of these persons, who not being of the faculty (i.e., not being physicians), cannot be supposed capable of distinguishing with accuracy either the nature of the disorder or the consequence of a seeming cure.[46]

Even Benjamin Franklin, who later changed his mind, said in a letter read to the Royal Society in 1758 that he "never knew any permanent advantage from electricity in palsies ... perhaps some permanent advantage might be obtained if the electrical shocks had been accompanied with proper medicine and regimen under the direction of a skilled physician."[47]

... Wesley was as well informed and as skilled as many physicians in his day.

Rogal recounts two occasions in which Franklin accidentally shocked himself in his experiments and concluded that great harm could come to human

beings with too much shock. He concluded, "Of course, there exists no easy means for determining the differences in the strength of electrical shock ... between Franklin's apparatus and Wesley's electrifying machine. This however raises an obvious question: if the Philadelphia scientist could not always control his devices, could the self-appointed healer of the Methodists, and/or his appointed agents, administer the shock with any greater care or confidence."[48]

Of course, the truth is that Wesley was as well informed and as skilled as many physicians in his day. His two books, *Desideratum* and *Primitive Physick* are based on much reading and personal experience. Moreover, the including of treatment for illness in the tasks of clergy had a longstanding tradition in seventeenth and eighteenth century England. Many clergy and lords-of-the-manor offered medical treatment to the poor who could not afford physicians. While nineteenth century Methodism in both England and America evidenced an increasing differentiation between the roles of clergy and physicians, in Wesley's time this distinction was not necessarily true. In fact, although the free clinics that Wesley started seemed to become defunct soon after his death in 1791, Methodist pastors persisted in offering medical advice to their parishioners well into the 1800s. Further, not all physicians were offended by Wesley's involvement in medical matters. Many of them were prominent in early Methodism.[49]

That electrotherapy "caught-on" and was embraced by many physicians later in the eighteenth century cannot be denied. A few of these developments were noted in the introduction to this essay. Among other developments was the first installation of a room for electrification in the asylum at Leicester in 1788. A fascinating account of an electric cure of an epidemic of hysteric reactions in a cotton mill at Lancashire was reported in the *Gentleman's Magazine* in 1787. A physician with a portable electric machine shocked some female workers who had gone into convulsions in imitation of a colleague who had a mouse put down her blouse in a playful ruse. The "fits" were stopped but it took a week for work to return to normal. Whether any of these developments were due to Wesley's influence is debatable, as Rogal noted in his thesis that Wesley was a relative unknown in professional circles.

Probably the first physician to write a book on the use of electricity in general medicine was Christian Kratzenstein in 1745. By 1783, Nicholas Phillipe Ledru and his son Charles established a "medico-electric" clinic in France and made house calls using a portable machine similar to that of Wesley's. Electricity was being used in Italy and Germany by 1786 when Galvani published his researches which were to lead to continuous current applications. Perhaps the most interesting indications of medicine's acceptance of this form of treatment were six pages of endorsements for Mr. J. L. Pulvermacher's "electric chains" in the back of the 1781 edition of Wesley's *Desideratum* that included over ten "gentlemen of the faculty," four of whom were listed as physicians to the queen! For physicians to be willing to have their names in print with Wesley's indicated electrotherapy had finally "arrived!" Even Benjamin Franklin had begun offering treatment by this time. Although these developments were, no doubt, due to more than Wesley's initiative, Turrell's evaluation of his efforts would evoke almost universal agreement. He stated, "Clearly, we find (in Wesley) a man of conspicuous ability, of indomitable energy, of reckless and fearless impetuosity, of science and fixed convictions, and of outstanding 'Benevolence to Human Kind.'"[50]

By the mid-nineteenth century the electrotherapy which Wesley had practiced on a theological and pragmatic basis had, at last, a firm theoretical and rational foundation.

By the time Wesley died in 1791, major developments were taking place in research on electricity that had import for the treatment of both general and mental illness. Aliosio Galvani had published his great *De Viribus Electricitatis in Motu Musculari Commentaris* on "animal electricity" based on his study of frogs. He forthrightly stated in his preface that he was induced to undertake his arduous task to make the application of electricity safer in the treatment of disease.[51]

In 1799 Alessandro Volta disproved Galvani's thesis that what he had observed was a natural substance in organisms and was but the nerves conducting a current between two metals. He produced his first battery; and two years later Bischoff claimed that he was able to cure hysterical paralysis and stupor by the application of direct continuous current. In 1818 the first psychiatric treatments of melancholia by similar methods were reported by Heinroth at Leipzig.[52] In 1831 Faraday's description of electromagnetism and the introduction of induced

current provided the French physician, Guillaume Duchenne, a rational basis for using Faradic as well as Galvanic procedures in treating hysterical paralysis in 1849.[53]

Thus, by the mid-nineteenth century the electrotherapy which Wesley had practiced on a theological and pragmatic basis had, at last, a firm theoretical and rational foundation. However, Hackman is probably correct in saying that the primary stimulus for psychiatry's adoption of electroconvulsive shock treatment was more dependent on observations that epileptics never seemed to suffer from a psychosis than on these theoretical developments in the treatment of common sicknesses.

There is stronger support for concluding that the heritage of Wesley was that he influenced the use of mild applications of electricity in the treatment of muscle stimulation and general medicine. Despite how well he was known or accepted among the physicians of his day, there is still some warrant for suggesting that Wesley foresaw the application of "the greatest medicine yet known to the world" to a great variety of maladies. Without a doubt, the use of electrical stimulation is a well-accepted procedure in twentieth century medicine.

The contention that Wesley was among the four best-known electrotherapists of the eighteenth century (and a precursor to the modern use of these procedures in general medicine) is well deserved.[54] More importantly, his example of a visionary who combined spiritual salvation with physical and mental health remains worthy of emulation among modern Christians. ✠

Notes

[1]This book has been republished by The United Methodist Publishing House: Nashville, Tennessee, 1992.
[2]Hill, A., *John Wesley among the Physicians: A Study in Eighteen-Century Medicine.* (London: The Epworth Press, 1958), p. 87.
[3]Tyerman, L., *The Life and Times of Rev. John Wesley, M.A.* (London: Hodder and Stoughton, 1870), p. 162.
[4]Hill, A., Schiller, F., "Reverend Wesley, Doctor Marat and Their Electrical Fire." *Clio Medica* (1981): 115, 159-176, Tyerman, L.
[5]Hunter, R. A., "A Brief Review of the Use of Electricity in Psychiatry with Special Reference to John Wesley." *British Journal of Physical Medicine* (1957): 20(5), p. 99.
[6]Wesley, J., *Primitive Physick: Or, An Easy and Natural Method of Curing Most Diseases.* (London: J. Palmar, 1751).
[7]Hackman, W. D., *The History of the Frictional Electrical Machine 1600-1850.* (Alphenaan den Rijn: Sizthoff and Noordhoff, 1978).
[8]Hunter, p. 100.
[9]Ibid., p. 100.
[10]Stainbrook, E., "The Use of Electricity in Psychiatric Treatment during the Nineteenth Century." *Bulletin of the History of Medicine* (1948): 22(2), pp. 156-177.
[11]Rogal, S. J., "Electricity: John Wesley's 'Curious and Important Subject.'" *Eighteenth Century Life* (1989): 13, pp. 79-90.
[12]Wesley originally published *A Survey of the Wisdom of God in the Creation; Or, A Compendium of Natural Philosophy* in three volumes in 1763 and in five volumes in 1777. The 1809 edition was a republication of the 1777 edition.
[13]Hunter, p. 99.
[14]Collier, F. W., *John Wesley among the Scientists.* (New York: Abingdon Press, 1928). pp. 33-34.
[15]*The Works of The Reverend John Wesley*: Thomas Jackson, Ed. Third edition, fourteen volumes, (London, Wesleyan Methodist Book Room, 1872), 2:388 (This was the journal for the ninth of November, 1756.).
[16]Collier, p. 133.
[17]Hill, A., p. 105.
[18]Woodward, M. W., "Wesley's Electrical Machine." *Nursing Mirror* (1962): 114(Suppl. 2978), 10, 16. p. x.
[19]Rogal, p. 79.
[20]Wesley, J., *The Desideratum: Or, Electricity Made Plain and Useful by a Lover of Mankind and of Common Sense.* (London: Bailliere, Tindall and Cox, 1760), p. 1.
[21]Hill, O., "J. P. Marat's Use of Electricity in the Practice of Medicine." *British Journal of Physical Medicine* (1957): 10(5), 100-102. p. 101.
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Communications

Science and Christianity in Japan

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The debate over the compatibility of science and religion has been a feature of the last 120 years, and has been discussed in pages of this journal before.[1] The belief that there is a conflict between science and faith, making belief in God incompatible with scientific belief, is called the Conflict Metaphor and its origins may have been political rather than rational.[2] While readers may be aware of the debate that continues in Western countries, it is interesting to look at the situation in Eastern countries. In this paper, we examine the history of this debate in Japan and the current attitudes found in our experiences living in Japan.

On the surface, the scientific enterprise in Japan would appear to be essentially the same as that in Western countries. The everyday functioning of scientists doing their research is the same regardless of cultural and religious background, but there is a trend to have more commercial or applied research in Japan than in most Western countries. With the founding of modern universities a little over a century ago in the Meiji Era, departments of engineering were the first to be established and have remained far larger than departments of physics. In its drive to catch up with the West, practical technology was emphasized far more than pure research. We note that the economic recessions in the West have shifted Western science toward output-measured or applied science as well.

There are significant differences in the cultural and religious history and in the historical development of science in Japan compared to the West. These have affected the way science and one's philosophical and religious understandings are viewed in relation to one another. Japanese scientists also tend to be more narrowly focused than their Western counterparts, and acknowledge that a much larger percentage of Western scientists have a grasp on a broad range of related fields and are not so narrowly specialized. These comments seem to be true not only in the context of science alone, but also concerning related ethical and philosophical understandings inherent in their world view. Our purpose is to make some observations concerning these differences, particularly as it relates to Japanese scientists who also hold to the Christian faith. Our conclusions are tentative, and are mainly based on personal observations and discussions with some scientists.

Historical Introduction of Science into Japan

The world view that a society has makes a great impact on the type of science that will develop there. One basic factor is whether the world is viewed as supernatural itself, or whether it is physical and ordered so that behavior can be explained by physical laws. The biblical world view of a Creator God, who created an orderly universe based on regular natural laws that could be observed and understood, was an essential part of the development of modern science. In Western history, the pursuit of natural sci-

ence to understand God's creation was a major reason behind the advance of science in both medieval Islam and in renaissance Christianity. We can make some comparisons to China, which did have scientific study predating the import of Christianity. In China, science originated with the belief that the entire universe was a vast organism,[3] and in general it was believed that there was no personal omnipotent deity as the ultimate power in the universe. About 4000 years ago, they did have *Shang Ti*, a "Heavenly emperor," quite close to the biblical concept of God. The Chinese kept *Shang Ti* in their rituals until 1911. In practice, however, the belief was lost one or two millennia before with the rise of Taoism and Confucianism.

Some very advanced technologies existed in the Orient prior to the arrival of the scientific method from the West, and in some cases they predate the West by a millennium. Noted technologies include the design of bellows and pumps, shipbuilding and porcelain manufacture, a mechanical clock, a magnetic compass, gun powder, and paper.[4] There were three major groups of Chinese thought: Confucianism, Taoism, and imported Buddhism. Buddhism had a largely negative impact on the development of science. For example, Buddhism is against speculation and refuses to deal with questions considered unknowable. Previous Chinese thought had considered the existence of individual souls, which allowed them to give their views of nature, i.e., naturalism. Buddhism and Confucianism were also predominant in early Japanese thinking, along with the native animistic religion of Shinto.

The origins of Japanese science lie with the importation of science from the West. There were attempts to develop science in the Tokugawa period during the seventeenth and eighteenth centuries.[5] At this time many texts were imported from China, and seventeenth century Japanese mathematics was based on this. By the eighteenth century, some technical literature was imported from Europe that was to form a background onto which the Meiji period restorations were to take place in the nineteenth century. In the Tokugawa period, only a few researchers conducted experiments, and a world view in which knowledge was sought for its own sake was not to be found. Rather, science was applied in such things as medicine, map-making, and explaining the calendar anomalies. There were two main groups who became scientists: the official translators in the ports of Nagasaki who knew Dutch and Chinese, and the medical community. The physicians not only had knowledge, but also money to conduct technical studies. Several of them gave up all medical studies to pursue science. Before that period, and still for a time after, most learning was the luxury of Buddhist scholars; other scholars were not well paid.

We see a few early cases of empirical studies in medicine. For example, the 1774 publication of *Kaitai Shinsho* (*New Book on Human Dissection*) by Sugita Gempaku was based on a Dutch translation with drawings of Johan Adam Kulmus' *Anatomische Tabellen* (1722), in which verifications were made by dissections. It represented an empirical approach to nature, which undermined the prestige of Chinese medicine.[5] By the early 1800s, Western medicine was being introduced, and one European professor opened a small medical academy in Nagasaki in the 1820s.

Other sciences were dependent upon physician "scientists" also. A work on astronomy based on Aristotelian and Ptolemaic views of nature (*Kenkon bensetsu*) was published in Japanese by a Jesuit, Christovao Ferreira, in the 1640s. Copernican views were introduced in 1792, and had limited distribution. However, there was little or no formal training, few research academies, and unfavorable views of those doing science by the government.

When Japan was forcibly opened to the rest of the world by Commodore Perry's fleet in 1853 (after some 250 years of self-imposed isolation following a brief exposure to Christianity and European values during the sixteenth century), Japan found itself overwhelmed by the technological superiority of the West. Following a few years of turmoil, the dormant emperor system was reinstated in the "Meiji Restoration" in 1868 for unifying the country and supplying a rallying point for the country's rush into the modern age.

The battle-cry for catching up with and surpassing the West was *wakon yosai* (Japanese spirit, western learning), referring to their desire to import anything and everything of practical use while maintaining their own unique identity as Japanese. This resulted in a wholesale importation of modern science and the technologies it had spawned without any of the philosophical base from which it grew. One Japanese Christian professor described this in terms of "importing the branches of the tree without the trunk or roots."

Biological reductionism and naturalism

Those roots, of course, are firmly planted in the Christian world view of God and his creation. Naturalism has become the dominant paradigm through

which particularly biology and related sciences are practiced today. The philosophical basis for naturalism itself, however, has a definite connection to the issue of religious faith and science. The paradigm shift that occurred with the Darwinian revolution had strong religious motivations based on the philosophical desire to eliminate any thought of a personal Creator God (and the moral and ethical demands inherent therein). It desired to explain everything in terms of "natural" processes alone and, at least in its origin, was an effort to give the scientists authority that had been previously held by priests. It replaced the view of the ultimate reality being the personal Creator God as revealed in the Bible, with a "blind watchmaker" (Dawkins) type of impersonal "Nature" that somehow through random chance natural processes alone resulted in the world as it is. Many scientists in the West are not aware that practically all of the early scientists who laid the foundation for the modern scientific movement were devout Christians whose understandings of the faith were foundations for their scientific work. Likewise, the errant view that science is based only on objective facts and that the history of science is one of emancipation of the truth from the shackles of religious dogma is also widespread, despite the wide acceptance of Kuhn's idea of the importance of paradigm shifts in science and Karl Popper's ideas on the falsifiability of science by the scientific community.

The debate between religion and science in Western scientific journals continues, as seen in some recent letters.[6] In general, we do not see many nonscientific papers in science journals in Japan. In biological fields, the prevailing view is reductionist evolution. Josephson[7] suggested what others had raised before, that there may be a genetic basis to religious belief based on the idea that religions are to promote human goodness. However, religions may have more to do with beliefs about eternal salvation than promoting goodness. The father of sociobiology, Ed Wilson, suggested religious practice is a biological advantage, as it provides each believer "unquestioned membership in a group."[8] Whether religiosity is genetic (and there is some data to support a link from adopted twin studies), these letters show that the science and religion debate continues.

Reductionism is accepted among Japanese perhaps more than in the West. Explanation of human behavior by molecular biology and neurobiology is a common theme in media portrayals of science and in the thinking of scientists. However, science is not necessarily reductionist, and the Japanese mindset may be more open to relativism than the Western one. For example, we could consider that the book, *The Selfish Gene*,[9] is challenged more among Japanese biologists than Western ones. It is considered too simple — or perhaps too scientific. Also, the status of animals is generally lower. Scientists in Japan are freer to use animals than in the West. Most Japanese do not think animals possess the same moral capacities as people, but they are thought to possess souls. Once a year at the university animal research center, scientists have memorial services for the research animals. There could be a similar gap between faith and practice in the case of spiritual views of animals and attitudes expressed by practice, as there is between religious faith and science.

Logic and a consistent world view

We could say that a logical world view is one that integrates all the information and beliefs that we have in a consistent and logical way. The world view that all truth should be unified, namely that one's understanding of ultimate reality and meaning within both one's science and in one's personal view of life should somehow be congruent with each other, is a fundamental premise of Western thought. It is a natural outgrowth of the biblical world view and ancient Greek philosophy, integrated through history by philosophers before and after Aquinas. For the Christian, this means that the fundamental premises of one's scientific paradigm should not conflict with one's understanding of the Christian faith. For example, as a Christian one cannot profess belief in a personal Creator God and simultaneously, as a scientist truly believe that we are the result of a completely undirected, purposeless natural process that just somehow came into being without any divine input.[10] Deism is the view that God exists but is not involved in the world, but it is also not an explanation for the Japanese belief, because some people still pray to animistic spirits, suggesting the intervention of spirits into the physical world.

It is not that this logical consistency or ideal of continuity is totally lacking in Japan, but it seems to be significantly weaker. With its major introduction into Japan during the last 130 years, Western logical thought certainly has taken root. However, the traditional non-logical thought processes that were part of the Japanese world view are still strong. This has led to a number of seeming contradictions, such as highly educated people living in a technologically advanced country still following superstitious, magical beliefs. The typical Japanese is both highly religious and "non-religious" at the same time. There is a very definite divorce between out-

ward form and inward belief that manifests itself in many ways, including the way Christian scientists view the relationship between their faith and science.

