# PERSPECTIVES on Science and Christian Faith

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In this issue . . .



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

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# Putting Things in Perspective

To many people "perspectives on science and Christian faith" immediately conjures up thoughts, and even emotions, regarding evolution and/or creation. Certainly some of the reactions to *Teaching Science in a Climate of Controversy* remind us that this issue is still with us, and that "evolutionists" and "creationists" continue to oversimplify and distort the subject in unscientific and uncharitable format.

However, there are numerous other issues in which our philosophical presuppositions influence our decisions. Thus, both Christians and nonchristians are grappling with genetic engineering and bioethics, with abortion and euthanasia, with war and peace, with issues of social justice, and with other problems that involve our views of the nature of human beings both as individuals and as groups. Hence, the conflict of ideas in the social sciences is an area where Christians need to wrestle with the implications of the biblical view of mankind.

One of the social scientists who has been much involved in formulating Christian perspectives in these areas is Mary Stewart Van Leeuwen. In the lead article of this issue, Dr. Van Leeuwen gives us a comprehensive, historical overview of the complex relationships between evangelical perspectives and the social sciences. Later in this same issue, Russell Bishop gives us an informative biography of this remarkable Christian psychologist.

As demonstrated by several papers published in this journal in recent years, as well as by letters to the editor, environmental issues are in the forefront for many people. In this issue, William Cobern discusses the importance of a values framework for teaching "global science" that checks antichristian attitudes and encourages values and religion in a non-sectarian framework.

John Templeton and Robert Herrmann emphasize how, in the light of relativity and quantum theory, God is not a mere "machine-tender or caretaker" but is intimately involved in every level of the created order. Materialistic and mechanistic oversimplifications have become increasingly unsatisfactory in the light of twentieth-century developments.

However, "evolution versus creation" is still with us! The fires of controversy are fed by a small group of anti-religious scientists for whom any mention of God—let alone biblical theism—is archaic, subversive, and unscientific. Unfortunately, the fires are also fed by Christians who, in a similar arrogant and uncharitable fashion, insist that only their interpretations of Genesis qualifies people as truly Christian. Kenneth Kemp surveys some of the basic premises of creation science and finds them wanting both theologically and scientifically. He emphasizes, as have other contributors to this journal, that "evolution and creation do not answer the same questions" and that, therefore, the battle against evolution is not an important battle for Christians to fight.

Among the Communications is Larry Riedinger's sociological analysis of intra-denominational conflict, with particular emphasis on the current problems within the Southern Baptist Convention. He suggests that "bitter conflict and a party spirit are antithetical to the very identity of the Body" of Christ. Raymond Seeger discusses the life of John von Neumann in the twenty-third installment of his biographical essays on scientists and their religion. *SEARCH: Scientists Who Serve God*, rounding out its first year as an insert in *Perspectives*, focuses on chemist Robert L. Bohon.

**WLB**

# North American Evangelicalism and the Social Sciences: A Historical & Critical Appraisal

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*This paper traces the nineteenth and twentieth century relationship of evangelicalism to the social sciences, particularly via the question of how the natural and social sciences should relate to each other and how both should relate to world view considerations. The "perspectivalist" approach of Bernard Ramm and Donald MacKay, which the latter deemed adequate for both natural and social sciences, is contrasted with the more post-positivist approach initiated by Thomas Kuhn and developed by Steven Evans as a more "hermeneutic" and "value-critical" approach to the social sciences. Reasons are advanced for Christian social scientists to give this latter approach more serious consideration.*

As a critical overview of the relationship of evangelicals to the social sciences, this paper focuses mainly on positions reflected in two interdisciplinary journals which began thirty to forty years ago and continue to this day. These are: *The Christian Scholars Review*, which began in 1955 as *The Gordon Review* and changed to its present name in 1970, and this journal, which began as *The Journal of the American Scientific Affiliation* in 1949 (seven years after the American Scientific Affiliation was formed as an organization to bring together evangelicals in the natural and social sciences) and which recently changed its names to *Perspectives on Science and Christian Faith*. I will, however, begin with some remarks about the eighty years or so prior to the beginning of these publications.[1] In addition, because North American thought has been influenced not a little by British evangelicalism in the last four decades, I will give credit to the latter tradition where due.