Historically, this separation between outward form and inward belief can be traced back at least as far as when Christianity was officially banned at the end of the sixteenth century and Japan began its two-and-a-half century isolation. The main symbol of the persecution that occurred then was the *fumie*, a wooden block with an image of Christ, that one had to step on to symbolize one's renunciation of the faith. The foreign Jesuit priests were coerced into stepping on the image not so much by the threat of their own execution but by being forced to watch Japanese believers being tortured and killed. Part of the persuasion tactic employed was to say that they could continue to believe whatever they wanted in their hearts as long as they conformed outwardly, and it was only when they agreed to step on the *fumie* that the lives of their Japanese converts would be spared. This separation of outward form and inward belief was also clearly seen during World War II, when Japanese Christians were coerced into obedience to *State Shinto* (*Shinto* — "the way of the gods") and worship of the emperor. The Christian faith could be believed in one's heart provided the person, as a good Japanese citizen, faithfully fulfilled all of the *Shinto* ceremonies associated with national unity and purpose. For a good, general description of current religious customs in Japan we recommend the 1993 book, *The Unseen Face of Japan*, by Lewis.[11]

Freedom of thought and religion is guaranteed in the postwar constitution, but in practice this earlier concept is still a powerful force in the lives of many Japanese today. In other words, the demands for conformity to the expected norms in family and social life effectively suppress freedom of religion — that is, an active, outward form — in the lives of many Japanese. You can still believe in the Christian God in your heart and your belief is respected as long as it is not expressed too actively. We suggest this trend is related to the gap between personal philosophical/religious beliefs and scientific understanding among Japanese scientists; they may believe but not link faith to their scientific world view.

We could also say that the style of Japanese religion, belief in an irrational world controlled by capricious spirits, is a "God of the gaps" mentality. God is used to explain everything we do not know. Since science can now explain many things, followers of such a way of thinking now only need a smaller contribution to the universe to come from "god," and may believe that everything could be explained eventually by science. In Japan scientists and academics are very well respected, while religious groups do not command as high a level of respect, and are perhaps viewed as more corrupt than in the West. For marriage and funeral services large fees are often requested, which has added to this image, and the suspicion that a religious cult was linked to the March 1995 toxic gas subway murders in Tokyo took no one by surprise inside Japan. Thus, we see much faith given to molecular biology and neuroscience as methods to understand the nature of human beings. Ironically rejection of this paradigm, which is inadequate to answer the deep questions of life, is also turning some Japanese to seek mysterious religions or cults to provide alternative views.

While the practice of science within the framework of one's philosophical or religious beliefs is not as pervasive as it once was in the West, there are still many Western scientists who have a religious or at least quasi-religious motivation to their scientific work. It is not uncommon to find a scientist in the West using science to promote their particular religious beliefs, be that Christian, "New Age" type mysticism or the actively anti-Christian atheism promoted by some neo-Darwinian evolutionists. In Japan we do not see scientists using science for any "evangelistic" activity. In the media documentaries, however, most Japanese biologists start from a reductionist explanation of the universe, though they believe this stand is without any faith.

While we think Japanese do not connect the logic of science and faith in religion as much as Westerners, this is difficult to quantify. In some opinion surveys over the last few years, attitudes to bioethical dilemmas have been explored using open response questions. In a 1991 survey of scientists, high school teachers, and the public in Japan, 16-20% of scientists did express concerns about genetic engineering — that it was "playing God" or "unnatural" — which is similar to the level of concern seen in New Zealand scientists. In both countries the public expressed somewhat more of these types of concern, consistent with scientists having a more logical world view, but interestingly the range of concerns was similar. This similar range of concerns was also found in public surveys in 1993 in Australia, Japan, Hong Kong, India, Israel, New Zealand, the Philippines, Russia, Singapore and Thailand, despite the variety of religious faiths and extent of religiosity.[12,13] Thus, it appears that some people do connect "religious" type concerns to logical science and cost-benefit type of analysis. So if there is a conflict between science and faith at this level of decision-making, they may not always be placed in separate mental categories.

Use of science and values

There are different ways to explain why people may pay more attention to science than to religion. Currently Japan prospers. In times of economic security and consumerism, the wonders of science may appear more exciting. The obsession with the physical world may have taken attention away from the spiritual, and this has led to more appreciation of science and scientists. It is true that there are trends against this materialism, and one sign of this is that there is growing attention given to the quality of life. Education may have also become more focused on the scientific method and the transfer of information rather than values, so that children learn more about science than they do about life values. These factors could also be said of people of all ages in Japan, and this may contribute to the preference for scientific answers over religious ones, which is even taken into non-scientific issues. We define science here as the study of theories that can be shown to be falsifiable (Popperian science).

The issues of the misuse of science and technology and associated challenges have been recognized in many countries, including Japan. Here there is less conflict seen between religion and science by scientists. Many scientists accept a role for the lay public, as well as religious representatives when considering the value questions over application of science. Among science and medical ethics committees, the last few years in Japan have seen the growing introduction of persons representing religious viewpoints, though progress is still behind other industrialized countries.[14] Even in this area we see some Western scientists continue to object to the involvement of value questions in scientific research, especially if it is associated with the "so-called" objective science, as seen in the attack on the creation of a new professorship in theology and natural science in Cambridge University by the journal *Nature*.[15] While in questions of moral choices, religion is more readily accepted, there is also a movement in philosophy to attempt to draw clear boundaries between philosophical ways of making decisions and theological ways.

Interestingly, Kant is one of the most popular philosophers among Japanese scholars and writers, but they selectively use his non-religious texts and are ignorant of the deep Christian faith responsible for his views.

Conclusion

We have explored some of the reasons that may explain differences we perceive in the science/faith debate in Japan and Western countries. The degree of this difference may be more significant than the differences seen between scientist members of evangelical groups in the UK and those in the USA. Despite the gap between faith and science, we can still see several times as many Christians among scientists and academics in Japan as there are in the public at large. This may be related to greater overseas exposure to Christian ideas that academics have had by virtue of time spent overseas. Nevertheless, personal faith and scientific thinking are more often separated than in the West. ✚

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How many trees did Noah take on the ark?

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Genesis 6, 7, and 8 describe the flood associated with the name of Noah. The narrative is concerned largely with the moral and spiritual situation at one place in Noah's day, God's instructions to Noah to build an ark in order to ride out the coming catastrophe, the gathering of the animals that were to be carried on the ark, the duration of rainfall and flooding, and finally recession of the water to expose dry land again.

Several things in the story are problematical, and inherent difficulties in this kind of narrative have been exacerbated in various ways: overly-enthusiastic translators, implications that are not in the original story, and a willingness to brush factual details aside as inconsequential.

Mountains or Hills?

For example, the statement that the flood covered "all the high mountains," is a pointlessly restrictive translation of a phrase that refers, first and foremost, to "hills." It is conceivable that it could indeed identify mountains, but one does not know that as a fact, and it is not even a good probability; the unbiased and most likely translation is "hills." We infer "mountains" for the simple and sole reason that we want to do it this way.

A good analog can be found in modern Spanish, where *cerro* means "backbone, ridge, hill" or "rise in the ground." Dictionaries generally do not list "mountain" as one of the meanings, yet some people use it in this sense, some published maps identify mountains (rather than hills) with this word, and some translators would choose to use "mountain" rather than "hill," perhaps because the imagery is more impressive.

A very clear and helpful detail is provided in Genesis 7:20. The Septuagint, an ancient Greek text which is by many centuries the oldest version presently available, says (in a literal translation): "Fifteen cubits upward was raised the water, and it covered all the hills high." The Masoretic text (a Hebrew edition from the Middle Ages, and the one that underlies modern English versions) says essentially the same thing. Most translations use the term "mountains" without justification; then, to get around the obvious contradiction, change it to something like "upward to fifteen cubits above all the high mountains." After all, it must make sense, even if we have to delete an important fact that we do not like. (Fifteen cubits may be about 20-23 feet, or 6-7 meters.)

A water rise of 20-25 feet in the course of a flood is not unknown in modern times. If Noah and his contemporaries lived on a broad flood plain, such as that of the Tigris and Euphrates Rivers, this kind of flood would be disastrous. Any rise greater than 25 feet adds nothing to the destruction and does not enhance the fulfillment of divine purpose (although it would make a great movie).

Many people will say that it is *possible* to use "mountains," therefore one *must* use "mountains." Jesus made a comment on this attitude, when he specifically rejected the "pointless spectacular," and opted instead for the "purposeful routine" (Luke 4:9-12).

How much is "All"?

"All" is likewise suspect, but for a different reason. "All the numbers," early in the kindergarten

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year, might mean "1 through 10." For a specialist in mathematics, the meaning is quite different. The appropriate rendition may depend on the sophistication of the writer. But a common procedure in Bible study is to argue that "all" must include everything on every continent, reflecting modern knowledge, thereby removing the story from its original context. The basic idea is: If "all" does not mean 100%, then we really do not know anything. In fact, "all" has many different meanings, as is easy to verify in an unabridged English dictionary, and "100%" is only one of them.

There is a mountain much higher than Mount Everest on Mars. Was this also covered by Noah's flood? It is Olympus Mons, and it stands some 27 kilometers above the Mars datum (about 90,000 feet tall), therefore about three times as high as Mt. Everest. For those who wish to believe that "all" invariably means 100% of everything that we can think of today, the answer is "yes" (the text clearly does *not* say, "except on Mars," or "on Earth only," and we *must* stay abreast of modern knowledge).

The critical point is not the sophistication of the translator or the reader, but the extent of knowledge of the writer. Did the original writer of this part of the record really know about, for example, Fujiyama? Or Mt. McKinley? Or Mt. Everest? What did "all" mean in *his* vocabulary? What it means in the vocabulary of the twentieth century is of no significance here.

"All" appears again in phrases like "all the Earth" and "under all the heavens." (The latter certainly includes Mars.)

Land or Earth?

Ancient peoples had no concept of the Earth as a planet. To them, the Earth was the platform (e.g., "stage") on which the drama of life was unfolded, and planets were merely wandering (that is, erratic) stars that astronomers could distinguish from other stars that had regular behavior. (The English word "planet" was derived from the Greek word meaning to go astray, or to wander.) In ancient times there was no connection between the Earth and the planets that were seen in the sky. Galileo's "sin" was in making a rational connection.

The word "Earth" (with a capitalized initial letter) refers to our planet, an almost-spherical object suspended in space, and this word should be used sparingly, if at all, in translating ancient documents. In the book of Genesis, two different Hebrew words are rendered as "Earth" or "earth" in the flood account: (1) *arets*, meaning land, ground, dirt, or country, and (2) *adamah*, meaning ground, soil, land, region, country. Either one means "earth," (that is, dirt or soil), but neither means "Earth." To render either one as the latter is to insert a concept that did not exist then. Considering the intellectual baggage which this word carries with it today, it should not be employed in translating the flood story. It requires an implication which is not permissible.

The ancient Greek version of Genesis uses the word *g**, in which the second symbol is a vowel, but not "e" or "a." It has a sound close to that in "day," "may," and "say," but not "red" or "fed," not "seed" or "need," and not "lad" or "sad." The meaning is land, dirt, plowed field, or country, but not "planet." This is the term from which we get the word "geology." We have extrapolated the latter (but not the original Greek word) to cover our planet.

The most appropriate rendition, in either case, appears to be "land," although "ground" might serve as well. Not only is the meaning, in the Genesis story, well represented by "land," but we should keep in mind that this term refers to the land as Noah knew it, not the land as it appears on some modern map or satellite image.

Words, Words, Words

Various people have discussed these points (hills, all, land) before, but it is popular to sweep logical discussion to one side, perhaps because logic, without facts, may not carry much weight. But in the present case, we have two important details that are undeniably part of the record, and they shed a great deal of light on the story.

These two specific and pertinent factual statements in the Genesis account do not depend on our ability to evaluate properly the sophistication of the writer. One is the fact (listed above) that the water rose 15 cubits (about 20-23 feet); this places a limit to flood height. The other is the statement that a dove, having been released from the ark, brought back a "freshly-plucked" olive twig (Gen. 8:11). Freshly-plucked means "green," in the parlance of today; if the leaf (or twig) were brown, "freshly-plucked" would be an error.

There is immediately a question of origin of the green leaf (or leaves). What was the location of the olive tree from which the dove got the twig? If the tree was on the ark, then Noah must have stocked the latter with a selection of trees. So, how many trees did Noah take on the ark? Was any specimen

a blue spruce or a Norfolk Island pine (not known in his part of the world)? Why does the record say nothing about collecting trees?

Obviously, Noah did not think the olive tree was growing in a suitable tub on the ark. Therefore, it must have been located somewhere else. It is not permissible to infer that the olive tree, still bearing green leaves, was newly-exposed by the falling water level after some five months of submergence (Gen. 7:24). Tree leaves must breathe, taking in air (for the carbon dioxide content), and exhaling oxygen. This is done through the stomata, numerous tiny openings which are present on the underside of the leaf (as well as, for example, on the stem).

It is easy to kill a leaf — and to do it quickly — by coating the underside with paint or varnish, thus plugging the stomata. Trees, which are covered by water for much less than 150 days, die (they can't breathe). The covered leaves die almost immediately. One does not have to paint the leaves of living trees to learn this; many a modern flood has left ample evidence.

The dove was gone from the ark for a few hours because according to the Genesis account, it returned the same day. This means that the green olive tree could have been tens of kilometers away, or perhaps as much as a few hundred. At that distance, the land had not been covered by the Noachian deluge, because tree leaves were still green.

Then Why the Ark?

If safe high ground was available within reasonable walking distance (ten or a hundred kilometers), why was Noah instructed to build an ark? Walking would have been simpler. This is a theological question, rather than a scientific question, and therefore it must be approached in a distinctive way. There are at least two possible answers: (a) The ark is a model of salvation through grace, whereas "walking to safety" (or running) is a model of salvation by works; and (b) The ark is a model of how stupid all of this looks to the outsider, until it is too late; the outsiders (at the time of the flood) had had a good time, making fun of Noah and the carpentry work.

An auxiliary answer might be: If Noah and his family had walked to safety, other members of the community could have done so also, even though they were targeted for destruction. They had to be confronted with an option that appeared to be foolish "on the face of it."

These are extremely important theological statements. Many people believe that "salvation by grace" is exclusively a New Testament concept, and has no place in the Old Testament. However, the story of the ark is *specifically* one example of this doctrine, and it appears in the Old Testament for this theological reason, *not* because it would make a great novel or movie.

The green olive leaf also provides an implication about the height of the flood: olive trees, then, as now, did not live at high altitudes. Therefore the tiny bit of information about the olive twig provides limits about both extent and height, and confirms the statement that the waters rose about 20-23 feet.

With this information, one must choose "hill," but not "mountain." "Hill" is the preferred translation anyway, unless there is strong evidence to the contrary. Also with this information, one must render "all" in terms of the knowledge available to Noah and his contemporaries, rather than in terms of a modern atlas. And, finally, "land" is obviously a much better translation than "Earth."

Furthermore, it is appropriate to ask the question of why God would choose to drown the tip of Mount Everest, merely to eliminate a relatively small group of people (all more-or-less within walking distance of Noah's house) on the low-altitude coastal plain, where a flood 20-23 feet high would do exactly the same thing. It is not instructive to reply that we do not understand why God might do this or that; of course we do not understand everything, but such a remark is an evasion of our responsibility to use our minds. The comment of Jesus (Luke 4:9-12), about rejecting the spectacular, should be helpful at this point.

But is this a Miracle?

One of the greatest problems that we encounter in trying to evaluate the scope of the Noachian deluge, is the demand, by some people, for God to perform impressive Hollywood-style miracles, even when there is no such need. What are the alternatives? Will we deny the faith if we believe that, on some given day, God does something important, but he does it in a way less exciting than what a modern magician, such as David Copperfield, is represented as doing? I have been told that a person who rejects the concept of total submergence of all mountains, is not a Christian — apparently an otherwise unstated theological requirement is at stake. It seems that God must do every conceivable miracle, at the maximum scale or rate, or he is not thought

to be God. Perhaps we should contemplate the problem of why he did *not* do any number of other conceivable miracles.

The green olive leaf, and the 20-foot rise, reduce the "global flood" of popular opinion to something less than that, but these two facts are part of the Genesis story, and should not be cast aside. If we accept the story, then we should accept these details.

Perhaps the result is a bonus: we can now concentrate on the concepts that are taught in the flood story, rather than stopping with a mere superficial admiration of a human conceptual edifice, erected by us for our own amazement. In other words, perhaps we will be able to turn away from the "cowboy story" with its gee-whizz aspects, to the theological drama. If the latter is not pre-eminent, then the narrative should not be in the Bible.

In fact, the idea of a limited flood doing precisely what it was supposed to do, but nothing more, fits well into the overall framework of the Bible (although it does not fit the popular but extra-biblical notion that everything done by God must be an extravaganza). It also fits into the history of the region, possibly the plain of the Tigris and Euphrates Rivers, where truly major river floods have been relatively common (perhaps every few centuries).

As a structural parallel, we may note that Paul was freed from prison in Philippi by an earthquake (Acts 16:26). It is commonly assumed that this event was a miracle. However, the prison was located in one of the two main earthquake belts of the planet: a single minor quake (the structure did *not* collapse) was routine, rather than extraordinary. One might as well say that every earthquake in California and in Japan is a miracle, and that natural processes have nothing to do with them. There was no miracle in the minor event in Philippi, but there *may* have been (depending on one's point of view) a miracle in the timing.

Type of Flood

There is one other facet that is worth mentioning. In addition to the question about "How many trees were there on the ark?" we need to ask, "What *kind* of flood was this?" The pat answer, of course, is that it was rain water, which at first glance appears to be both biblical and logical.

In fact, floods are of two main types: (a) Fluvial, due to one or more streams spreading out beyond their banks, and (b) Coastal, due to a severe storm, or an unusually high tide, or some combination of these two. Short-term rises in the coastal cases are a matter of only a few meters. However, the geological record is full of regional (but *not* global) evidence for coastal floods, much larger than this, due to the ocean spreading (very slowly) hundreds of kilometers beyond its earlier banks on a long-term basis.

Melting of the present major ice caps (Antarctica and Greenland) would raise sea level some 60-70 meters, and this would take thousands of years. The melting of the former North American and European ice sheets, between roughly 20,000 and 10,000 years ago, raised sea level by 130-140 meters to about its present position. Smaller melting events raised sea level by smaller amounts, for example 5 or 10 meters. The most recent 15-25 meter coastal flood occurred some 8,000 years ago, and the combined rise and fall were spread across three or four centuries.

There has been a good deal of public concern, recently, over possible global warming and an associated sea level rise (perhaps as much as 8-10 meters); this concern is based on the fact that such a rise — if it were to occur — could devastate places where there are large concentrations of people, from New York and London to Calcutta and Tokyo. Rises this large, and larger, have taken place various times in the geological past, and presumably will take place again. Nevertheless, no known rise was global (e.g., reaching to the tops of the highest mountains), no matter how much damage was caused locally.

Conclusion

Perhaps the question of possible coastal flooding, in the next few decades, is not as important as the question that arises directly from the biblical text: How many trees did Noah take on the ark? The answer should be quite clear, and it is not trivial. If the answer is "one or more," then the dove could have found a fresh leaf in a minute or two. If the answer is "none," then the next question is: What is the point of the story? Is it physiographical? Or meteorological? Or theological? If either of the first two, then the story should not be in the Bible. If the latter, then what is the doctrine? This is well worth pondering. ✚

For Background Reading

Tanner, W. F., 1993. "An 8,000-year record of sea level change from grain-size parameters: Data from beach ridges in Denmark." *The Holocene* (published by Edward Arnold, England), vol. 3, pp. 220-231.

Essay Review

Toward Responsible Christian Stewardship

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ON BEHALF OF GOD: A Christian Ethic for Biology by Bruce R. Reichenbach and V. Elving Anderson. Grand Rapids, Michigan: Wm. B. Eerdmans Publishing Co., 1995. 348 pages, bibliography, index. Paperback.

This book is part of a series — Studies in a Christian World View — that focuses on the relationship of Christianity to the various academic disciplines, in this case to the science of biology. The two authors, well equipped by training and experience to deal with the multiplicity of issues involved in the topic of a Christian ethic for biology, have collaborated to produce a rich and challenging overview of many of the most challenging ethical issues encountered in today's world.

Bruce R. Reichenbach is Professor of Philosophy at Augsburg College in Minneapolis, and V. Elving Anderson is Professor Emeritus of Genetics at the University of Minnesota, Minneapolis. After an introductory discussion of science as a human way of knowing, they develop an ethic of stewardship based on the biblical commands to fill, rule over, and care for creation. They then apply this ethic to the major ethical issues relating to the biological sciences: the environment, reproductive technology, and genetic engineering. Next they explore the ethics of the process of knowing itself and how this relates to doing, and consider a variety of issues involving brains, genes, moral responsibility, and human sexuality. The general thrust of the book is to provide the framework within which responsible Christian stewardship can be lived out, and to provide insights into the most critical questions and typical answers given by others to date. The reader is then "sent forth" not usually with the final answers to critical issues, but with the background and understanding to seek those answers while avoiding naive or mistaken approaches. "Our solutions," the authors write, "are not meant to be dogmatic; rather, they are intended to stimulate further discussion."

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The authors recognize the difficulty in defining their ethical choices in a simple and straightforward way from the Bible itself.

> It is often difficult, if not impossible, to find explicit statements regarding many of the moral problems we face. This applies, though not uniquely, to biological ethics. ... the Bible never explicitly considers the ethics of many biological issues, such as abortion, in vitro fertilization, genetic engineering, use of pesticides, tropical deforestation, species preservation, fetal and animal research, genetic variability or the basis for alcoholism, schizophrenia or sexual orientation. ... To require the moral judgment to be explicitly biblical introduces the danger of making the biblical authors say something they really did not say about a topic they never addressed.

The authors attempt to build a Christian paradigm from biblical guidelines to arrive at ethical decisions. The ethical paradigm used to express concerns in the subsequent discussion is drawn from three commands found in the creation accounts in Genesis 1 and 2: (1) to fill, interpreted primarily qualitatively, rather than quantitatively, with the implication that we have the obligation to "improve where possible both the environment and the human condition;"

(2) to rule over: as God's representatives we have the obligation to gain "both knowledge and control over the earth and its inhabitants;" (3) to care for: those things ruled over on behalf of God. One key aspect of this paradigm is that "it provides a basis for moral standing. ... Something is good because God, who is the ground of values, values it."

At the conclusion of the discussion on environmental ethics, the authors emphasize that ethics concerning the environment cannot be separated from ethics in other aspects of human life. Their conclusion is that "Conservation of the tropical forests must include measures to control human population growth, to find family-sustaining jobs for the disenfranchised rural poor, and to curb the developed world's exploitation of the developing world's resources." Any environmental ethic must tie into "a broader ethic that considers social, economic, political and spiritual problems and obligations."

After a careful analysis of the issues involved in assisted reproduction, the authors conclude that there "seems to be no general human right to bear or father children that creates in others the obligation to fulfill that right," that "to consciously and intentionally undertake a pregnancy, knowing that there will only be one parent there, is questionable morally," and that selective implantation, involving indirect killing of unused fertilized ova, is not to be viewed as equivalent to abortion. Their consideration of surrogate leads to the conclusion "not that surrogacy is immoral or that it ought to be prohibited outright, but ... like all other human actions, it is fraught with dangers and complications." In their discussion of abortion, they make use of the concept of a pre-embryo and conclude that "a pre-embryo is a long way from being a human person." They follow with the clear statement, "This suggests that we should abandon the painful search for a clear point of discontinuity and instead adopt a developmental or gradualist view, according to which the respect due to the pre-embryo, embryo, or fetus is appropriate to its stage of development." The experimental use of pre-embryos for seeking solutions to human problems is judged acceptable if the pre-embryos were not generated specifically for this purpose alone.

After a careful consideration of the various aspects of the human genome project, the authors point out two critical misperceptions: (1) that genetic therapy will resolve all human medical and behavioral problems, and (2) that mapping the human genome will remove individual responsibility for human behavior. After a perceptive chapter on "Knowing and Doing," the authors return to consider "Brains, Genes and Moral Responsibility." They discuss the genetic basis for alcoholism and schizophrenia, the general validity of the self-excusing claim that "my genes and my environment made me do it," and a careful analysis of the different models proposed for reconciling the perspectives of free agency necessary for moral responsibility and those of the scientific disciplines emphasizing the biological causes.

Finally the authors consider the issues related to sexuality and remind us of a fundamental conclusion recently gained: "sexual identity lies on a continuum shaped much like a barbell." They then explore the implications for topics such as the purposes of sexuality, population control, singleness, and the basis for sexual orientation. Concerning the issue of homosexuality they conclude that "persons are not morally responsible for their genetic predisposition to a particular sexual orientation," but are responsible about how they live this orientation out. This discussion then leads to one on the nature of sexually transmitted diseases and a variety of issues involving AIDS.

This book provides an excellent foundation for further exploration of these issues by Christians. It is a valuable contribution to the ongoing efforts to understand what authentic stewardship requires of human beings. ✚

Book Reviews

Book Reviews may now be sent directly by e-mail to: ASA@newl.com

THE FAITH OF A PHYSICIST: Reflections of a Bottom-Up Thinker by John Polkinghorne. Princeton, NJ: Princeton University Press, 1994. 211 pages. Hardcover; $24.95.

As a young reader in mathematical physics at Cambridge, John Polkinghorne participated in the 1965 Oxford conference on a Christian philosophy of science, cosponsored by ASA and RSCF (now Christians in Science). He went on to become a Cambridge professor, a Fellow of the Royal Society, an Anglican priest, and is now president of Queen's College, Cambridge. He has written popular treatments of up-to-date physics *(The Way the World Is,* 1983; *The Quantum World,* 1984) and a series of helpful books on the relationship of science to Christian faith.

Perspectives readers acquainted with Polkinghorne's *One World* (1986), *Science and Creation* (1988), *Science and Providence* (1989), or *Reason and Reality* (1991), will be familiar with many lines of thought in *The Faith of a Physicist.* This work, the 1993-94 Gifford Lectures on "Natural Theology," is a systematic theology following the pattern of the Nicene Creed. The first two chapters (Humanity; Knowledge) expand on the phrase "We believe"; the third (Divinity), on "One God the Father Almighty"; the fourth (Creation), on "Maker of heaven and earth"; and so on, with an added chapter (Alternatives) on the relationship of Christianity to other faiths.

Polkinghorne differs from a number of other writers on "theology in a scientific age" in "wanting to make much more detailed contact with the core of Christian belief." Having thus aligned himself with orthodox (some might say "evangelical") faith, he seems to enjoy the irony that the creed of a modern scientist could be based on a fourth-century document — which finds a place also in ASA's Statement of Faith.

The author's theological approach, a "search for motivated understanding, so congenial to the scientific mind," is suggested in his subtitle: *Reflections of a Bottom-Up Thinker.* He starts from "the phenomena that give rise to the theories," aware that in science "evident general principles" may turn out to be less evident and less general than at first supposed. With so much theology done by "top-down" thinkers, he wants to keep asking, "What is the evidence that makes you think this might be true?"

That empirical, bottom-up approach has great appeal to this reviewer, a confessed "metaphysical minimalist" (in "Science, Selves, and Stories," *CTNS Bulletin,* Spring 1991). Many *Perspectives* readers will be comfortable not only with Polkinghorne's theological method but also with most of his theological conclusions. He rejects the idea that a trinitarian and incarnational theology needs to be abandoned "in favour of a toned-down theology of Cosmic Mind and an inspired teacher" (p. 1). After all, "A scientist expects a fundamental theory to be tough, surprising and exciting." As to process theology, he finds in its picture of God no "adequate ground of hope" (p. 65).

Grappling with historical criticism of the Gospels, Polkinghorne thinks that more can be known of Jesus than some agnostic scholars will allow (p. 93). The confession of Jesus' conception may be troublesome to some, yet he is persuaded that "the words 'born of the Virgin Mary' can be a proper part of the creed of a bottom-up thinker" (p. 145). He takes a strong stand for the historicity of Jesus' resurrection (pp. 106-123).

The chapters on Divinity and Creation delve into God's relationship to the physical world, a perennial topic of discussion in ASA. Affirming both *creatio ex nihilo* and *creatio continua,* the author seeks a less radical way of fusing the Creator's immanence and transcendence than that of "panentheism." To assert that God's care for his creation is continuous is not to deny the possibility of "occasions when that care is exercised in specific ways" (p. 78). To believe in the open character of physical process is not the same as restricting God's activity to gaps in our knowledge. To Polkinghorne, theists who seem reluctant to acknowledge any actual divine activity reveal an implicit deism "only thinly covered by a garment of personalized metaphor" (p. 79).

With many of us, Polkinghorne finds Michael Polanyi's account of what scientists do to be "actually recognizable by a practicing scientist" (p. 47). Of Lewis Wolpert's claim that "Unlike science, religion is based on unquestioning certainties," Polkinghorne says that it betrays a "lack of acquaintance with the practice of religion" (p. 193). *The Faith of a Physicist* is full of other memorable passages and provocative statements.

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THE DARWIN LEGEND by James Moore. Forward by Mark A Noll. Grand Rapids, MI: Baker Books, 1994. 218 pages, bibliography, appendices. Paperback.

James Moore, who has published extensively on Darwin, religion, and belief, now offers us an intriguing piece of detective work investigating Darwin's alleged repudiation of his science linked with a religious conversion near the end of his life. After exposing every facet of the did-he-or-didn't-he options, Moore's sleuthing reveals a

remarkable window of opportunity, leaving the reader to ponder the thought that perhaps Darwin, after all, did make his peace with Christian faith as he understood it.

But there is a deeper message running throughout Moore's portrayal of the tug of war between those who espouse Darwin as rejecting evolution in favor of a narrowly construed doctrinal type of Christianity and those who hijack Darwin for an atheistic rejection of religion in favor of a naturalistic-materialistic interpretation of the science of evolution. Moore pleads for a greater depth of appraisal than mere "either/or" alternatives; to accept Darwin on his own terms and to allow for a range of overarching alternatives without requiring conformity between public and private expression.

There seems to be no convincing evidence that Darwin renounced his theory of evolution. More to the point, there seems to have been no good reason, need, or advantage for him to have done so; for Darwin was "more complex ... than anyone imagined" (p. 110). Indeed, Darwin may well have sought out his publicly professed agnostic stance as a half-way house between what was to him the "damnable doctrine" of legalism masquerading as Christianity, and the godless rejection of religion altogether, for he explicitly refused to the very end to join the atheists.

Moore's Darwin was evidently breaking out of the confining frame of his day. If his theory undermined the "creationist edifice" (p. 36) and fabric of Anglican orthodoxy, the *Origin* was also a "pious work" making a case for creation by natural law (p. 41) while deposing creationist tradition. Indeed, Darwin's work introduced a "grander theology" (p. 39) than creationism. At the time of his burial at Westminster Abbey, there were those who could appreciate this event as "a visible sign of the reconciliation between Faith and Science." If I have grasped the message which Moore wishes to convey, it would appear that Darwin would have felt no need to renounce the one in favor of the other, since he realized that his theory of evolution, if properly understood, could be reconciled with a truly Christian position concerning creation.

Among the issues that Moore declined to develop is the evident disjunction between Darwin's private views and the ultimate course and interpretation of evolution as a scientific theory. Clearly Darwin was not the only source of the idea(s), and as with scientific breakthroughs in general, these do not remain the scientist's intellectual property. So Darwin's personal renunciation of his views, as a matter of principle, would have had precious little relevance to the survival of the theory of evolution. Since scientific ideas take on a life of their own independent of their source, it remains puzzling how either creationist fundamentalists or atheistic anti-creationists could have hoped to gain any advantage by such specious argument from authority.

More important than the issue of intellectual property, though, is the tacit assumption by both sides that this is a zero-sum game; either evolution or Christian belief. It would have been helpful had Moore developed the integrated model he alludes to; an alternative that is quite prevalent and acceptable today regarding creation and evolution. If Darwin was indeed tacitly seeking out such a middle ground, then perhaps this pioneering work in science and religion should be recognized with appropriate accolades.

Moore has set his sights on sorting out the competing claims and refutations about the legend. As to the if-when-how aspects of Darwin's reputed renunciation of evolution in favor of Christianity, Moore has done a remarkable job leaving the reader to ponder this realistically. If I have understood Moore correctly, there is a story within this riveting story. The other story is about a Darwin whose capacity for reconciliation exceeded that of most of his contemporaries and many of our own day. It would appear that Darwin rejected *neither* in his heart, realizing intuitively that an enlightened Christianity would ultimately find his theory of evolution a valuable ally even theologically. Darwin was indeed complex. As Moore concludes his text, "Charles was determined to be his own man" (p. 111). "Perhaps the time has come to let him be."

And so, perhaps it is time to accept him on his own unconfined terms as the evolutionary breakout thinker that he was.

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SCIENCE AND THEOLOGY by Murray Rae, Hiliary Regan and John Stenhouse, Eds. Grand Rapids, MI: Eerdmans Publishing Company, 1994. 251 pages, index, biographical notes. Paperback; $29.99.

This is another book addressing the relationship between science and religion. Many others have wrestled with the uneasy dialogue between science and theology. Some (usually unbelieving scientists) see no relationship at all between the two disciplines and would relegate theology to the realm of fiction or private opinion. Others (usually believers) affirm that all truth is divine truth; therefore science and religion are compatible. Most Christians have struggled with this issue. This helpful book may assist in this regard.

This is a difficult book to summarize because there are six major authors dealing with complex matters. Each of the six authors has written a chapter followed by two responses which serve as evaluations of the main chapters. The six chapters focus on: (1) natural theology; (2) arguments for the existence of God; (3) what theology can learn from science; (4) God and natural order; (5) relativity and theology; (6) creation and causality. The authors tackle such issues as the nature of scientism, God's involvement with the world, the problem of evil, freedom versus determinism, epistemology, postmodernism, foundationalism, quantum physics, and many other complex issues.

The authors, for the most part, speak from a Christian perspective. They affirm that science and theology are compatible. The authors are a mix of scientists and theologians who are clearly knowledgeable in their respective fields. The unifying theme running through the book is that God and science need not be antagonists. It is a theme most ASA members will appreciate since ASA also makes that same assumption.

The book is well written and helpful in stimulating thought on the general relationship between science and faith. My main criticism relates to an oversight. When speaking of epistemology and ultimate truth claims, it seems to me that consideration must be given to the preconditions of knowledge. For the most part, the book assumes that science and theology seek truth through rational-empirical inquiry. In order for "religion" to be acceptable in today's world, it must stand up under scientific scrutiny. Several authors pointed out the problem with this approach. The data making up our world is subject to various interpretations. Arguments for the existence of God are seldom compelling to an atheist. It seems to me that a book of this type must at least explore what I consider to be the most compelling arguments for the truth of a Christian world view, namely the transcendental (presuppositional) argument advanced by theologian Cornelius Van Til.

Van Til argued that before we can decide what is true and real we must establish the pre-conditions for knowing anything at all. Science, using its own tools, can never come to a knowledge of God. However, the scientist must ask this question — How can I know anything at all? The first choice to be made in answering that question is to assume either the reality of God, or God's non-reality. If one assumes that reality is totally "natural" — that everything can be explained without resorting to God — there is no basis for explaining reality in a meaningful way. If God is out of the picture, then everything is happening by "accident" or by "chance." But no scientist can operate from that premise. He or she must "borrow" from the very world view which is denied, namely theism. Science depends on order, regularity, predictability, none of which would be present in our world if the universe evolved from a mindless eternity.

Once we assume the other alternative, Christian theism, we possess a world view which alone can satisfy our need for establishing the pre-conditions of knowledge. With God present "in the beginning" we have a basis for science and knowledge. Without God we have no basis for explaining anything since we cannot even explain how the scientific method works in an accidental, mindless universe.

However, let not these comments dissuade anyone from reading this outstanding book. Those who like to grapple with ultimate issues will find much food for thought in this book.

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DESIGNER UNIVERSE: Is Christianity Compatible With Modern Science? by John Wright. Crowborough: Monarch Publications, 1994.

Wright has had a long career as a researcher in physics and recently retired as Director of Health and Safety for Nuclear Electric in the U. K. A lay reader in the Anglican Church, he is responsible for the "Science and Faith" project at Luton Industrial College. The book has a few illustrations and several valuable appendices.

The purpose of the book is stated in the preface:

> We live in an age when it is customary to explain science in a popular way. This book is no exception. It covers a very wide range of science at a very basic level — the real objective is to show how all this fits in with Christianity — It is intended for the general reader, not professional theologians or philosophers.

It is Wright's opinion that we may have good scientific explanations for many of the phenomena of nature, but that doesn't mean that God is not active in the realm of nature. All that may be inferred from this, he says, is that God permits us to see something of himself through the medium of science. In the author's opinion, this is a key issue. Science illustrates how God acts as a designer.