After a consideration of the pre-1947 period, the paper will develop three observations concerning the ambiguous relationship of evangelicalism to the social sciences. The first concerns the relationship of the social sciences (both Christian and secular) to the *natural* sciences, and the consequences which followed the majority decision to organize Anglo-American social science around a natural sciences paradigmatic ideal. Secondly, I will trace the debate, which has gained momentum in the last two decades, between Christians who believe that the social sciences should be "hermeneutic" or "interpretive" disciplines (instead of, or in addition to being "scientific"), and those who believe just as sincerely that good, God-honoring social science can only be done if, like the natural sciences, it limits its attention to causal, deterministic relationships which are empirically testable. Finally, I suggest that the social sciences *should* and will become more hermeneutic in their approach (without jettisoning all that

they have acquired of value from the natural sciences paradigm) and that evangelical Christians can both lead and profit from such developments.[2]

## Evangelicalism & the 19th-Century Rise of Social Science

The climate in which the social sciences emerged was both similar to and different from that which prevailed when the natural sciences began to be formalized three centuries earlier. Many historians see the natural sciences as resulting in part from the anti-scholastic, anti-authoritarian mindset of the Renaissance and the Reformation. Many also see in the emergence of natural science the beginnings of secularization in European society. But others are willing to grant that the Reformational mindset, which saw Earth as the orderly creation of a faithful God—a creation human beings were mandated to explore with respect and gratitude—could be a catalyst to the development of natural science without always sliding into unbelief.

The social sciences, by contrast, emerged as separate disciplines only in the nineteenth and early twentieth centuries. In this case there was also a revolt against authority, but now of a much more profound nature. Prior to about 1870, there seemed to be a kind of Christian "gentlemen's agreement" among academics to the effect that the naturalism of the natural sciences would go only so far. It was considered quite compatible with good creation theology to see God's providential hand in the mechanics of day-to-day physical and biological laws. But two areas of inquiry were implicitly off-limits to naturalistic explanation—namely, the origins of life and the individual and social behavior of human beings. In American colleges (including such now-secularized institutions as Harvard, Princeton, and Yale) these topics were exegeted not by natural or social scientists (the latter did not have any institutional existence as yet) but by a "moral" or "mental philosopher," frequently the college president, who was often as not also a clergyman. The standard, year-long moral philosophy course for seniors was, in historian Mark Noll's words,

> a course with vast horizons, including everything having to do with human beings and their social relationships (the subjects studied under this rubric would later become the separate disciplines of psychology, philosophy, religion, political science, sociology, anthropology, economics and jurisprudence). The course almost always included an investigation of epistemology in general and the epistemological foundations of Christianity in particular. . . . It represented an effort to perceive all bits of knowledge as parts of a comprehensive whole, and to do so within a Christian framework. It was, in modern jargon, a course seeking to integrate faith and learning. [It] provided college seniors with a respectable defense of God's existence and the moral law. It offered comprehensive exhortations to live morally in society, to support religion, to put public good above selfish interests, and to work for the coming of God's kingdom in America.[3]

In its intention to combat atheistic skepticism, promote democratic ideals and encourage social morality, moral philosophy represented a laudable program. But the methods for achieving its ends were ill-equipped to withstand the rise of evolutionary biology, old-earth geology, hypothetico-inductive experimentalism, and the so-called value-neutral, naturalistically inclined social sciences. Noll points out that its epistemology was reductionistic: it assumed that intuition was an adequate basis for the defense of morality, that science was the supreme route to truth (its methods equally applicable to Scripture and the natural world), and that logical argument alone could prove the existence of God. Moreover, its ethics were individualistic: moral philosophers were unable to see that sin could be a property of institutions as well as of individuals, a myopia which probably helped lead to their being upstaged by the new, secular discipline of sociology.