The author sets forth the evidences for God as designer through a review of current science, as outlined in the following. (1) *Cosmology.* The Big Bang indicates the moment of creation. The anthropic cosmological principle is used to show that there is a purpose for the cosmos. If the physical constants of the cosmos were varied by an infinitesimal amount, the stars and galaxies would not have formed and carbon life would not have evolved. (2) *Particle physics.* The old philosophy of a deterministic universe (with no room for God) has been nullified by particle physics. Quantum theory, the theory of relativity, Heisenberg's uncertainty principle, and chaos theory collaborate to reveal "the significance of random and chance elements which enable a universe of great subtlety and fruitfulness to have emerged." (3) *Biology.* Wright accepts the neo-Darwinian explanation of diversity in life forms. He asserts that "God's hand was on the evolutionary process, sifting the options, preparing the ground for his highest creation, humankind." He is emphatic that there is no evidence that life arose spontaneously from non-living chemicals. He insists that such an event is highly improbable. Wright may properly be classified as a theistic evolutionist.

Wright devotes considerable space to the issue of miracles and the problem of pain and suffering. He also discusses the problem of good. These topics are problems for naturalism as for theism. Wright believes that miracles have occurred, pointing out that such events are outside of scientific methodology. He accepts the resurrection of Christ as an historical fact.

Many scientists, according to the author, subscribe to "ontological reductionism," which he sees as the fallacy of reducing biological observations to "nothing but physics."

Wright has the gift of explaining complex scientific concepts in simple and understandable language. He succeeds in demonstrating that theism is a respectable and reasonable belief system in the light of current knowledge of science. I doubt if ASA members, or others well versed in both science and the Bible, will learn much from the book. For those Christians bothered with intellectual doubts about the relationship between science and Christianity, this book will be of help.

Wright does not specifically defend Christianity in this book. He makes occasional references to Christian beliefs. His main thrust is to defend theism as opposed to deism or atheism. Wright's theism could be affirmed by an orthodox Jew or a Muslim, so he is not addressing the Christian view of God as one might expect from the subtitle.

The God of the Bible is described as purposeful and efficient in his actions relative to man and nature. Wright neglects to deal with this biblical concept of God in his defense of theism. By endorsing Neo-Darwinism, he fails to address the problem of how God, "who guides the evolutionary process" (Wright's words, p. 129) does so by use of a haphazard and seemingly purposeless process as most neo-Darwinians believe.

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WORLDS APART: The Unholy War Between Religion and Science by Karl Giberson. Kansas City, Missouri: Beacon Hill Press, 1993. 224 pages, index. Paperback.
RELIGION CONFRONTING SCIENCE: And There Was Light by Donivan Bessinger. Greenville, SC: Orchard Park Press, 1991. 160 pages, glossary, index. Paperback; $10.95.

The desire to help subsets of the Christian community to relate their faith to contemporary science continues to inspire efforts by writers from diverse disciplines. The contributions of Nazarene physicist Giberson and Episcopalian surgeon Bessinger come out of a desire to clarify the science-religion question, first for their church and then for a wider audience. My interest in this review deals with both the subject matter and the strategies used with faith communities who might be expected to have differing attitudes toward science and the Bible.

Curiously, each author finds himself a radical in his community. Giberson (according to the Forward) wants the freedom to follow the canons of science "without being restricted by scientifically untutored theologians" while Bessinger suggests that his approach may "raise some orthodox eyebrows." Bessinger's religious foil is the fundamentalist literalist while Giberson spends much of his book detailing the errors of "creation science" ways. He prefers to develop his presentation along historical lines while Bessinger, with less space available, dwells primarily on current themes.

Each author begins by defining the nature of the *conflict*. Bessinger finds that is stems from a clash of world views while Giberson sees the issue as a clash of authority, notions which are not all that far apart. It is interesting that there would be science-religion *conflict* in the typical Episcopalian church. Both authors argue the ancient notion that when Christian faith is properly understood there should be nothing but harmony with science. This may be a more eschatological vision than an existential one if history is to be believed. Bessinger finds no conflict between a religiously inspired quest for knowledge and the scientific method.

Bessinger describes world views in chronological fashion; the oldest is the ancient notion of *myth*, a sacred story (perhaps historically true) which carries profound psychological significance for human living. Then came the *alchemical* world view of the European middle ages which provided a transition leading to the *scientific* world view of today which has given vast knowledge of nature but has cut us off from the meaning and inspiration of the *mythic* world. Our challenge is to develop a new world view, a *grand synthesis*, which gives full expression to both reason and spirituality. Giberson discusses the elements involved in constructing a Christian world view along the lines of Art Holmes and Nick Wolterstoff in emphasizing the conflict inevitable when competing world views (lines of authority) clash.

Giberson follows his world view discussion with a careful historical analysis of science-religion discussion ranging from the Greek philosophers to contemporary Richard Dawkins's *The Selfish Gene*. He suggests that a contemporary world view should fall between the extremes of scientific materialism and biblical literalism — a difficult line for those in denominations where theology dominates the scene.

Bessinger turns from world views to how to read scripture. Literal religionists and literal scientists are at a disadvantage. "There is more here than meets the literal eye. The unusual in scripture must be read with a *mythic* eye which offers a 'deeper and eternally new meaning.'" Moses and the burning bush can teach us "to see God in any bush, or every bush, and perhaps even to hear a divine call." His point is that Moses' spiritual experience does not conflict with what we know about science. The Genesis creation story is viewed in documentary hypothesis terms as the *Priestly* and *Yahwist* stories. The Priestly account is seen as having more congruence with current scientific views. Discrepancies between texts or with science require us to look for sacred meanings behind the literal interpretations of the words. The strange physics of small particles, the very fine tuning of physical laws to allow the development of physical life, and the probability of a multidimensional universe and energy-matter interconversion help to frame a new picture which fits reasonable well with the Priestly account.

Cosmology for Bessinger has had a better relationship with the church than biology. He suggests that current science and the anthropic principle offer a far more complete picture than that found in the Genesis accounts on

biological evolution and the interactions among all forms of life. If natural selection makes it difficult to identify design, it may be seen at the level of "life principles." Evolution "pulls" rather than "pushes" the development of life forms. He suggests that a mystical view of religion, more focused on relationships with the divine than on literalistic doctrine, can see the possibility of a triumphant convergence of all things into a divine unity — for example, Teilhard de Chardin.

Giberson spends little time on evolution. He accepts the notion that it is the only game in town, yet recognizes that it has many deep problems. He warns his audience against settling for a theological explanation when a scientific explanation is incomplete. He too, is impressed with the anthropic principle seeing it as "but one example of a kind of fruitful dialogue that could exist between science and religion if both could treat their methods as plowshares capable of tilling the same soil." He appeals to the new ideas stemming from physics that force scientists into considering issues which previously were exclusively theological. Giberson adopts a complementarian approach which views the world from two perspectives—one dealing with detail, the other with purpose. One-dimensional approaches such as that of scientific materialism or creationism give only one part of the story.

Bessinger too argues that quantum mechanics is pointing to the existence of a reality beyond the reach of science. He interprets scripture as requiring an intuitive method for sensing the divine rather than a cognitive method of reason in examining the material world.

Giberson writes in an autobiographical fashion as one who has dealt with the issues from within the Nazarene community. Bessinger personalizes his experience in terms of his medical experience.

This reviewer came away from this study with a renewed appreciation for the diversity of ways in which the Christian can develop a world view which takes into account both God and nature. I suspect that Giberson's *Worlds Apart* will be more transferable to evangelicals. Bessinger's *Confronting Science* deals with Scripture in a way that is more acceptable to main-line church communities. Each of these inexpensive works can provide material for Sunday school classes and small group discussions for the lay community.

Reviewed by J. W. Haas, Jr., Gordon College, Wenham, MA 01984.

DIVINE WILL AND THE MECHANICAL PHILOSOPHY by Margaret J. Osler. New York, NY: Cambridge University Press, 1994. 284 + xi pages, with bibliography, index. Hardcover.

The contributions of Galileo and Newton to the development of mechanics are known by those with even passing familiarity with physics. The present book, subtitled "Gassendi and Descartes on Contingency and Necessity in the Created World," is devoted to two other thinkers of the seventeenth century who were precursors of classical mechanics. Margaret Osler, of the University of Calgary, deals with their differing views on matter and scientific method. She especially emphasizes the ways in which they translated important ideas of Christian theology into their ideas about the nature of matter and about the roles of theory and observation in understanding the world.

The first chapter sets the basic theological background for God's action in the world. It presents the difference between rationalist theologies typified by Aquinas and voluntarist views typified by Ockham. Rationalism argues that God is in some way bound by necessary relations embodied in the natural laws which God has created. Voluntarism, on the other hand, stresses divine omnipotence to the extent that it denies that God's action in the world is bound by anything beyond the law of non-contradiction. The difference between these traditions can be related, Osler argues, to differing emphases on God's *absolute* and God's *ordained* power, a theme carried through the entire work.

In the seventeenth century, Gassendi and Descartes, both trained in the Roman Catholic tradition, took these different routes as they contributed to the newly developing mechanical philosophy. Gassendi's voluntarist approach took the form of rehabilitation, though with considerable modification, of the atomism of Epicurus. Osler titles Chapter 2, "Baptizing Epicurean philosophy," a baptism which Gassendi the priest required because of the common association of Epicurean philosophy with practical atheism and materialism. As far as the development of mechanics was concerned, an important implication of Epicureanism was the contingency of all that happens in the world. There are, Gassendi thought, no universal essences or natural laws which God is bound to obey. This means that we can know about natural phenomena only by observing them.

Descartes has also been characterized as a voluntarist by some modern philosophers, but Osler argues in Chapter 5 that this is a mistake arising from insufficient attention to his medieval theological background. Descartes, like all Christian thinkers, believed that God had freely created all things as he willed but, like Aquinas, thought that God had made the eternal truths and laws of the world to be necessary. God created our rational minds to be in accord with the rationality of the world. Thus, it is possible for us to have *a priori* knowledge of eternal truths and laws, though the variety of phenomena makes observation of the world a practical necessity if we are to understand it.

This study of the thought of Gassendi and Descartes, their differences, and further developments of their approaches will be of interest primarily to those concerned with the evolution of early modern science, and especially with ways in which Christian theology influenced that development. Relativity, quantum mechanics, and chaos theory have made us aware of the limitations of the "mechanical philosophy" in the narrow sense, but some con-

cerns of the seventeenth century endure, though perhaps in transmuted form. When Einstein said in his essay, "On the Method of Theoretical Physics," that "pure thought" can, in a sense, "grasp reality"— though experience is the final test of theory — the connection with the Cartesian tradition was clear.

Osler's book is also of value for those involved in the science-theology interface today. Some of the fundamental questions in that dialogue have to do with the way in which God interacts with the world, and classical understandings of divine providence are certainly germane to the discussion. Of course, theology, like science, has evolved. Modern theologians will not, for example, simply take divine immutability for granted, so that Descartes' derivation of the necessity of the laws of nature from the unchangeableness of God is open to question.

Divine Will and the Mechanical Philosophy is well written, sustaining the reader's interest as the detailed theological and philosophical details are laid out. The number of small but annoying typographical errors is, however, disappointing for a publisher of Cambridge's reputation.

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

SCIENCE AND THE BIBLE: 30 Scientific Demonstrations Illustrating Scriptural Truths by Donald B. De Young. Grand Rapids, MI: Baker Books, 1994. 110 pages. Softcover; $6.99.

This book is written to provide science activities that are analogous to scriptural truths. The title is clarified in the introduction where the author states that the "book contains thirty Bible and science activities." These activities are listed with a brief description and the appropriate Bible reference in a helpful table that follows the contents page. This book is the third in a series of similar books that address science, astronomy, weather, and the Bible.

Each experiment presents a theme, Bible verse and lesson, a description of the demonstration, and an explanation of the science involved. A good example concerns the theme of an empty heart (Luke 11:24). The "Bible Lesson" expands on the return of an evil spirit to the former abode and demonstrates the principle by dropping a burning paper into a wide mouthed jar. A shelled, hard-boiled egg of slightly larger diameter than the jar opening is then placed over the mouth of the jar causing the egg to vibrate as warm air is expelled, but upon cooling the egg is sucked back into the jar. The analogy being that the evil spirit, or egg, will be sucked back into the person.

All but two of these demonstrations could be classified as physics experiments that make use of gravity, air pressure, magnetism, or other natural phenomena. The demonstrations use props that are commonly found around the house and each is explained in enough detail to ensure that a nonscientist will feel competent conducting the demonstration and fielding questions.

Several "demonstrations" seem particularly mundane (a bucket of water is safely inverted by swinging it in a circle without losing any water, spinning on a swivel chair with weights at various distances from the center) while others are particularly novel (slicing a banana without removing the skin). Most of the object lessons are designed for children though one or two could be used by pastors, as described on the cover (tearing a newspaper against and with the grain as an analogy to God making our paths straight). In the opinion of this reviewer, there are enough good demonstrations in the book that it could serve as a resource for youth leaders and Sunday school teachers who want to present memorable analogies for scripture lessons.

Reviewed by Fraser F. Fleming, Assistant Professor of Chemistry, Duquesne University, Pittsburgh, PA 15282.

REASONING & RHETORIC IN RELIGION by Nancey C. Murphy. Valley Forge, PA: Trinity Press International, 1994. 282 and xvii pages, index, Scripture index. Paperback; $16.00.

Nancey Murphy teaches Christian Philosophy at Fuller Theological Seminary. Her book is a textbook written for seminary students, which examines reasoning as used in the theological disciplines of ethics, historical studies, biblical studies, systematic theology, sermons, philosophy of religion, and apologetics. She said that the title of the book should really be *Reasoning in Theology*, but changed it to a catchier title to increase interest in the book.

Exercises at the end of each chapter provide opportunities for practice. An answer key to these exercises is available. Murphy acknowledges the influence of Stephen Toulmin and refers to his book, *The Uses of Argument* (Cambridge, 1958). There are diagrams throughout the book to illustrate how to set up arguments. Students in other disciplines may find the first part of the book very helpful while later chapters are more directly intended for theologians. Of course, many of us are theologians at heart and will enjoy those chapters, too. The book is easy to read. I recommend it to everyone who wants to improve their writing or speaking skills.

Reviewed by Jan de Koning, Instructor of Mathematics, Box 168, St. Michael's College (University of Toronto), 81 St. Mary Street, Toronto, Ont., M5S 1J4, Canada.

CHRISTIAN APOLOGETICS IN THE POSTMODERN WORLD by Timothy R. Phillips and Dennis L. Okholm, Eds. Downers Grove IL: InterVarsity Press, 1995. 208 pages, index, bibliography. Paperback; $12.99.

Those who wish to function as Christian apologists in today's world must come to an understanding of a viewpoint usually referred to as "postmodernism." The various authors in this collection of essays provide much helpful information and guidance.

Postmodernism is characterized by an epistemology which denies that humans can access absolute truth. A recent Barna poll reveals that 66% of Americans believe there is no such thing as absolute truth. Relativism is the philosophical orientation of not only the secular university but also the majority of American citizens. This book wrestles with the implications of postmodern thought for the church, especially in the realm of apologetics.

The authors help us understand how the modernism which grew out of the Enlightenment is passing away. Postmodernism focuses on the idea that humans create "reality" with words. There is no such thing as unchanging reality. Ideas of God are simply the result of the stories told in a particular culture. The notion that one story is somehow absolutely true is an oppressive idea which fails to affirm the value of other stories according to postmodern thought. Since orthodox Christianity testifies to an absolute God who has revealed himself definitively in Jesus Christ, the stage is set for an irreconcilable conflict between Christianity and postmodernism.

The only "truth" for the postmodernist is the culturally conditioned "truth" created by language. Once we grasp this aspect of postmodernism we can understand more clearly the dynamics of "politically correct" speech. Postmodernism demands that all perspectives and lifestyles be affirmed, except, of course, those which reflect the notion that truth is absolute and unchanging.

In one of the essays John Stackhouse helps us understand that the traditional apologetic approach of lining up rational arguments to prove the existence of God or the truth claims of the Christian faith simply do not work in a postmodern world. The postmodern person may simply say, "This is fine for you, and I affirm what you are saying. Christianity works for you, but I find meaning in a different story." The notion that one story has universal application is heresy in postmodern thought.

Other authors, particularly Phillip Kenneson, embrace some aspects of postmodernism. Kenneson agrees with the postmodernist that objective truth is unavailable. His solution is for the church to live in such a way as to compel unbelievers to acknowledge the Christian God. While this positive suggestion has merit seems to me he has yielded too much intellectual ground in embracing postmodern skepticism regarding objective truth. One need not choose between objective truth and a compelling church witness. Both are a part of the church's ministry to the world. Once the notion of objective truth is abandoned I find it hard to understand how a vibrant church community can compel faith in view of the fact that there are non-Christian communities which have commendable features. It seems to me that the absolute truth claims of Christianity cannot be abandoned without losing everything.

On the other hand, it was helpful for me to have some of the virtues of postmodern thought pointed out. We do have to be careful when we absolutize. Language does impact heavily on how we perceive reality. Still, the church must take great care in embracing any secular system of thought. As the editors point out in the Introduction, "Loss of cultural respectability and popularity should not concern a church that ought to be more worried about losing a soul than about gaining the whole world" (p. 23).

The book suffers from the inevitable unevenness present when essays by different authors are put under one cover. There is, however, a positive side to this diversity. The different authors approach postmodernism in diverse ways giving us a range of viewpoints rather than a single perspective.

I found the book to be very helpful in my own ministry in a denomination where postmodernist ideas thrive. For Christians who do not have a good grasp of postmodern ways of thinking, this book would be a good starting place. The bibliography will help the interested reader to locate other important books which address postmodern thought.

Reviewed by Richard M. Bowman, Director of Research and Publications, Disciple Renewal, Box 109, Lovington, IL 61937.

EARTH AGE: A New Vision of God, The Human & The Earth by Lorna Green. Mahwah, NJ: Paulist Press, 1994. 139 and ix pages. Paperback; $8.95.

On page viii the writer claims that this book developed out of the Catholic traditions (plural). Green tells how she came to her present way of thinking (pp. 63, 132-134). After she had a nervous breakdown, she had ten years of almost unbearable "free-floating anxieties." She went to a Benedictine and charismatic monastery in Pesos, New Mexico. Although she had studied science through the doctoral level, she switched to philosophy. Then she taught the great books of Western civilization at Santa Fe. In this book, she mentions how Thomas Berry (who wrote the Foreword) and Brian Swimme, the writers of *The Universe Story* (Harper, 1992), influenced her way of thinking.

This book is not a Christian book, though clearly Green has read the Bible. She often uses biblical language, but gives it an unbiblical content. For example, she refers to the earth as the stone which the builders have rejected, which is really the cornerstone (p. 99). She also says that animals are made in the image of the creator (p. 103). Green often uses the thoughts of mainly secular Greek philosophers without showing where the thoughts of these

writers may be found. The book has no index and bibliography.

The only biblical text specifically mentioned is Genesis 1:28-30: "We are to have dominion" (p. 86). Green realizes that it is an incorrect translation, but she appears to put the blame of the disastrous ecological developments at least partly on that text. She does not mention that sin came after Gen. 1 in Gen. 3. Her new earth is not the new earth of Revelation. On pages 91-94, she calls the earth God. Green wants us to go back to nature, and live like the natives do. They know that the earth is a spirit. She claims that in the fullness of time Moses, Christ, and Buddha came to reveal the nature of the universe (p. 68).

I do not recommend the book, though Green does point to sins of our society: wanting "progress" to be measured in money, serving the god "More" (p. 96), overconsumption, and "self."

Reviewed by Jan de Koning, Instructor of Mathematics, Box 168, St. Michael's College (University of Toronto), 81 St. Mary Street, Toronto, Ont., M5S 1J4, Canada.

HUMANITY, ENVIRONMENT AND GOD: Glasgow Centenary Gifford Lectures by Neil Spurway, Ed. Oxford, United Kingdom: Blackwell Publishers, 1993. 229 pages including index. Hardcover.

As we would expect, this edited collection of Gifford lectures is a distinguished work. However, environmentalists will find the name misleading since the book deals with the broad metaphysical environment rather than the ecological environment. Each of the seven contributors makes an outstanding contribution to the metaphysical implications of his field. Three contributors will suffice to characterize the book. John Barrow discusses the roles of law, concepts, and origins in cosmology and physics. Richard Dawkins speculates on how any organism, by interaction with its environment, reflects both its immediate context and its entire universe. John Roberts discusses "History as Environment," but with a clear emphasis upon the ideological environment of events. Philosophers, especially philosophers of science, will find this book to be very useful for understanding the broad philosophical and epistemological implications of several distinct areas of knowledge.

Reviewed by Andrew Bowling, John Brown University, Siloam Springs, AR 72761.

BACK TO DARWIN: The Scientific Case for Deistic Evolution by Michael Anthony Corey. Lanham, Maryland: University Press of America, 1994. 434 pages, index. Paperback.

In this book, which is a sequel to his *God and the New Cosmology*, Corey attempts to reconcile the conflicting ideas between natural evolution and intelligent creation of living organisms on earth. He presents a thesis of deistic evolution which argues that God created the universe from nothing and preprogrammed the conditions for, and the courses of, its evolution, including the evolution of life, for the sole purpose of developing humans and humanity. The author is wise to have declared that deistic evolutionism is not "a true science" but a philosophical interpretation of the known scientific evidence.

Corey asserts that Charles Darwin was a firm believer of God who created the universe, and that the neo-Darwinists deviate from Darwin's belief and have developed the view that Darwinism must be atheistic. He thinks that we must return to Darwin's belief of a Creator, hence the main title of this book. However, in my opinion, the subtitle of this book should properly be the main title and vice versa, because the majority of the book is about deistic evolutionism and not Darwin.

This book is well-organized and covers many areas of science, philosophy, and religion. The extensive bibliography therein shows how well-read the author is. At the end of each chapter, there are lengthy notes and comments which should best be incorporated into the main text because they are not negligible. The text is generally comprehensible, although there are terms that require definition or clarification, such as "pre-scientific humans" and "unconscious awareness" (p. 362). This book has not been adequately proofread, as shown by the many obvious typographical errors throughout the text.

In the later part of the book, Corey extends his discussion of deistic evolution to the field of human behavior (apparently his area of expertise) and anthropocentrism. On human behavior, he indicates a parallel between paranoid thinking and the presumed tendency of some nontheistic evolutionists, and further refers to the actions of these people as chronic reality-twisting. No specific evidence is given to support these allegations. One wonders if the author's behavior in writing these passages ought to be examined.

A few authors on the origin of life have ignored the following basic principle of statistics — a truly random event with an extremely low frequency of occurrence can take place anytime, though we do not know when, but we need not and may not have to wait a long time for it to happen. Also, the probability of an event is not the same as the frequency of its occurrence. Corey, too, seems to have missed these points when discussing the likelihood of spontaneous generation of life on earth and of composing a meaningful sentence by random typing.

Corey insists that it is a profound mistake for scientists to conclude that supernaturalness does not exist simply because they cannot detect it. I believe that most scientists probably would not make that conclusion in that manner. Supernaturalness is outside the realm of experimental science. Whether or not one believes in supernaturalness depends on his or her own faith.

Corey states that animals lack self-consciousness and, as a result, are unable to conceptualize pain and suffering.

I will let the readers decide if that statement is acceptable or not.

In conclusion, I think members of the American Scientific Affiliation will find this book a great reference on deistic evolutionism. However, be prepared to ponder some of the author's arguments.

Reviewed by James Wing, 16212 Red Clover Drive, Rockville, Maryland 20853.

THE EARTH, HUMANITY AND GOD by Colin A. Russell. Bristol, PA: Taylor & Francis, (London: UCL Press Limited) 1994. 157 pages, notes, bibliography, index. Paperback; $18.95.

This book is based on five Templeton Lectures given at Cambridge University in 1993 by Colin A. Russell, Visiting Research Professor of History of Science and Technology at the Open University. His stated intention summarizes the thrust of the work: "to offer a Christian perspective on environmental problems that takes very seriously both the scientific and theological issues." The book is directed toward "general readers" who are basically interested in the perspective on environmental issues provided by a Christian world view.

The book consists of ten chapters dealing with an "Introduction," "the Earth in space," "the Earth in time," "Fragile planet," "'Hurt not the Earth'," "Foes of the Earth," "'Mother Earth?'," "Gaia," "Surveying the prospects," and "Hope for the Earth." Three considerations have shaped the author's perspective: a commitment to the scientific enterprise, a commitment to the Judeo-Christian view of God, and a commitment to the value of scholarly historical inquiry. The author concludes that neither the conventional scientific view in which science is seen as the only solution to all problems, nor the "postmodernist" view in which conventional science is viewed with disdain in favor of a more New-Age oriented perspective, are acceptable frameworks for discussion. The author argues for a third perspective based on the concepts of biblical stewardship.

The author finds the mechanistic world view to be both an enemy and an ally to the Christian faith. Such a world view holds five different ideas: design, materialism, self-sufficiency, determinism, and expendability. He argues for the importance of a mechanical world view for Christianity, and points out that it is significant "that in our own era, when a living Earth has become a central theme of postmodernism, New Age movements and so on, that era can be simultaneously described as post-Christian *and* post-scientific."

Russell considers the various "perils for the planet" due to flooding, volcanoes, earthquakes, comets, meteorites, radiation, solar heating, and then inquires as to the kind of response that is appropriate. In a technological sense, one choice is fatalism, with the only viable alternative to be found in "a determined, but limited, application of technology." In a theological sense, following the example of Jesus when the tower of Siloam fell and killed 18 persons, and the account given in Job 40-42, Russell argues that there is "no direct connection between a natural disaster and individual human wickedness," and that natural disasters are to be viewed in terms of nature acting according to the properties with which it has been endowed by the Creator.

But natural disasters do not account for anywhere near the number of actual and potential disasters that arise from human actions: massive destruction of trees and grass, wholesale destruction of marine life, wholesale pollution of rivers and the atmosphere, and devastating warfare. In some sense, the critics of science and technology have a point, since it is modern technology that has provided the processes that pollute, and by successes in decreased mortality rates, contributed to an immense population explosion; still science and technology have led to a major increase in public awareness of the issues. After discussing the problems of nuclear energy technology, Russell is disconcertingly optimistic when he cites Peter Hodgson and his conclusion "that the huge energy needs of the Two-Thirds World in the future ... can be met only by harnessing the energy of the atom."

There are several dimensions to the human failure to face up to and attempt to resolve the challenges posed by the need to preserve the Earth as the home of the human race: "human ignorance, human greed, human aggression and human arrogance." Ignorance calls for education and more and better science. Greed, aggression, and arrogance call for a "Christian ethic which enjoins love to one's neighbor and respect for God's world." Arrogance calls for a clearly expounded theology of nature, which rejects that attitude which "ascribes to man an absolute right to dominion over all the Earth," and a church "which will proclaim it in intelligible terms as part of its larger proclamation of the Gospel."

Russell goes on to consider the "return to myth" and the invocation of Gaia as a living Earth-entity, as attempts to deal with environmental issues. Confusion concerning the use of the term "Gaia" arises from the fact that it is used often without discrimination in three quite different ways: (1) the *weak* form, "a complex entity involving the Earth's biosphere, atmosphere, oceans and soil;" (2) the *strong* form, "the Gaia hypothesis supposes the Earth to be alive;" and (3) the *final* form, "Life on earth was able to actively regulate the global environment so as to maintain conditions comfortable for life." The *weak* form is seen as having considerable predictive power and as having generated much unquestioned scientific activity. The *strong* form is judged as being without scientific basis, and *the final* form "may be deemed scientific but only if the teleology is immanent." When the *strong* and *final* forms are seen as equivalent to mythological Earth Motherism, they pose "a serious threat to all that we know of science." They become "an aberration of theology and an abandonment of science."

Finally Russell considers six propositions which offer hope for the Earth: (1) The earth is valued by God; (2) God himself is active in creation/restoration; (3) human beings have an instrumental function in Earth's recovery; (4) Earth's destiny is part of God's purpose; (5) the Earth will welcome its Creator; and (6) there will be a new creation.

This challenging and thoughtful book concludes, after citing Revelation 21:1-7, with the following words that deserve to be quoted:

> Here indeed is hope for the Earth; hope for suffering, captive, longing humanity! And here, meanwhile, is challenge enough for all who can embrace this hope and can open mind and heart to the gracious purposes of God for his creation. By demonstrating genuine environmental concern as part of its ministry the Church may yet fulfill the age-old prophetic word to "prepare the Way of the Lord." No steward ever worked harder than when he knew his master was on his way. But inseparable from such labor goes the task of proclamation:
>
> Tidings of a new creation
> to an old and weary Earth,
>
> For at the very heart of Christianity lies that ringing message of imperishable hope.

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

EARTH-WISE by Calvin B. DeWitt. Grand Rapids, MI: CRC Publications, 1994. 86 pages. Paperback; $6.50.

The message of Genesis 1 is the starting point for Calvin B. DeWitt's book *Earth-wise*. DeWitt believes that God is the creator of all that we see around us. He believes that we have dominion over all of creation. He then argues that such dominion forces upon us an obligation to treat creation with respect and do what we can to preserve and rejuvenate the creation.

Oft times, environmentalists try to convince through guilt. DeWitt claims in his introduction that the book "will not pile on the guilt." He does a commendable job in living up to that claim. The arguments he puts forth are generally encouraging and constructive. He does not condemn man nor does he brand most modern technology as tools of destruction of the environment.

DeWitt's concern for the environment grew from his childhood fascination with God's creation. In that creation, according to DeWitt, God made seven provisions for the sustaining of the creation. These are (1) energy exchange, (2) soil building, (3) cycling, (4) water purification, (5) creative fruitfulness (e.g., species with adaptive capabilities), (6) global circulation of water and air, and (7) human ability to learn from creation.

A fair treatment of our responsibility to God's creation must point out those areas where people have done damage and DeWitt lists seven "abuses of creation." Included among these are land conversion, habitat destruction, and global toxification.

Throughout the course of the book, DeWitt cites various scriptures to support his positions. The difficulty in this effort is a lack of any verse saying "Thou shalt not destroy the environment" followed by specific examples of such destruction. God's edict giving dominion also involves responsibility to future generations. However, some passages cited by DeWitt seem to be stretched to cover environmentalism. For example, Jeremiah 2:7 speaks of defilement of the land but the context seems to indicate a spiritual meaning rather than an agricultural one. Neither is it clear to the reviewer that Romans 8:18-21 is relevant to man's environmental responsibilities.

Earth-wise is written at a level that can be understood by junior high students but it is not so elementary that an adult would find it tedious. At the end of each chapter, the author gives discussion topics, activities, and scriptures for study.

Many people, non-Christian and Christian alike, cross the line between concern for creation and worship of creation. In general, DeWitt does a good job of staying away from that line. One of his suggestions for a church environmental project may get too close to the line, though, when he suggests planting a "new church whose mission statement would direct that all members practice stewardship and promote and honor the Lord of creation in every respect." While environmental consciousness is important, such a step seems to this reviewer to be dangerously close to exalting the creation at the expense of the Creator.

The majority of DeWitt's suggestions are good. Many, such as turning off lights when they are not in use, ought to be adopted even by those with no consideration for the environment.

Earth-wise is not likely to win over anyone who is not already at least mildly concerned about the environment. However, for those who want to do more to protect and preserve the environment, it can be a great help.

Reviewed by Fred Worth, Associate Professor of Mathematics, Henderson State University, Arkadelphia, AR 71999-0001.

EVOLUTION EXTENDED: Biological Debates on the Meaning of Life by Connie Barlow, Ed. Cambridge, MA: MIT Press, 1994. 333 pages. Hardcover; $24.95.

Evolution Extended is a collection of writings organized into four sections: (1) Is Evolution Going Anywhere? (2) Tools and Metaphors of Evolution; (3) Embracing the Cosmos; and (4) Evolution and Religion. The selections are primarily from interpretive or argumentative works rather than from research papers.

Though it might be effectively used in certain classroom situations, this collection differs in a number of ways from a standard supplemental resource. The selections vary in length from single paragraphs to chapter-length essays, interspersed with much poetry and art and a few scientific illustrations. Inclusion of such snippets makes the book a kind of scrapbook, albeit a fascinating one.

Actually, *Evolution Extended* is more like a personal journal, with entries accompanied by the editor's reflections and accounts of how she came across them. She did it that way "to give it the feel of a salon." Whatever one's philosophical world view, she says, some voices in her book will surely "say what you most want to hear." The book is "unabashedly philosophical."

To ensure "a seamless presentation," the editor has sometimes stitched together separate bits from the same author, with no indication of ellipsis. Keys to the original works are provided later for anyone seeking exact page numbers. Thus the book ends with not only a good index and annotated bibliography but also with an unusual "concordance" of passages used, plus lists of sources of illustrations and poetry. The editor acknowledges the assistance of many of the authors, particularly those who have inspired her the most (e.g., James Lovelock and Richard Dawkins).

Somehow Connie Barlow majored in zoology without ever learning that evolution had stimulated strong debates. After some wilderness adventures in the Pacific northwest and employment as an energy economics consultant, she was introduced to philosophical aspects of biology at a 1985 lecture on "Gaia" by Lovelock. She became a science writer, producing a collection of selected writings on the life sciences, *From Gaia to Selfish Genes* (1991).

Although evidently attracted to what many would call "New Age spirituality," Barlow offers balancing views to let readers come to their own conclusions. On the question of evolutionary progress, she pits "prophets of progress" (J. Huxley, F. Ayala, E. O. Wilson) against "nay sayers" (G. G. Simpson, J. Bonner, S. J. Gould, D. Raup), concluding with her own assessment that new research on asteroidal impacts has potential for a "reshaping of worldviews" unimagined by Huxley or Simpson.

To passages from Darwin and Dawkins, Gregory Bateson responds that integrative processes may be more important than competitive strife. Other metabiological topics, such as chance, contingency, and self-organization, come up for debate. Despite her partiality to Teilhard de Chardin, Barlow follows his writing with vigorous rebuttals from P. Medawar and J. Monod.

The section devoted specifically to religion contains proposals for making evolution into a religion (E. O. Wilson, J. Huxley), or at least extending it into religious thought (Alister Hardy), plus science historian John Greene's cautions against such moves. "Scientific creationism" is championed as an alternative to evolution (by Henry Morris), disdained by religious liberals, derided by the usual cast of well-known scientists. Yet (surprise!) the last words on the subject come from "conciliators," Martin Eger and Ed Larson (*Trial and Error*). The book's ultimate last words echo the "New Story" of "Global Religious Myth," with Jeffrey Wicken and Brian Swimme as representative authors.

On the whole, this collage is a profitable and pleasurable introduction to nonscientific extrapolations from biology. It definitely reinforced this reviewer's appreciation of ASA's 1991 resolution, "A Voice for Evolution as *Science*" (*PSCF*, December 1992, p. 252), as the "first word" to be said on the subject of evolution. Before speculating on the last word — what something means — we should be clear about what it *is*. It would be unwise to base a philosophy on "evolution" without discerning whether that basis is fact, hypothesis, theory — or somebody else's philosophy.

Reviewed by Walter R. Hearn, Professor of Science and Christianity, New College Berkeley, 762 Arlington Ave., Berkeley, CA 94707.

CREATIONISM'S UPSIDE-DOWN PYRAMID: How Science Refutes Fundamentalism by Lee Tiffin. Amherst, New York: Prometheus Books, 1994. 229 pages, index. Hardcover; $23.95.

When J. C. Whitcomb's book, *The Genesis Flood*, appeared in 1961, it sparked a debate about geology and Noah's flood that has, more than thirty years later, still not subsided. Author Lee Tiffin continues the debate with an analysis of these arguments as they have appeared in the writings extending to his most recent book, *The Early Earth*, as well as in ICR publications. The author's credentials include a master's degree from the University of Maryland and a career as a pastor in a number of Christian churches (unidentified). The analysis is primarily on scientific grounds; those familiar with Whitcomb will remember that his books dwelt also on biblical evidences.

The first section of the book deals with "Issues and Challenges;" Tiffin takes on the creationist's assumptions and methodologies, developing a set of very strong arguments opposing them. A second section, more technical than the first, contrasts "Science versus Creationism;" it is here that Tiffin develops his argument that "scientific creationism" is not scientific. He closes with an all-too-brief section (17 pages) on public concerns and responsibilities. There are good footnotes, primarily referencing the creationist works by title and page, no bibliography (the footnotes serve that purpose well), and a short names index.

Whitcomb and Tiffin do agree that if one takes the Genesis account as literal, the only assumption that fits is "miracle." What Tiffin argues is that geological evidence does not show such a miracle, and that the flood geologists have argued incorrectly that it has.

I like Tiffin's suggestion (to the flood geologists) for a program (p. 33) involving the subjection of a variety of plant species to various saline solutions at varying depths

for a year's time to see which ones, if any, might survive. He is quite critical of them for doing so much speculation and so little empirical testing.