The moral philosophers were also committed to Baconian inductivism—to the notion that unchanging "facts" (whether in nature or Scripture) could be perceived by unbiased minds and organized without controversy into generalizable propositions or laws. Thus, they were reluctant to concede that the construc-

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tion of scientific laws might require disciplined imagination and hypothetical thought, or that such laws (not to mention their own handling of Scripture) might be open to revision. As a result, there was a too-simplistic triumphalism about evangelical moral philosophy: its adherents assumed *a priori* that the enterprise of science would always confirm their particular doctrines about God, creation, and human beings.

In light of all this, most evangelicals were ill-prepared to weather the onslaughts of biological and social Darwinism in the late nineteenth and early twentieth centuries.[4] Their response was to retreat from contact with mainstream higher education almost completely after the demoralizing outcome of the Scopes trial in 1925. Instead, they concentrated on setting up Bible colleges, or, at the few remaining evangelical liberal arts colleges, in clinging to the nineteenth-century moral-philosophical approach to learning, thereby creating a wider and wider chasm between themselves and mainstream natural and social science.

*Moral philosophers were unable to see that sin could be a property of institutions as well as of individuals . . .*

This "fortress mentality" continued unabated until what historian George Marsden sees as the watershed year of 1947, when Carl Henry published his famous critique, *The Uneasy Conscience of Modern Fundamentalism.*[5] That was also the year of the founding of Fuller Seminary; consequently, the period of serious American evangelical dialogue with the social sciences is no longer than those intervening forty years.

## The Beginnings of Rapprochement

In January 1949, the first mimeographed issue of *The American Scientific Affiliation Bulletin* (soon to become *The Journal of the American Scientific Affiliation*) was produced. The majority in its seven-year-old parent organization were natural scientists, dedicated to the task of overcoming the schizophrenia many had lived with as culturally defensive fundamentalists on the one hand, and trained scientists on the other.[6] But from its inception, the journal welcomed contributions of a social-scientific nature as well, although the majority of such papers appearing in early issues were in fact written by theologians, philosophers, and pastoral counsellors—something which may indicate both a residual attachment to the "moral philosophical" approach among evangelicals, as well as the paucity of evangelical scholars actually trained in the social sciences.

Consequently, the early articles in the *J.A.S.A.* have a decidedly "in-house" flavor, reflecting more concern to make science relevant to the contemporary pastoral and theological agenda than to show the relevance—or even the compatibility—of a Christian world view to the conduct of science. In light of the stand-off between fundamentalist and mainstream scholarship in the first half of the twentieth century, this was perhaps the most that could be expected—or risked without being branded heretical. Thus, the first five or six volumes of the *J.A.S.A.* included articles with titles like: "Science and Salvation," "Geriatrics and the Book of Ecclesiastes," "Probability in Biblical Prophecy," "The Biblical Psychology of Conviction," "Reflections on Sociology and Evangelism," and "Genetic Evidence as to the Color of Adam and Eve."

But the year 1954 saw another watershed publication, a book that was considered so significant that the *J.A.S.A.* published no fewer than three reviews of it in the December 1955 issue, by an anthropologist, a theologian, and a biologist.[7] Twenty-five years later, in 1979, a special *Festschrift* issue of the journal honored the book's author and commemorated its publication, at which time the volume itself was still selling briskly through the Affiliation's book service. The book in question was philosopher/theologian Bernard Ramm's *The Christian View of Science and Scripture*, which ranged over the fields of astronomy, geology, biology, physical anthropology, and philosophy of science.[8] There is little doubt that, for better or worse, its conclusions have shaped faith/science dialogue within an entire generation of evangelicals in the natural and social sciences.

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The cover commentary on Ramm's book is a bit misleading, for it reads:

> Acutely aware of the imperative necessity for a harmony of science with Scripture, [the author] calls for the return of evangelicalism to the tradition of late nineteenth-century conservative scholars, who learned the facts of science and Scripture with patience, care and integrity, and showed with great

> competence that these two can never conflict. [The result is] a scholarly, comprehensive and masterly contribution to the complex problem of finding a true harmony between modern science and Holy Scripture.