The arguments I found most interesting involve the creationist assumption that the ark held 35,000 larger animals and upwards of 1,000,000 insects, all of whom entered in one day (Gen. 7:11-13). That's efficient dock-loading! Two or three seconds per animal for the big guys (camels, elephants, turtles, sloths, etc.) and (through the same door?) twelve insects every second. All of which had to be directed to their proper place in the ark for their year-long journey by a staff of eight people.

This is a good book. While it brings little new to the debate, it is an excellent summary of the arguments which most seriously refute the flood geology thesis. It is done respectfully; the author does not use pejoratives against the creationists, only against their ideas. For anyone taking flood geology seriously, this book is the place to begin. It is a book which ASA members might consider owning, as it is an excellent first answer to those colleagues and students who might want to study the creationist thesis.

Reviewed by John W. Burgeson, 6715 Colina Ln., Austin, TX 78759.

COMPANIONS IN CONSCIOUSNESS: The Bible and the New Age Movement by Ronald Quillo. Ligouri, MO: Triumph Books, 1994. 191 pages. Hardcover; $18.95.

This as an attempt, written from within organized Christianity, to defend the New Age Movement as a harmonious companion to Christianity. Quillo is a professor of systematic theology, philosophy, and spirituality at the Oblate School of Theology in San Antonio, TX. Previous publications include numerous articles on holistic education and psychological interpretation of Scripture. The thesis of his book is that, far from being threatened by the New Age, Christians and Jews should realize that the Bible has much in common with the New Age, which "can actually provide persons with a fresh appreciation of biblical teachings" (p. 22). He does admit that the Bible and the New Age may never agree on some points, such as the nature of God, but he strongly stresses "parallels" between New Age and Christian doctrines.

The book is clearly written for those who may have little or no knowledge of either Christianity or New Age; accordingly, it covers basic material in fundamental detail. He compares a good selection of fundamental Christian doctrines with "Eleven Principles of the New Age Movement." These aspects of Quillo's work are quite good.

Consistent with the eclecticism of the New Age, Quillo's thought is synthetic, not analytic. He begins by stressing New Age "consciousness," a New Age doctrine difficult for many to grasp, and from which they get their view of the power of the mind to affect the world. Then he blandly applies this formulation of "consciousness" to Christianity and spends the rest of the book showing how the two consciousnesses parallel. He never explains why "parallel" should imply an identity of purpose or a reason to accept each other's viewpoints. The first such parallel is the "divine" and God. Although he admits the pantheism of the New Age concept of "the divine" and its difference from Christian belief in a transcendent, personal God, he persists thereafter in speaking of the (New Age) "divine" as if it were interchangeable with God.

He frankly surveys the Bible from the perspectives of the New Age: "...the principles of the New Age movement provide tentative vantage points from which to assess the Bible's religious message. They are a place from which to begin" (p. 54). On page 71 he calls for syncretistic blending: "Either group can learn from the other and reshape the other's teachings by standards deemed appropriate."

While giving an accurate portrayal of biblical data, he selects and stresses what will appear to synthesize well with New Age: e.g., the faith normally connected with the healing miracles, which he claims "aligns with the New Age views of holistic health where mental dispositions, including positive imagery, are thought to significantly influence bodily and spiritual well being." This includes their methodology of "visualization or the use of guided imagery." Thus, the Christian faith in the utterly transcendent God is "aligned" with faith in and use of one's own mental power and magical procedures!

This is a book, written by a scholar obviously sympathetic to the New Age, which will acquaint one with the basic beliefs of New Age and the arguments used, either deliberately or unwittingly, to win a place for New Age beliefs and practices within the Christian church. Its message is aligned beautifully with the "everyone's o.k." spirit of this age, well designed to penetrate and change a shallow, secularized Christianity. Perhaps the book can also be used, therefore, to sound a wake up call to the intellectual and spiritual leadership of orthodox Christianity! It is the best argument I know of for intensive Bible study under the guidance of the Holy Spirit! *Companions* should be read by everyone in spiritual and intellectual leadership in the Christian church, but it should not be put in the hands of novice Christians, unprepared to analyze the similarities and differences between the two antithetical religions.

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

AGING AND GOD: Spiritual Pathways to Mental Health in Midlife and Later Years by Harold G. Koenig. The Haworth Pastoral Press, an imprint of the Haworth Press, 1994. 544 pages.

Harold Koenig is a geriatric psychologist at the Duke University Medical Center. This thoroughly researched study of the relationship between religion and mental health for those in the later stages of life builds on two major projects. The premise of the book is "that successful

aging is possible for every older person, even in the midst of circumstances that on the surface would appear dismal and hopeless." Successful aging is defined as having a purpose in life that sustains one through times of crisis, possible physical and mental deterioration, and so on.

The book comprises six parts. The first deals with religion and the mental sciences, giving a summary of how the mental health profession thinks about and deals with religion and religious expressions on the part of patients. The second part addresses theoretical issues of human development in general and the development of religious faith in particular. A review of advances in research, especially the author's own work but also that of other researchers, on how patients — especially older patients — find resources in their faith during periods of illness and suffering comprises the third part. The fourth part addresses clinical applications, suggesting ways that religious needs and beliefs can be integrated into overall patterns of care. In the fifth part on special concerns in later life, there are discussions of problems (e.g., Alzheimer's disease) faced by elderly patients and their families. The last part deals with issues surrounding death and how to cope with it.

The book is intended to be useful both as a textbook for educators in the health sciences, social sciences, and religion, and also for policy makers who must cope with the mental health needs of older adults. Since well-known demographic trends make it clear that the number of older adults and the cost of providing care for them will significantly increase in the next two decades, this book is timely and practical.

It can be of particular interest to readers of this journal who work in the fields it addresses because the author presents religious faith as an important element in the experience of individuals as they age, and of North American society as a corporate entity.

Reviewed by David T. Barnard; Department of Computing and Information Science, Queen's University, Kingston.

SHADOWS OF THE MIND: A Search for the Missing Science of Consciousness by Roger Penrose. Oxford, New York, Melbourne: Oxford University Press, 1994. 457 and xvi pages, bibliography, index. Hardcover; $25.00.

In 1989 Penrose published *The Emperor's New Mind*. That book evoked much discussion. The first half of the present book tries to answer objections against and questions raised about *The Emperors New Mind*. Penrose considers four different viewpoints: (1) all thinking is computation; (2) awareness is a feature of the brain's physical action; whereas we may simulate any physical action computationally, computational action cannot by itself evoke awareness; (3) appropriate physical action of the brain evokes awareness, but we cannot even properly simulate this physical action computationally; (4) awareness cannot be explained by physical, computational, or any other scientific terms (p. 12).

Penrose rejects the idea that awareness cannot be explained, which according to him negates the physicalist position altogether. That is the viewpoint of the mystic, and seems to be involved in the acceptance of religious doctrine. Penrose thinks appropriate physical action of the brain evokes awareness. He bases his conclusions on Godel's incompleteness theorem and Turing machines. Part I of the book explains his reasoning.

The title of part II is "What New Physics We Need to Understand the Mind: The Quest for a Non-Computational Physics of Mind." Penrose starts this part by saying that we, our bodies and minds, are part of a universe that obeys mathematical laws. I agree, but obeying mathematical laws does not mean that everything is *based* on mathematics. Penrose starts at the wrong end. Starting with mathematics, he wants to build our understanding of the physical world. Only after we solve the problem of quantum measurement, says he, may we expect to make headway with the issue of consciousness in terms of physical action. He claims that we must solve that problem in entirely physical terms. Only then can we move to the question of consciousness (p. 331). That problem of mind is much more difficult than the measurement problem.

Philosophers of science and mathematics may find the book interesting. I do think, however, that the road Penrose takes leads to a dead end. He sees some difficulties when he talks about human responsibility and asks about the missing ingredient from our present-day physical understandings (p. 36). At the end of the book, he asks for our patience, since he believes that in the mysterious developments of quantum mechanics the concepts of mentality are a little closer to our understandings of the physical universe than they had been before (p. 420). As a Christian I disagree with him, although I agree that science has a long way to go yet.

Reviewed by Jan de Koning, Instructor of Mathematics, Box 168, St. Michael's College (University of Toronto), 81 St. Mary Street, Toronto, Ont., M5S 1J4, Canada.

THE CHRIST: A Critical Review of The Evidence of His Existence by John E. Remsberg. Buffalo: Promotheus Press, 1994. 437 pages. Cloth; $29.95.

John Remsberg (1848-1919) was the author of *Thomas Paine: The Apostle of Religious and Political Liberty* and a strong advocate of "freethought." Remsberg asserts in the preface of *The Christ* that the "supernatural Christ of the New Testament, the god of orthodox Christianity, is dead" (p. 7). While the human Jesus "may have existed," the Christ of Christianity "is an impossible character and does not exist" (p. 11). However, the book is an unsuccessful attempt to establish this claim. Although interesting at points, Remsberg's arguments have been, in the main, roundly refuted by contemporary scholarship — not to

mention by many of Remsberg's predecessors. Moreover, they are often unwarranted, crude, and historically inaccurate. Unfortunately, he raises far more issues than a brief review can address; so I shall try to summarize and critique the gist of his book.

The first chapter is devoted to a refutation of miracles, which renders Christ's existence impossible. Remsberg rightly states that miracles must be possible if the Christ of Christianity is to be believed, but a miracle "is impossible and incredible" (p. 14). The argument Hume advanced against miracles (which are "violations of Nature," whose laws are inviolable) is taken by Remsberg as having "never been refuted" (p. 14). But Remsberg's assessment reflects the prejudice of naturalism and is obviously circular. If God created and sustains the universe, why should miracles be impossible in principle? While miracles, the result of a personal God's actions, are naturalistically-impossible events (which can only be the case for the naturalistically-minded Remsberg), they cannot be excluded from consideration *if* the God of theism exists, and Remsberg has done nothing to show the implausibility of his existence.

In the second chapter Remsberg notes the silence of writers who lived contemporaneously (or shortly after) Jesus, which allegedly casts doubt upon Jesus' historicity. I will only deal with his discussion of Josephus' "Testimonium Flavianum" (in *Antiquities* 18.3), which Remsberg dismisses in its entirety as a spurious Christian interpolation. But while most critical scholars acknowledge a spurious Christian interpolation in two or three places (e.g., "He was the Messiah"), they generally agree that the original (expunged) version *is* authentic. (See John P. Meier's discussion of this in *A Marginal Jew* [vol. 1., Doubleday, 1991]).

Chapter three examines the Christian evidence for Jesus (i.e., the four Gospels), rightly arguing that with "these four brief biographies," Christianity must "stand or fall" (p. 35). Chapters four through eight examine various alleged textual and moral contradictions as well as apparent historical discrepancies in the Gospels (incidentally, which even if true would not necessarily undermine the Gospels' historicity — no more than Josephus' errors would undermine the historical value of his works). However, it can be said that most of these alleged conflicts have been satisfactorily resolved by New Testament scholarship.

Here is a sampling of some alleged problems in the Gospels. (1) "Matthew's genealogy of Jesus conflicts with Luke's" (pp. 46-64). Although a precise explanation is difficult to give, the likely reason these genealogies are discrepant is that they are not one lineage but two: one lays out Jesus' *biological* lineage through Mary and the other his *legal* line through Joseph. (2) "Jesus was born in a *house* according to Matthew but in a *stable* according to Luke" (p. 75). Kenneth Bailey and others have argued that the word "inn" in Luke 2 is a mistranslation of the word "guest room" (*katalyma*, which is found in Luke 22:11, where it clearly refers to the guest room of a private home); many first-century Jewish homes usually had a stall for animals *attached to* their "living room" area but about a meter lower than the living area. So Jesus, having been born in a living room (since the guest room was occupied), was laid a few feet away in a nearby manger. (3) "A number of women went to Jesus' tomb early Sunday morning, but John indicates that only Mary Magdalene went" (p. 224). As with the number of angels or "young men" at the tomb, when the Gospel writers single out one of them, they are not thereby implying that *only* one was at the tomb, but *at least* one. Furthermore, John clearly indicates that Mary Magdalene was not alone; she told the disciples, "We do not know where they have laid him" (John 20:2).

In his later chapters, Remsberg discusses alleged sources of the Christ myth (e.g., nature, solar, or sexual deities), which is nothing more than a severe case of "parallelomania"— treating any two remotely similar ancient beliefs as causally and historically connected. (Remsberg seriously undermines his own credibility by alleging that the cross, the emblem of Christianity, is simply a takeover of ancient phallus worship!) But merely showing that similarities exist is not to give evidence for one's historically *influencing* the other.

In short, Remsberg's often-sensationalistic piece lacks the sober-minded analysis necessary for effective historical critique.

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RESPONSIBLE GRACE: John Wesley's Practical Theology by Randy L. Maddox. Nashville: Kingswood Books division of Abingdon Press, 1994. 416 pages, notes, indexes. Paperback.

Most church historians and writers on the theology of major church figures have demonstrated little interest in the ways that these leaders interacted with the scientific culture of their day. The many hundreds of books, dissertations, and articles lavished on John Wesley in the two hundred years since his death seldom give more than passing reference to his life-long interest in scientific questions and the ways that science was integrated into his ministry. Indeed, the Wesleyan legacy has been traditionally viewed as anti-science.

Thus, it is refreshing to see one of the new breed of Wesley scholars including a treatment of the encounter of Methodism's founder with science in a work dealing with his theological activity. If Wesley touched on every major area of Christian doctrine, it is equally true that he sought to bring the eighteenth century picture of nature to bear on his theological reflections and their practical outworking. However, his affirmation of science was tempered by vigorous dissent when it was placed in the service of his enemies, the deists and atheists, or twisted by his Calvinist adversaries.

Wesley's empirical epistemology embraced the notion that God provided humans with *spiritual senses* to perceive spiritual realities and *physical senses* to gain direct knowledge of the physical world (p. 27). He actively opposed all forms of Deism (pp. 31, 51), embraced a moderate natural theology (pp. 34-5), and wrote a popular multi-volume work on science (p. 49) and a survey of electricity (extolling the potential for electrotherapy). Wesley affirmed conventional eighteenth century views on the role of God as an active creator and sustainer and the "ultimate agent" for all that occurred in the material world. The laws of nature are the expression of God's normal action (pp. 58-9). Wesley worked hard to understand the relationship of the soul to the body avoiding "both a materialist reduction of the relationship and Malebranch's opposite reduction of all creaturely action to God's immediate causation" — human freedom and responsibility must be maintained (pp. 70-1).

One feature of Wesley's writings was his willingness to speculate on the state of nature during the various stages of salvation history. His biological and geological notions may bring a smile to our readers but these ideas still resonate with a segment of American Christendom. He argued strongly for a "renewed physical creation" as part of his postmillennial synthesis (pp. 235-239).

The fact that my review has focused on Wesley's scientific concerns should not obscure the major purpose of Maddox's very readable examination of John Wesley's views on the many dimensions of *responsible grace*. Those of Wesleyan convictions should not be without this balanced and thorough work. The rest of us would benefit from a better understanding of the thought of this pioneering evangelical who appropriated the science of his day to serve the cause of Christ.

Reviewed by J. W. Haas, Jr., Gordon College, Wenham, MA 01984.

JESUS UNDER FIRE by Michael Wilkins, J. P. Moreland, Eds. Grand Rapids, Michigan: Zondervan Publishing House, 1995. 222 pages, bibliography, index. Hardcover; $16.99.

Ten evangelical scholars have contributed to this volume which confronts the arguments put forth by *The Jesus Seminar*, a group of theological liberal scholars who have concluded that much of the material in the four gospels did not come from Jesus, but was added by the early church. *The Jesus Seminar* makes a distinction between "the Jesus of history" and "the Christ of faith." The former is the real, historical Jesus. The latter is the mythical Jesus invented by the authors of Scripture.

The eight chapters of the book along with the Introduction and Conclusion by the editors, take on the conclusions of *The Jesus Seminar*, showing clearly how unconvincing they are. In page after page the conclusions of radical, liberal scholarship are examined and shown to be intellectually bankrupt. The authority of Scripture is demonstrated to be a reasonable, logical belief. Jesus' miracles, his resurrection, and his claim to be the exclusive path to God are set forth as believable doctrines. The lack of consistency in the methodologies used by *The Jesus Seminar* and their inability to make a rational case for their unbelief are presented in a readable yet scholarly fashion by the authors.

R. Douglas Geivett (chapter 7) gives some revealing information about one of the key leaders of the Seminar, Marcus Borg. Using Borg's own words he points out how much of his "scholarship" is based on his own personal "experiences" of God. While any Christian prizes personal experiences of God, it is a flimsy foundation upon which to build a theology. Most Christians test the validity of their experiences over against the inspired Scriptures. Borg exalts his experience and that of others over the authority of the Bible.

Darrell Bock (chapter 3) points out how ancient historians were not prone to invent stories. His quote of Thucydides, a fifth century B.C. Greek historian (see p. 79), is worth the price of the book. It shows that even outside of the Jewish culture there was a great concern to write history accurately. Everyone who has studied ancient history knows how careful the Jewish scribes were in their work. Bock presents a convincing case that it is the voice of Jesus we hear speaking in the New Testament, not the voice of the church. If we give historical credibility to ancient secular historians, why not show the same courtesy to the authors of Scripture?

Is Jesus Christ the only Savior for the world, the only path to God? *The Jesus Seminar* says, "Of course not. There are ways God may be known apart from Jesus." The New Testament claims that Jesus alone can bring us into a right relationship with God. Again, the authors help us to believe that Scripture is more dependable than the results of radical scholarship.

The Jesus Seminar scholars try to present their conclusions as unbiased and reasonable. They assume that the authors of Scripture and, later, the early church leadership cannot be trusted to give us accurate historical data concerning Jesus. Their faith in Jesus drives them to exaggeration concerning his person and work. The authors of *Jesus Under Fire* persuasively argue that if anyone's integrity is to be doubted, it is not the authors of Scripture but the members of *The Jesus Seminar.*

Any person who has been confused and upset by the work of *The Jesus Seminar* will be encouraged and helped by this book. It presents intellectually satisfying answers to every question raised by the radical New Testament scholars. The authors are clear examples of the high quality intellectual scholarship present in today's evangelical church. Jesus may be "under fire" in the camp of theological liberalism, but now *The Jesus Seminar* is under fire to justify their work which has been wonderfully critiqued and found wanting in this excellent book.

Reviewed by Richard M. Bowman, Director of Research and Publications, Disciple Renewal, P.O. Box 109, Lovington, IL 61937.