Ramm's approach, however, was anything but a return to the nineteenth-century moral-philosophical approach, although his strong creation theology certainly convinced him that there need be no conflict between "God's word in Scripture" and "God's work in nature." Both, he affirmed in the tradition of Reformed theology, are the ongoing products of God's purpose and sovereignty; therefore, evangelicals need not be defensive about the results of natural science when carefully done and cautiously theorized without accompanying metaphysical pronouncements. In other words, science short of reductionistic scien*tism* was a legitimate aspect of the human mandate to subdue the earth.

But Ramm differed from the moral philosophers in several crucial respects. First of all, he affirmed a division of labor between science and theology: science was to explore the structure and functioning of the universe, while theology was to explain its ultimate meaning and purpose in light of revealed truth. Secondly, the Bible was not to be treated as a scientific textbook (as many fundamentalists had tried to do in wake of the moral-philosophical tradition). It was to be understood as God's progressive message embodied in the phenomenal language of the cultures to which it was revealed, and not as a coded storehouse of scientific theory which could be deciphered by means of a certain exegetical calculus available to a privileged few. Finally, because science and Scripture were two different, yet complementary, ways of understanding the universe, each was to be given sovereignty to operate in its own sphere. Theologians should not presume to be scientists, and scientists *qua* scientists should not dabble in metaphysics. If these rules were observed, Ramm thought, the way would be open for a mutually respectful dialogue between evangelicals and the sciences.[9]

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It should be pointed out that neither Ramm's integrative approach nor his hermeneutics were strictly new, as he himself was careful to acknowledge. The fact/value division between science and religion goes back at least to Kant, and evangelical biblical scholars had been applying a hermeneutic similar to Ramm's for over a quarter of a century. Indeed, in Britain, where their conclusions were better diffused among non-scholars, Ramm's book was so enthusiastically received that a British edition was released within a year of the American one. The virtue of Ramm's semi-popular work was that it "brought the [American] fundamentalist reading public up to date" with the conclusions of its best biblical scholars.[10] Many of those readers apparently did not like what they read in Ramm's volume,[11] but for many evangelical scientists (as the later *Festschrift* reminiscences make clear), Ramm's book was like a breath of fresh air which enabled them to survive with integrity as scientist-Christians.

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### Ramm's Perspectivalism & Evangelical Social Scientists

The most prominent social scientist to develop Ramm's "division of labor" approach (although he may have arrived at it through independent British influences) was undoubtedly Donald MacKay of Keele University in England.[12] Trained as a physicist, but with an acquired interest in human thinking from a cybernetic perspective, MacKay was the creator and head of an interdisciplinary department of neuroscience until his death in 1987. MacKay, who became a role model for many evangelical academic psychologists, was famous for his promotion of three ideas in service of the religion/social science rapprochement.

First, MacKay held that it was possible to examine the same phenomenon from a number of logically separate but complementary "perspectives," each of which could be theoretically exhaustive on its own level but still not sufficient to do justice to that phenomenon. Thus, for example, an electrically wired "NO EXIT" sign may be described exhaustively by an electrician in terms of resistances, wattage and voltage; by a fire-marshall in terms of efficient traffic flow in case of emergency; by a linguist in terms of the Latin and

Anglo-Saxon roots of the words involved; or by a literary critic in terms of Sartrian existentialism. So too with the study of human behavior: one could study human beings as mechanisms without necessarily denying that other "perspectives," or "levels of explanation" (such as the religious) were needed for a complete account.

As a related point, MacKay was a sharp critic of all reductionisms—that is, of attempts (especially by behaviorists) to reduce all of human functioning to "nothing but" what they observed from their own research perspective. Thus, he had nothing against B.F. Skinner's program to examine human functioning *only* in terms of respondent and operant conditioning (that was his privilege as a specialized scientist) provided he didn't turn metaphysician and announce that there was nothing more to be explained (as he surely did, for example, on the religious level).

Finally—and most importantly for this paper—MacKay was a strong unity-of-science adherent in the philosophical tradition of Karl Popper. This meant, first of all, affirming the position that there was only one method which characterized all true sciences (including social sciences), a method which consisted of giving causal, deterministic explanations which were empirically testable. So although he was anything but scientistic (in the sense of according science both complete and ultimate explanatory power of all phenomena), he did adhere to the idea that sciences and non-sciences are characterized by different methods, and so explain the same phenomena in very different ways. Thus, when talking about the study of human beings, MacKay often used the metaphor of the "O-Story" and the "I-Story." The "O-Story," (the "outside" or "objective" story) was the account given by social or natural sciences in causal, deterministic categories. Such an account, no matter how complete on its own level, did not preclude *other*, non-scientific disciplines (such as history, literature, theology, *etc.*) from analysing human beings from an empathetic "I-Story," or "insider's" perspective. But it did mean, in MacKay's view, that the social sciences should be organized around a natural-sciences ideal, leaving the interpretive or hermeneutical approach—with its stress on human meaning, values, freedom, and responsibility—to the humanities.

Closely allied to this was MacKay's insistence on the in-principle objectivity of the scientific method. Although human bias and prejudice was constantly in danger of creeping in, MacKay was certain that the checks and balances of the scientific method (e.g., its norms of replicability and empirical testability) made it possible for scientists corporately and progressively to "see what was really there." Moreover, he suggested, from specifically *Christian* scientists God expected no less. In a 1984 letter to the *J.A.S.A.*, criticizing a colleague who espoused a more Kuhnian, post-empiricist philosophy of science, MacKay wrote:

> If we publish the results of our investigations, we must strive to "tell it like it is," knowing that the Author is at our elbow, a silent judge of the accuracy with which we claim to describe the world He has created. . . . If our limitations, both intellectual and moral, predictably limit our achievement of this goal, this is something not to be gloried in, but to be acknowledged in a spirit of repentance. Any idea that it could justify a dismissal of the ideal of value-free knowledge as a "myth" would be as irrational—and as irreligious—as to dismiss the ideal of *righteousness* as a "myth" on the grounds that we can never perfectly attain that. . . . [Christians must not] forget that, whatever their difficulties in gaining objective knowledge, they are supposed to be in the loving service of the One to whom Truth is sacred, and carelessness or deliberate bias in stating it is an affront.[13]

However, in expressing the issue in the way he did, MacKay may have confused some of the very levels of explanation he was so anxious to keep independent. For it is one thing to say that evangelicals should unambiguously confess that God is the author of truth and sovereign Lord of the universe. It is quite another thing to imply that such an acknowledgement can lead to only one, properly Christian philosophy of science—

*There is no doubt that the perspectivalist resolution* was *(and still is) attractive to many evangelicals, especially those in the academic, as opposed to the applied, social sciences.*

namely, one which claims, Kantian fashion, that facts and values can be neatly separated and *will be* so separated in the best exemplars of science.[14] To this point I will return presently, but before doing so I wish to comment on what it was about MacKay's perspectivalism that attracted so many Christian social scientists.[15]

There is no doubt that the perspectivalist resolution *was* (and still is) attractive to many evangelicals, especially those in the academic, as opposed to the applied, social sciences. In a sense, it allowed them to get the best of both worlds: by affirming that no one perspective on human behavior was complete by itself, they avoided charges of naturalistic reductionism from fellow-Christians; at the same time, by affirming the hegemony of the scientific approach in their own

particular disciplines, they maintained professional respectability with their secular colleagues. Thus, in a 1972 collection of essays, *Christ and the Modern Mind*, economist Thomas Van Dahm wrote:

> Economics, in brief, being a science, is ethically neutral, its principles suitable for use for the loftiest as well as the most depraved ends. . . . Will the fact that the student approaches economics from the standpoint of a Christian world and life view cause any problems for him in cases where the professor or authors of the course materials hold other views? No, provided that neither the student nor the professor and authors allows their views on religious questions to interfere with their perception of data, and provided that they can keep separate any cases of disagreement arising solely from differences in their underlying premises concerning the nature of God, man, and the physical world and their interrelationships. Such disagreements simply are not economic, but philosophical; therefore they have no bearing on one's understanding of economics per se.[16]

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And sociologist John Scanzoni wrote in the same volume that

> a "Christian sociology" does not exist any more than a "Christian psychology" or a "Christian biology." Sociology . . . represents an attempt to apply scientific methodology to the study of relationships between individuals and between groups. Any science is a set of generalizations induced from observations about empirical phenomena. Christianity, on the other hand, is a set of deductive propositions, many of which are simply beyond the ken of empirical verification.[17]