THE COMFORTING WHIRLWIND: God, Job, and the Scale of Creation by Bill McKibben. Grand Rapids, MI: Eerdmans, 1994. 95 and xi pages. Paperback; $8.99.

This book starts by reminding us that the book of Job is not the story of a patient man. It is the story of a frustrated man who is condemned by an orthodoxy in which he does not believe. Job does not know why he is suffering. Conventional wisdom does not fit any longer. McKibben then draws a parallel with our time when conventional economic wisdom does not fit. Now the wisdom is that growth is good, even at the cost of decreasing natural resources. McKibben says that continual economic growth in a world with limited resources is impossible. In the frustration caused by this contradiction, he turns to chapters 38-41 of the book of Job.

It is a joy to read this short book. It is not a scholarly essay but shows the power and glory of our Lord applied to the present ecological crisis. I heartily recommend it for scholar and "lay" person alike.

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THE BIBLICAL FLOOD: A Case Study of the Church's Response to Extrabiblical Evidence by Davis A. Young. Grand Rapids, Michigan: Eerdmans Publishing, 1995. 327 pages. Paperback; $19.99.

The second rule of science, after "methodological naturalism," was coined (I am told) by the Epicureans as "Consider *all* the evidence." Young, professor of geology at Calvin College, writes about the use and abuse of this rule through the many centuries of scientific and theological investigations of the Genesis flood. He has produced a jewel, a book which deserves a place on the shelves of every person who takes both Christianity and the study of science seriously. It is difficult to praise this work enough, or to recommend it too highly to *PSCF* readers. The target audience is the non-geologist scientist, the Bible teacher, the preacher, and any person — clergy or laity— who sincerely struggles with the problems of the relationship between science and Christianity.

This is a "fun" book to read. Technical terminology is kept to a minimum, commensurate with telling the fascinating story, chronologically, of the attempts of thinkers through the ages to deal with both the Genesis record and scientific data. Of particular interest is chapter 4, "The Impact of the Exploration of the New World." Young is perhaps too kind to Calvin and Luther, who wrote after data from those explorations was available, yet, curiously, ignored nearly all of it. In the final chapter, the modern-day flood theories of Whitcomb and Morris are analyzed. Young is critical of many current evangelical writers for their "departure ... from a familiarity with and an appreciation of mainstream science ..." (p. 301), suggesting that writers of a century ago occupied "higher intellectual ground."

The book's usefulness is enhanced by generous footnotes, an adequate index, and the author's pattern of concluding each chapter with a short "Analysis and Application." Young argues that debates on the flood have been confused by appeals to obsolete data and discredited theories; often appeals have been made, uncritically, to "yet another miracle" to bridge a difficulty. If Christians are to witness effectively to today's scientifically literate civilization, he asserts, they must necessarily include today's knowledge of geology, paleontology, and other scientific disciplines. This book is a first-class overview of this knowledge. Get it.

Reviewed by John W. Burgeson, IBM Market Research (retired), 6715 Colins Lane, Austin, TX 79759. e-mail 73531.1501@compuserve.com

DEFENDING THE FAITH: J. Gresham Machen and the Crisis of Conservative Protestantism in Modern America by D. G. Hart. Baltimore: The Johns Hopkins Press, 1994. 227 pages. Hardcover; $35.00.

G. Gresham Machen was perhaps America's most widely known and respected Protestant in the early part of this century. The respect he garnered was based on his scholarly and intellectual approach to the secular and religious issues of his day.

This is not the first biography of Machen. In 1954, Eerdmans published Ned Stonehouse's *J. Gresham Machen: A Biographical Memoir;* and other books have included chapters on Machen. The author of this biography, D. G. Hart, is head librarian, associate professor of church history and theological bibliographer at Westminster Seminary in Philadelphia. He was the director of the Institute for the Study of American Evangelicals at Wheaton College until 1993.

Hart's book is unique in that it approaches Machen from a valuative and critical point of view. Machen is revealed as a complex intellectual who could defend orthodox Christianity while at the same time espousing aspects of the secular humanism of his day.

Although Machen was a fundamentalist, his views were often unpredictable. Thus, he sometimes became an ally of secular intellectuals who sought to free culture and scholarship from religious bondage. Although Machen espoused traditional Christianity, he elicited praise from H. L. Mencken and Walter Lippmann, two secular writers of the day who did not share Machen's theological views.

According to Hart, Machen's significance lies in his apparent contradictions. While Machen defended the accuracy of the New Testament, he promoted critical biblical scholarship. On the one hand, he advocated private Chris-

tian education, but on the other hand, he opposed Bible reading and prayer in public schools. Machen rejected any project which sought to preserve Protestant America, while at the same time arguing that churches should direct their energies to religious endeavors.

Machen believed strict Calvinist doctrine should be promoted in the Presbyterian Church, but he opposed the efforts of the government to impose anything on society. He thought the secularization of American life was undesirable, but he did not oppose the teaching of evolution in the schools. He argued against the shoddy scholarship of mainstream Protestantism, but his text on New Testament Greek was published by a secular New York firm and widely used at the institutions of his religious opponents.

Machen was a segregationist who opposed the admission of black students to Princeton Theological Seminary. On the other hand, he was a cultural pluralist who advocated bilingual education in ethnic communities. He opposed women's suffrage, but was a life-long member of the Democratic party. In 1928, he was one of the few Protestants who voted for Al Smith, the first Roman Catholic presidential candidate.

Machen was the son of a prominent Baltimore family, studied at leading American and European universities, and taught for most of his career at Princeton Theological Seminary. He was seen by some fundamentalists as the initiator of separatism when he left Princeton Theological Seminary to found Westminster Theological Seminary.

What words best describe Machen? Intellectual, orthodox, libertarian, amalgam, paradox, contradiction, unique. Despite (or perhaps because of) Machen's sometimes conflicting traits, he left his imprint upon the church through his efforts to cleanse Protestantism of its liberal tendencies. His scholarship can still be appreciated today: nearly all of his books remain in print including his 1923 *New Testament Greek for Beginners*, used widely at both evangelical and liberal institutions of learning. Machen's manuscripts and correspondence are housed in the Westminster Theological Seminary Library.

Why should members of the American Scientific Affiliation read this book? To become acquainted with a Christian whose influence helped set the direction of modern day Christianity, to understand how a scholar can hold seemingly contradictory positions, to appreciate the convictions of a Christian intellectual which sometime set him at odds with both Christians and secularists. This book will expand one's understanding of fundamentalist-liberal confrontations in the early decades of this century and one Christian's part in them.

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

Books Received and Available for Review

Contact the book review editor if you would like to review one of these books. Please choose alternate selections. Richard Ruble, Book Review Editor, *Perspectives on Science and Christian Faith*, 212 Western Hills Drive, Siloam Springs, AR 72761

Howard Bloom, *The Lucifer Principle: A Scientific Expedition into the Forces of History*, Atlantic Monthly Press, 1995

Jeffrey H. Boyd, *Soul Psychology: How to Understand Your Soul in Light of the Mental Health Movement*, Soul Research Institute, 1994

David Darling, *Soul Search: A Scientist Explores the Afterlife*, Villard Books, 1995

Paul Davies, *Are We Alone: Philosophical Implications of the Discovery of Extraterrestrial Life*, Basic Books, 1995

Adam Drozdek, *Moral Dimension of Man in the Age of Computers*, University Press of America, 1995

Gordon Fraser, et al., *The Search for Infinity: Solving the Mysteries of the Universe*, 1995

M. W. Friedlander, *At The Fringes of Science*, Westview, 1995

Alan Hayward, *Creation and Evolution: Rethinking the Evidence from Science and the Bible*, Bethany House Publisher, 1995

Jean Holm & John Bowker (Eds.), *Attitudes to Nature*, Pinter Pubs. Ltd., 1994

John Kilner, (Ed.), *Bioethics and the Future of Medicine: A Christian Appraisal*, Eerdmans, 1995

T. A. Morrill, *Evolution As Growth of One Earth Organism*, 1995

Evelyn B. Pluhar, *Beyond Prejudice: The Moral Significance of Human and Nonhuman Animals*, Duke University Press, 1995

Evelyn Reed, *Sexism and Science*, Pathfinder, 1993

N. M. Samuelson, *Judaism and the Doctrine of Creation*, Cambridge, 1995

Susan Leigh Star, *Ecologies of Knowledge: Work and Politics in Science and Technology*, SUNY Press, 1995

M. R. Steele, *Christianity, Tragedy, and Holocaust Literature*, Greenwood, 1995

Anthony Van Den Beukel, *The Physicists and God: The New Priests of Religion*, Genesis, 1995

William R. Van Der Zee, *Ape of Adam: Our Roots According to the Book of Genesis*, Genesis, 1995

Vladimir Vukanovic, *Science and Faith*, Light and Life, 1995

Shelley Wachsmann, *The Sea of Galilee Boat*, Plenum, 1995

Richard Webster, *Why Freud Was Wrong: Sin, Science, and Psychoanalysis*, Basic Books, 1995

Gene B. Williams, *God's Chronicler: Darwin*, Desert Oasis Publishing Co., 1994

Letters

Retrogression and Relapse: About Mills, Moreland, and Their Ilk

Toward the end of the seventeenth century, Isaac Newton presented a rational basis for Kepler's Laws. However, he did not believe in the stability of the solar system thus described, holding that God had to intervene from time to time to restore order. Phrased bluntly, Newton's God was not smart enough to design and to create a fully functional universe, although he had the insight to catch problems before they destroyed everything and the power to restore stability as needed. A little more than a century later, Pierre Simon de Laplace demonstrated that Newton's principles adequately explained all the motions of the planets and their satellites. This view was later extended by John Couch Adams and Urbain Jean Joseph Le Verrier to interpret the vagaries of the orbit of Uranus as produced by the yet unobserved planet, Neptune, which was soon spotted. In other words, the solar system is stable and God does not need to be called in periodically to keep it from ruin.

Recently, some scientists have claimed that aspects of the solar system demonstrate elements of deterministic chaos. While this may suggest a return to Newton's view, one may propose a different outlook. For example, it appears that a renegade planetoid smashed into the primordial earth to produce the moon and many aspects of the earth-moon system which benefit, or even allow, life as we know it on this planet. That is, what seems a random destructive event produced a special order. Natural events, whatever their characteristics, accomplish God's purpose.

Long before Newton, orthodox theologians enunciated a view that fits Laplace's demonstration better than Newton's. They speak of God as omnipotent and omniscient, all-powerful and all-knowing. The declaration, "I believe in God, the Father, Almighty," goes back to the early Roman Baptismal Creed which antedates the misnamed Apostle's Creed. The original fourth century Nicene Creed declares: "We believe in one God the Father Almighty,..." The Augsburg Confession speaks of the Trinity as "of infinite power, wisdom and goodness." *Luther's Small Catechism* calls God "omnipotent" and "omniscient." The Reformed Gallican Confession calls God "omnipotent" and "all-wise." The Anglican Articles of Religion speak of God's "infinite power, wisdom and goodness." Only the Anabaptist Dordrecht Confession, among these sixteenth century statements, does not refer to the deity's omniscience. One may also note both omnipotence and omniscience in Aquinas, though he does not use the terms: *Summa Theologica*, Part I, Q. 7, a. 2; Q. 14, as. 1, 9 and 15; *Summa Contra Gentiles*, I, 50 and 55; II, 7.

In contrast, in a posthumously published work, *Three Essays on Religion*, John Stuart Mill argues for a finite deity. This is also found among those who, following Alfred North Whitehead, espouse process theology. Only very recently, as noted in *Christianity Today* (January 9, 1995), pp. 30-34, have such views been publicly argued by those calling themselves evangelicals. All these views claim that God may be surprised by events in creation. These last, however, insist that God has the power to modify miraculously the consequences of the unforeseen occurrences. In this they have returned to a view like Newton's.

Gordon C. Mills (*PSCF* 47:112-122 (June 1995)) and the authors of *The Creation Hypothesis* noted by Howard J. Van Till (ibid., pp. 123-131) express what is essentially the same view. Their God has to tinker repeatedly and directly with the developmental sequence in order to produce a working universe. They defend their outlook by computations of "impossibility." But I recall a time when the developmental sequence of the embryo was called miraculous by scientists. Now we know something about the sequential activation of genes, often the same gene at different times in different locations; the diffusion of various factors, some of which have been found to have specific activities even in the adult; controlled apoptosis—with new discoveries being made regularly. Embryological development is more and more understood in terms of biochemistry. It is increasingly difficult to roll one's eyes heavenward. Does this exclude God from the normal developmental process? Only for those who do not understand that God is as active in providence as in miracle.

I recall when it was claimed that a protein (enzyme) was absolutely necessary to process hereditary material. Now I read of self-catalyzed RNA reactions. It was claimed quite recently that the folding of proteins had to be guided. Now I read that they naturally fold themselves into the proper functional configuration *in vitro* as *in vivo*. Amino acids, which, it was declared, either could not form or would necessarily be more rapidly degraded by natural processes, are extracted from meteorites. The list could be extended tremendously, with more and more gaps closed as research continues.

Admittedly, this does not close the gap Mills mentions: cytochrome c with a chance probability of 2×10^{-65}. However, I suspect that there are reasonable ways to recalculate the probability, and that the apparent difficulty of synthesis will be reduced as new discoveries are made. In any event, I do not want to hitch my faith in a Creator to the current limitations of scientific explanation.

Materialism has been widely accepted from the time of Heraclitus to the present. Even when the notion of a Creator, a uniquely Hebraic view, became widespread, the belief in the autonomy of nature or matter commonly remained. It is clearly evident in deism, the outlook that dominated eighteenth century thought. Even among

avowed theists, the commitment is evident. It is present in Mills' claim that no natural process could produce cytochrome c: supernatural intervention is required. This tacitly denies the strictly theistic tenet that God is as active in growing grapes and fermenting juice as in the miracle at Cana.

Additionally, there is a problem with biblical interpretation. The Genesis week specifies but three creative acts, expanded to five in the usual discussions. If we understand these as episodes, each including several acts, the total number is still relatively small. It seems to me that this is as far as sound exegesis and hermeneutics can stretch. In contrast, Mills and the contributors to *The Creation Hypothesis* must posit thousands, or even millions, of miraculous episodes. This is a further consequence of their failure to understand and commit to true theism rather than to the popular deistic modification thereof. Since the point is philosophically subtle, I understand that a scientist might not detect it and its consequences. But philosophers Moreland and Meyer should have avoided the error. However, any scientist should recognize that "miracle" and "supernatural intervention" cannot function in a scientific context. So Van Till must be highly commended for grasping the theological, philosophical, and scientific consequences the others missed.

The others have been suckered by the *Zeitgeist*, even as they reject parts of it. Their inadequate or improper assumptions include (1) that God is too limited to produce a proper universe through "natural" means; (2) that God is only present in the gaps in scientific explanation; (3) that scientific discoveries, no matter how comprehensive, will always leave the same gaps that now allow their deity to act; (4) that matter or nature is autonomous; (5) that "miracle" and "supernatural" can somehow function in scientific theories. They will certainly deny some of these points, yet they are clearly implicit in their writings. All these errors need to be rooted out before they can present a proper theistic view.

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Issues and Evidence, Not *Ad Hominem*, Should Characterize Environmental Debate; A Response to Richard Wright

Richard Wright's comments in "Tearing Down the Green: Environmental Backlash in the Evangelical Sub-Culture" (*PSCF* 47:2 [June 1995], 80-91) about my critique of the Evangelical Declaration on the Care of Creation (EDCC) and about my *Prospects for Growth* deserve a reply.

His comment that my critique in *World* (8:27 [November 27, 1993], 10-13) of the EDCC "concludes that there is no serious environmental problem in the world today" is verbally almost identical to the description of that critique by Gordon Aeschliman in his editorial in *Prism*; he said I had written that "... there is no substantial environmental problem in the world today." My article itself, however, said nothing of the sort. One wonders whether Wright read my article or only Aeschliman's misrepresentation of it. What I did say is that the sorts of crises emphasized in the EDCC (and its prior draft, the best evidence we have of the specifics lying behind the vague generalizations that dominate the Declaration) lacked conclusive empirical evidential basis.

There are indeed severe environmental problems. The worst ones are in developing countries and in present and former communist countries. Among them are unsafe drinking water (mostly because of contamination by untreated human and animal sewage and by natural bacteria, often also because of contamination by agricultural and industrial wastes); serious air pollution (lead, ozone, particulates, carbon monoxide, and other vehicular and industrial emissions); deforestation and desertification (the two sometimes interrelated) owing largely to the gathering of fuel wood by poor people in marginal ecosystems; and the deterioration of agricultural soils because of poor practices. Such problems are directly implicated in the poor health and early mortality of hundreds of millions of people in the developing world.

But these are not the sorts of things on which the EDCC, particularly in light of its penultimate draft, focuses: global warming[1] (a still hypothetical danger that has not yet caused any deaths and may never, even if it turns out real), acid rain[2] (which, even if one accepts claims about harm to forests and lakes — which there is good reason to doubt, according to the National Acid Precipitation Assessment Program — has certainly not killed anyone), ozone depletion[3] (another hypothetical threat that has not yet led to measurable non-natural increases in ground-level UV-B and may never, and that certainly has not yet killed millions of people); massive species extinction[4] (another hypothetical danger for which there is at present no good empirical evidence, and that again has certainly not killed anyone); and so on. My critique argued in part that the EDCC's promotion of the crisis mentality on these still hypothetical problems hazards Christian environmentalism's credibility. Perhaps I should have added that it puts the focus — and invites the lion's share of money to be spent — on problems that, to whatever extent they turn out real, are unlikely to be nearly so dangerous as such present and actual problems, which are associated with a low degree of economic development, as unsafe drinking water in developing countries.