The upshot of this way of resolving the tensions between faith and social science was usually the conclusion that one's scientific work had scant bearing on one's confessional life, and that one's confessional life had little bearing on social scientific theorizing. Thus, when asked by students what makes a Christian psychologist (or economist, sociologist, anthropologist, *etc.*) adherents of the perspectivalist resolution could often be heard to say that "A Christian psychologist (*etc.*) is simply a *good* psychologist." What this was meant to imply was that one's faith might affect one's *personal* conduct as a social scientist—hopefully making one more honest, more careful in data-collection and analysis, and more courteous towards research subjects, clients, *etc.* A Christian service mentality might also be a motivator behind the kinds of *applications* one sought for one's research results. But the actual *conduct* of hypothesis testing—the actual "logic" of the scientific method—was seen, at least in principle, to be rightly immune to world view considerations.[18]

## Problems of Perspectivalism & the Post-Positivist Response

There was, however, a price to be paid for this neat compartmentalization of one's social scientific paradigm—putatively value-free, deterministic and naturalistic—from one's Christian confession regarding the supreme importance of certain values, the relationship of human freedom to moral responsibility, and the existence of a non-material reality. The most obvious problem was that by embracing only natural-scientific models of humanness, evangelicals in the social sciences, while moving closer to their secular *academic* colleagues, created an ever-widening gulf with their colleagues in the *applied* social sciences, particularly those in counselling and clinical activities. It is true that there have been some attempts to "scientize" clinical psychology—the medical model of mental illness and doctrinaire behavior modification are the most obvious examples—but for the most part clinicians and counselors (Christian *and* secular) have assumed a model of humanness which stresses the very things which the methodological determinism of academic psychology ignores: the irreducible existence of meaning, values, freedom, and moral responsibility in the lives of their clients.[19]

A second problem has to do with the fallout of Ramm's insistence that the Bible not be seen as a sourcebook of scientific theories. One can understand why Ramm hammered so insistently on this point, and why evangelical natural scientists agreed with him: the biblical drama of creation, fall, redemption, and future hope is not natural or social history so much as it is "metahistory," or salvation history. Its trustworthiness is not dependent on its various genres being reducible to a rigid chronology of temporal events, a set of logical propositions, or a set of detailed scientific theories (all

*Christian social scientists need an understanding of* both *the substantial and the relational image to do justice to the scriptural picture of humanness.*

of which earlier fundamentalists claimed.) But the *social* sciences are concerned with human beings, not for the most part with subhuman entities as are the natural sciences, and human beings are central players in the biblical drama. Systematic theologians have long seen the importance of articulating a biblical anthropology in the form of the doctrine of man; by contrast, evangelical social scientists have tended to deny that the Bible reveals *anything* about human nature that could help them construct and adjudicate theories.

This denial is accomplished by focussing on what theologians have called the *relational* image of God in persons to the exclusion of the *substantial* image; that is, on the claim that the way persons "image" God is strictly through His covenant relationship to them, and conversely, through their potential to respond to God and to their neighbors rather than because of anything essentially different about human beings *per se*.[20]

*A personal, value-laden, hermeneutical dimension—not reducible to technique—is not only inescapable in science, but probably essential to it.*

Again, adherents of this position seem to get the best of both worlds: they acknowledge the importance of covenant theology (thereby maintaining an evangelical identity), but at the same time assert that discovering what (if anything) makes humans unique is a strictly empirical question (thereby sparing themselves the embarrassment of seeming like religious fanatics in the eyes of their secular colleagues). But Christian social scientists need an understanding of *both* the substantial and the relational image to do justice to the scriptural picture of humanness.[21] In particular, they need to grasp and apply what Scripture says about human freedom, creativity, sociability, sexuality, and the impulse to worship and attribute meaning. Moreover, they need to understand how each of these is qualified by successive acts of the biblical drama. This is no easy task for social scientists, who want to avoid the naive biblicism that characterized their nineteenth-century forebears with regard to the natural sciences. But to overreact by denying that the Bible contains *anything* of relevance to social science theorizing is simply to throw the proverbial baby out with the bathwater.[22]

A final problem resulting from rigid adherence to the unity-of-science ideal has been a progressively outdated conception, on the part of both Christian and secular social scientists, as to how the natural sciences actually *do* operate. Contemporary philosophers of sciences, beginning with Thomas Kuhn in the 1960's, have become acutely aware that the actual, historical practice of sophisticated science departs substantially from Popper's notions of falsification and rigid, hypothetico-deductive logic—notions what are still taken for granted in academic psychology particularly.[23] The business of science is basically that of theory-adjudication; that is, deciding which of many possible theories best explains a certain phenomenon. In making such decisions, scientists use a number of non-logical criteria which philosophers of science term "epistemic values." These include such things as the simplicity of the theory under consideration, its internal coherence, its breadth of scope (i.e., the number of other theories it can subsume), its empirical testability, its susceptibility to numerical expression, its fruitfulness (i.e., the number of research programs it generates), and the success with which it can be modelled through the use of meaningful metaphors.

However, scientists by no means apply such epistemic values in universally agreed-upon ways. For one thing, it is almost impossible to maximize all of these values at once when judging a theory, and scientists differ in the way they rank-order their importance. This does not mean that "anything goes" when it comes to judging theories; as with the criticism of literary texts, there are limits on the range of theories one can realistically apply to the materials. But it does mean that a personal, value-laden, hermeneutic dimension—not reducible to technique—is not only inescapable in science, but probably essential to it.[24] How does one scientist settle on the model of the double helix to describe the DNA molecule, or another on the metaphor of the snake swallowing its tail to represent the benzene ring? An adequate apprenticeship, a deep sometimes even inarticulate knowledge of the field, the capacity to think divergently, a hunch as to what one is looking for even before logical and empirical details support it—such "tacit knowledge" is no less essential in natural science than it is in textual criticism or counselling psychology.

*The distinction between the so-called "value-neutrality" of science and the "value-ladenness" of religion simply doesn't hold up.*

In addition, it is now well understood that there are no strictly neutral "facts." Not only are theories underdetermined by facts (witness the number and diversity of espistemic values that come into play), but the reportage of "just the facts" is in fact highly value-laden. What scientists choose to look at, how they conceptualize it, how they determine the validity of those concepts, how they decide on the range of applicability of their findings—all of these operations involve value-judgments, many of which are bound not just to epistemic values, but to the scholar's prescientific faith-commitment to a certain world view. Consequently, the distinction between the so-called "value-neutrality" of science and the "value-ladenness" of religion simply doesn't hold up.[25]

*Study after study has shown that it is* natural *scientists who perceive the* least *conflict between science and religion, and who display the highest levels of religious commitment.*

An important question, then, is not why some evangelical social scientists have begun to *reject* the traditional empiricist notions of objectivity and value-neutrality, but rather why so many others continue to cling to them. The work of Robert Wuthnow, an evangelical sociologist at Princeton, suggests that it has to do with the greater insecurity of *all* social scientists regarding the legitimacy of their disciplines, given the institutional recency of their existence and especially the lower level of theoretical consensus that exists in the social as opposed to the natural sciences.[26] Lower levels of religiosity tend to be associated with higher levels of education in *all* academic fields; but contrary to the accepted secularization hypothesis concerning the inevitable conflict of science with religion, it is *not* true that irreligiosity is highest among academics in the most successful natural sciences. In fact, study after study has shown that it is *natural* scientists who perceive the *least* conflict between science and religion, and who display the highest levels of religious commitment.[27] Wuthnow argues that the latter, being more secure in their accomplishments, have less need to develop "boundary posturing mechanisms" by which they set themselves apart from the social norms and epistemology of everyday life in order to feel more secure as an academic guild. "People in the social sciences and humanities reject religion not so much because of what they dislike about religion specifically [Wuthnow notes that they differ from the ordinary population on political and lifestyle issues too] but because of the ill-codified reality they need to protect within their own discipline."[28]