My article also argued, as did *Prospects for Growth*, that in most of these cases trends are either toward improvement already or can be predicted to be such as economic development continues. There is a very strong statistical correlation between level of economic development and reduction of pollution.[5] Long-term economic forces and trends lead me to believe that economic improvement in

developing countries will lead to improvements in all of the areas mentioned in the previous paragraph; indeed, in many such countries, for most of the factors, improvement has already been under way for from one to three decades, as reflected in such statistical sources as the World Bank's *Social Indicators of Development on Diskette* (annual). (An example of such is the marked improvement in access to safe drinking water in low- and middle-income countries from 1970 to 1990: up by about 63 percent in twenty years — by 92 percent [from 28 to 54 percent] in rural areas and by 10 percent [from 75 to 83 percent] in urban areas.[6])

Wright pejoratively refers to some of my sources — Julian L. Simon, Herman Kahn, S. Fred Singer, and Dixy Lee Ray — as "scientific" sources. Liberal Democrat environmentalist Gregg Easterbrook, who appears to think every federal environmental policy adopted in the last thirty years has been wise and who champions extensive governmental control of economies yet criticizes the crisis mentality of contemporary environmentalism, wrote in his outstanding (if idiosyncratic) new book *A Moment on the Earth: The Coming Age of Environmental Optimism*, "A rule of argument is that when opponents attack someone's qualifications or motives rather than rebutting the substance of arguments, this happens because they do not know how to rebut the substance. Increasingly in the 1990s, doctrinaire environmentalists have been impugning the qualifications or integrity of those who disagree with them" (p. 561). Wright's placing quotation marks around *scientific* is just such a case of *argumentum ad hominem* abusive.

Wright refers to "scientific work" as including "demographic" work. Perhaps he is unaware that Simon is one of the world's leading demographic scholars, which implies that he is a scientist. So why the quotation marks? Many people know of him only from popular articles and his popular *The Ultimate Resource* (which, by the way, still contains a great deal of good science). But his *The Economics of Population Growth* (Princeton University Press, 1977) is one of the most thorough and sophisticated analyses of the subject ever published; regardless whether one agrees with his conclusions, it must be acknowledged as scientific work. Does writing popular articles disqualify one as a scientist? Then what happens to Carl Sagan and Paul Ehrlich and other heroes of environmentalism? Singer is a geophysicist (see note 3 for his credentials) one of the earliest (and continuing) researchers on stratospheric ozone (inventor, in fact, of the standard ozone measuring instrument) under NASA. Ray was a long-time member of the zoology faculty at the University of Washington, chairman of the Atomic Energy Commission, and assistant secretary of state in the U.S. Bureau of Oceans. I don't happen to have quick access to Kahn's scientific credentials, but I've read a fair amount of science in a wide variety of fields and consider his work, with Brown and Martel in *The Next 200 Years*, to have been solidly scientific. To be qualified as a scientist, must one agree with Richard Wright?

Furthermore, in *Prospects for Growth* I cited Simon as an authority only on the economics of demography; I cited Singer only once, and then as an authority only on stratospheric ozone; I cited Ray only twice, once for her short and clear description of the *unenhanced* greenhouse effect and once for the rather pedestrian point that correlation doesn't prove causation in studies of the etiology of disease (would Wright like to argue with her at either of these points?); and I never once cited Kahn himself (as opposed to scientists who contributed chapters to a book of which he was co-editor) as an authority on anything. So my only citations of these scientists were entirely legitimate. And Wright completely ignores the dozens of other fully credentialed scientists I also cited.

Wright criticizes me for not having used standard statistical sources from the World Bank, the World Resources Institute, and the Worldwatch Institute. I did use evidence from the World Bank's *World Development Report* (annual) in *Prospects for Growth*, as well as from various other standard statistical sources. (In fact, a whole appendix of the book was nothing but statistical tables [most adapted from *WDR*] that provided the statistical basis for lengthy discussion of the economics of demography in chapter 6.) I did not rely on information from either the World Resources Institute or the Worldwatch Institute because both are advocacy organizations whose reports time and again have contained unreliable data and horribly unreliable predictions. (One might, for an interesting exercise, look back through Worldwatch Institute President Lester Brown's track record as a prophet of trends in resource availability, agricultural productivity, poverty, hunger, famine, and so on. It's not a pretty sight.)

Rather than committing the genetic and *ad hominem* fallacies, it would have been considerably more helpful for Wright actually to have interacted with some of the demographic and economic arguments in *Prospects for Growth*. But if he had, would I have been justified in writing off his arguments since, after all, his formal training is not in the economics of demography but in biology? For that matter, should I write off his arguments about ozone and global warming because he is neither a climatologist nor an atmospheric chemist but a biologist?

Nowhere in *Prospects for Growth* or in my critique of the EDCC did I ever say that the environment should be protected "*only* because it is important to man" (emphasis added), and I don't believe that. It should be protected first and foremost because that is one of the tasks God has given to man (Genesis 2:15; a point I did make in *Prospects for Growth*, pp. 23-4, despite Wright's implying that somehow I had completely ignored the verse), and obedience to God is the most important motive for any act. In addition, it should be protected for God's pleasure and man's benefit, and finally it should be protected for the benefit of other creatures, independent of man's benefit. And by the way, I never wrote — and don't believe — that the rest of creation should be *enslaved* to mankind; that is Wright's word, not mine.

The Christian scientific community would be better served by arguments that stick to issues and evidences and avoid *ad hominem* and straw man attacks.

NOTES

[1]On which see Robert C. Balling (Ph.D., geography; director of the Office of Climatology and associate professor of geography at Arizona State University; author of over fifty papers on global warming in journals of climatology), *The Heated Debate: Greenhouse Predictions Versus Climate Reality* (San Francisco: Pacific Research Institute for Public Policy, 1992); Sherwood B. Idso (Ph.D., soil science; former adjunct professor in geology, geography, botany, and microbiology, Arizona State University; author of more than 400 articles in refereed journals, including many on the effects of increased atmospheric CO_2), *Carbon Dioxide and Global Change: Earth in Transition* (Tempe, AZ: Institute for Biospheric Research/IBR Press, 1989); Patrick J. Michaels (Ph.D., climatology; associate professor of environmental sciences, University of Virginia; author of many articles in refereed journals of climatology, forestry, and meteorology), *Sound and Fury: The Science and Politics of Global Warming* (Washington: Cato Institute, 1992); Frederick Seitz, Robert Jastrow, and William A. Nierenberg (all with Ph.D.s in fields relevant to global warming, and all having published on the subject in refereed journals), *Scientific Perspectives on the Greenhouse Problem* (Washington: George C. Marshall Institute, n.d.). (I include authors' credentials here and in the next two notes simply to head off another *ad hominem* argument.)

[2]On which see Edward C. Krug (Ph.D., soil chemistry; field scientist with the National Acid Precipitation Assessment Program, author of more than thirty articles in refereed journals), "The Great Acid Rain Flimflam," *Policy Review*, Spring 1990, 44-48; John J. McKetta (Ph.D., chemical engineering; author of more than 400 articles in refereed journals and of ten professional books, professor and chair of chemical engineering at the University of Texas, Austin), "Acid Rain—The Whole Story to Date," National Council for Environmental Balance, 1988; and J. Laurence Kulp (Ph.D., engineering; director of the National Acid Precipitation Assessment Program under the EPA; affiliate professor of civil engineering, University of Washington; author of many articles in refereed journals), "Acid Rain," in *The State of Humanity*, edited by Julian L. Simon (Oxford: Blackwell, 1995 [forthcoming]).

[3]On which see Hugh W. Elsaesser (Ph.D. in dynamic meteorology, participating guest scientist at Lawrence Livermore National Laboratory, author of over 100 articles in refereed journals), "An Atmosphere of Paradox: From Acid Rain to Ozone," in *Rational Readings on Environmental Concerns*, edited by Jay H. Lehr (New York: Van Nostrand Reinhold, 1992); S. Fred Singer (Ph.D., physics; former professor of environmental sciences, University of Virginia; former chief scientist, U.S. Department of Transportation; former director, National Weather Satellite Center; presently director, Science and Environmental Policy Project; author of more than 400 articles in refereed journals), "My Adventures in the Ozone Layer," *National Review*, June 30, 1989, 34-38, and "Stratospheric Ozone: Science and Policy," in *The State of Humanity*, ed. Simon.

[4]On which see T. C. Whitmore and J. A. Sayer, eds. (for the International Union for the Conservation of Nature), *Tropical Deforestation and Species Extinction* (London and New York: Chapman & Hall, 1992). This fascinating book took shape as an attempt to respond to various essays by Julian L. Simon and Aaron Wildavsky (e.g., Simon, "Disappearing Species, Deforestation and Data," *New Scientist*, May 15, 1986, and Simon and Wildavsky, "On Species Loss, the Absence of Data, and Risks to Humanity," in *The Resourceful Earth: A Response to 'Global 2000'*, edited by Julian L. Simon and Herman Kahn [Oxford: Blackwell, 1984]) charging that no sound empirical evidence existed for claimed rapid rates of species extinction. Despite this, the book's editors sum up the findings of the many studies that led to the book as follows: "Many people have asked IUCN to comment on the numerous conflicting estimates of species extinction and some would like us to come up with a firm and definitive figure for the number of species which are being lost in a given period of time. The data available would not enable this to be done with any reasonable degree of scientific credibility and we have not attempted to do so in this book" (xi), and acknowledgment that expected species loss has been disconfirmed appears in chapter after chapter.

[5]Mikhail Bernstam, "The Wealth of Nations and the Environment," Institute of Economic Affairs, 1991; cited in Gregg Easterbrook, *A Moment On the Earth: The Coming Age of Environmental Optimism* (New York: Viking, 1995), 330-31. Easterbrook also cites the work of Princeton University economists Gene Grossman and Alan Krueger showing "that countries increase pollution output as GNP climbs toward the level of about $5,000 per person in constant dollars. Then, as knowledge accumulates and affluence makes possible investments in emission controls, pollution begins to decline" (331).

[6]Calculated from raw data for over 180 countries in The World Bank, *Social Indicators of Development on Diskette, 1994* (Washington: The World Bank, 1994).

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The Wright Response

I am grateful to E. Calvin Beisner for his response to my article. He has not only taken me to task for some of the views expressed in the article, in his response he has also clarified his own approach to environmental issues. It is tempting to debate his concerns point by point in this forum, but another feature-length article might result if I did. However, I will answer several of his responses. The first is in reference to his editorial in *World*, where I state that Beisner "concludes that there is no serious environmental problem in the world today." Because my statement is similar to Aeschliman's in *Prism*, Beisner suggests that I may not have even read his article — puzzling, since earlier in the article I quote extensively from it. Could this be an *ad hominem* attack? I must submit that Beisner's language in the editorial leads inevitably to such a conclusion. In problem after problem, he claims there is no evidence to support concern.

I am happy to see in his response that Beisner recognizes "there are indeed serious environmental problems." However, the problems cited (in developing countries and the present and former communist countries) are only a subset of the problems that the Evangelical Declaration records, and Beisner once again dismisses acid rain, global climate change, ozone depletion, and the loss of biodiversity. The main reason appears to be that these problems haven't killed anyone yet, and thus are non-problems. Such an attitude appears to dismiss any environmental damage that does not lead directly to human deaths. Even assuming no immediate human deaths, should we not be concerned about what is happening to the rest of Creation? And, should we not respond, as the world community indeed

has, to major threats like ozone depletion that are slowly getting worse and will indeed kill many people if they are not addressed? What is most disturbing again about Beisner's response is his apparent willingness to ignore the mainstream scientific consensus on these major issues and continue to rely on scientists and others who — for a variety of reasons — are challenging this consensus. It is their right to do so, but the mere existence of a counter opinion does not imply that the consensus is wrong, or that the truth is somewhere in the middle.

Beisner makes the point that many trends are either toward improvement or can be predicted to improve as economic development occurs, and cites the strong statistical correlation between development and reduction of pollution. I must point out that this correlation is a selective one. Some problems get worse with level of development: release of CO_2, production of air pollutants like sulfur dioxide, and generation of solid waste, for example.[1] Development alone will not take care of everything, even assuming that development will happen rapidly in the less developed part of the world — an assumption that is subject to serious question.

Perhaps the most serious charge is that I make use of *ad hominem* arguments — instead of debating the issues and using empirical evidence to counter the views of Simon, Singer and Ray. In my article in question, I was deliberately probing the motives behind the environmental backlash. It was, I felt, necessary to ask why people were taking a given position, and to do so meant looking very directly at *ad hominem* concerns. For a more detailed look at the evidence and issues, I could direct the reader to the 5th edition of my text, *Environmental Science: The Way the World Works*,[2] or to any of the well-regarded texts in environmental science written by highly credentialed scientists. I might add that these documents — and the mainstream refereed articles on which they are based — are not constructed out of thin air or conjecture. The concerns they address are real, and one must either be unaware of the scientific work or must have an *a priori* bias in order to dismiss the concerns. To mention just one — Beisner claims that there are as yet no measurable increases in ground-level UV-B, yet Kerr and McElroy documented in 1993 a clear relationship between declining ozone levels over Canada and rising ground-level UV-B.[3]

Again, it is helpful to see Beisner's current thinking about environmental protection. I am encouraged to see that his reasons for protecting the Creation include doing so "for the benefit of other creatures, independent of man's benefit." This was not at all clear in his previous publications.

I do appreciate Beisner's drawing attention to the quotes around "scientific work," as I referred to the sources employed by him and by Burkett, Limbaugh, and others to refute the current consensus. I should not have done that, and I apologize for doing so. Most of these workers are indeed scientists, with good credentials. Again, however, it is fair to ask: Why are they so exercised over the issues of global climate change, acid rain, and ozone depletion? Is it that they have convincing data and arguments that can demolish the opposition, or could it be that they are working out of a political commitment that fears the public policy changes implied by the magnitude of the environmental issues they address?

I'm afraid that I just crossed the line again into *ad hominem* arguments. Nevertheless, I welcome E. Calvin Beisner's criticisms, and hope that these issues will continue to be the subject of debate and critique in the pages of this journal. It is my belief that they are of crucial importance for the Christian community.

NOTES

[1]The World Bank, *Development and the Environment: World Development Report 1992* (New York: Oxford University Press, 1992)

[2]Bernard J. Nebel and Richard T. Wright, *Environmental Science: The Way the World Works* (Upper Saddle River: Prentice Hall, 1996)

[3]Kerr, J. B. and C. T. McElroy, "Evidence for Large Upward Trends of Ultraviolet-B Radiation Linked to Ozone Depletion," *Science* 262, 1993, pp. 1032-1034.

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Corrective Surgery or An Autopsy?

As an avid but amateur follower of the creation science debate, I was intrigued by both *The Creation Hypothesis* and by Dr. Van Till's response. I must confess that my reading of the book was far less insightful than his, and I appreciate his careful dissection.

The distinction between naturalistic (narrow) and Naturalistic (broad) is a helpful concept. I have always appreciated this view and agree with his emphasis on a "gapless economy" of creation. However, I wondered why Dr. Van Till did not address one of the major premises of the book — namely that the entire Darwinian theory, at least as currently applied by Naturalistic (broad) scientists is a "theory in crisis" (to use M. Denton's words).

I would appreciate it if Dr. Van Till or someone else would address this question, ie. should those of us who have previously believed God used a naturalisticly explainable method of creation (theistic evolution?) be more willing to accept the possibility that he did not, since there are so many flaws in the current paradigms? The appendix to *The Creation Hypothesis* provides a long list of *secular* scientists who seem to have concluded that current origin and evolutionary theories are bankrupt. Wouldn't it be appropriate to conclude that acts of special creation are possible explanations? If not, what alternatives are there? Can we honestly say that current theories, either of origins or evolution (S. J. Gould's *Punctuated Equilibria*) are plausible for those of us who believe in naturalism (narrow) but not Naturalism (broad)?

Finally, I wondered whether Dr. Van Till's dissection, although skillful and thorough, was intended to be corrective surgery or an autopsy. He cut the book apart; did he intend to kill it? I ask this because I found it to be carefully written, respectful of many views, and in an area of neglected discussion. (For example, I did not know that Kurt Wise was a "young earth" paleontologist, but this strengthens my impression that we need more discussion on issues such as this among evangelical scientists from all views.) The book's major theme, at least from my perspective as an annotated amateur, was to emphasize that theories of design, whether "special creation" or "gapless economy" are rejected by most of the scientific community because of a commitment to Naturalism (broad). I agree that we need to distinguish naturalism (narrow) from this pervasive view, but isn't Johnson largely correct in his assessment, at least of the secular academic world? Isn't this an important area where we can agree with our "young earth" colleagues?

I enjoyed reading these articles. Perhaps many of ASA's members already have clear opinions about the questions I raised, but I suspect that many of us who are not researching these areas would benefit from Van Till clarifying what he agrees with in *The Creation Hypothesis*, and whether his intent was palliative or funerary.

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Genesis and Time Warp

I follow with interest the young earth/old earth debates presented in the ASA Journal. One of the most recent articles on this issue is by Robert C. Newman entitled "Scientific and Religious Aspects of the Origins Debate," Sept. 1995, Vol. 47, No. 3. To date, I have not noticed any of the authors using the argument put forth by the MIT physicist Gerald Schroeder (who is also a Hebrew scholar) in his recent paperback, *Genesis and the Big Bang*, Bantam Books, 1990 (paperback, 1992). In his second chapter entitled "Stretching Time," he presents Einstein's time dilation argument to match the literal six day creation record of Genesis 1, with the 15-billion year astrophysical estimates based on the Big Bang Theory. The key to Schroeder's discussion is that prior to Adam, there were no human beings to measure the passage of time. Until Adam appeared on day six, *God alone* was watching the clock, and in *his* frame of reference (close to the speed of light!) six 24-hour days are equivalent to 15-20 billion years from human-Adamic frame of reference, i.e.

$$\Delta T \text{ (Divine)} = \Delta t \text{ (human)} [1\text{-}v^2/c^2]^{0.5}$$

As soon as Adam was created, the earth, where man dwells, started to operate in the same space-time reference frame as its Creator. At this point, the chronology of the Bible and the flow of time on earth became one.

Time dilation has been proven many times over in experiments conducted to validate Einstein's General Theory of Relativity (eg., Hafale, J. and K. Keating, "Around the World Atomic Clocks; Predicted Relativistic Time Gains" *Science* 177 (1972) 166-168). A classic example, of course, is the time dilation experienced by mu-mesons traveling the earth's atmosphere at almost the speed of light. To the observer on the ground, 200 microseconds pass as the mu-meson traverses the 60 km. distance from the top of the atmosphere, where they are formed, to the earth's surface. To the mu-meson, however, traveling close to the speed of light, the elapses time is 4.5 seconds. For the same single event two totally different times elapse!

I would be curious to know if ASA members have considered the above option, so ingeniously presented by Schroeder in his book, as a means of reconciling the six 24-hour day creation story of Genesis 1 with the billion year estimates evidenced form astrophysical observation.

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

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

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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 and Christian Faith* and the *ASA/CSCA Newsletter*). The CSCA subscribes to the same statement of faith as the ASA, and has the same general structure; however, it has its own governing body with a separate annual meeting in Canada.

Local Sections

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

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