Furthermore, it turns out that this boundary-posturing activity is greater among self-confessed *religious* people in the social sciences (few though they may be) than it is among their religious colleagues in the natural sciences. A 1973 study revealed that social scientists who believed in God were *much more* likely to assert that they had to keep their religious convictions and their research separate than believers working in the natural sciences, who generally said they felt no need to keep science and religion separate![29] This suggests that many evangelical social scientists feel doubly defensive. Not only are their disciplines, which aspire to be scientific, dubiously successful in achieving this end (at least by unity-of-science standards), but in addition they themselves fear being labelled "subjective" or "intellectually lightweight" because of their Christian commitment. Thus, those who do not decrease their defensiveness by renouncing religion entirely take pains to keep their religious and disciplinary epistemologies in mutually exclusive compartments.

*The time is ripe for evangelical social scientists both to stop accepting false guilt for having a world view that "weakens" their scientific objectivity, and to give up the rigid compartmentalization of their religious from their scientific activities.*

It should be clear by now that a legitimate alternative to this strategy would be to accept at least a weak form of the sociology of scientific knowledge, acknowledging that the pursuit of truth in science (and especially social science) is not a value-neutral endeavor at any point, and that the theory-adjudicating activities of scientists are not as different from those of non-scientists (or as free of social and metaphysical influence) as their popular image has led people to believe. Philosophers of science increasingly agree that world view considerations affect *all* scientific theory-adjudication, whether this is consciously acknowledged or not. Consequently, the time is ripe for evangelical social scientists both to stop accepting false guilt for having a world view that "weakens" their scientific

objectivity, and to give up the rigid compartmentalization of their religious from their scientific activities. They need to realize that it can be an advantage to have a world view which is overt rather than covert, under constant scholarly discussion, open to refinement, and capable of supplying certain "non-negotiables" about the basic nature of individual and social life, both as these were creationally intended and as they have been affected by the Fall.

Such an admission should, in turn, leave evangelical social scientists free to explore the possibility of alternative paradigms to the methodological determinism demanded by adherence to the unity of a science ideal. I agree with Stephen Evans that this does not imply the eclipse of empirical research, with its search for regularities of behavior. It does mean, however, that such regularities are only the beginning, not the end, of social explanation. It means that social scientists have to look for explanations of human behavior (both regular *and* irregular) as much in the realm of *reasons, intentions*, and *purposes* as in the realm of laws of the natural-scientific sort. It means that like their colleagues in counselling, history, and literature, they must begin to see human beings as "narratives in progress" or "living texts," as much or more than as passive materials in an experiment. This suggests that human behavior is to be regarded as quasi-linguistic: fully understandable only if one has learned the grammar and syntax of the rule-following community to which a respondent or client belongs. This is what Evans calls the "interpretive" side of social science, which is fully as important as its empirical side (and, indeed, essential to it).[30]

The development of a more interpretive methodology in academic psychology would obviously do much to unify it with the concerns and methods of Christian clinicians and counsellors, not to mention those of overseas and home missionaries—whose successful work depends on their ability to become empathic "participant-observers" in the cultures to which they are assigned. Nor does such an approach have to imply value-relativity, for as Evans points out, even as we seek to understand the rules by which others operate, covert judgments of value are inescapable. The very fact that even the self-professed value relativist distinguishes between acceptable *reasons* for a given behavior and *rationalizations* (which are seen as "bad" or "inadequate" reasons—note the value-judgment!) testifies to this.

It is increasingly recognized that all social-scientific work whether consciously admitted or not, includes an interpretive face and a judgmental (or "value-critical") face, in addition to its better-understood empirical face.[31] For evangelical social scientists to focus consciously only on the last of these, to the neglect of the other two, is to produce social science theory which is at best incomplete, and at worst sub-Christian. Increasing numbers of mainstream social scientists recognize the need to do justice to all three.[32] Consequently, given both the textual-interpretive traditions and the value-concerns Christians have to draw on, it would be both sad and ironic if evangelicals failed to offer leadership at this time of paradigm questioning in the social sciences.

## NOTES

[1]For a more detailed treatment of the 19th century, see George Marsden (ed.), *Evangelicalism and Modern America* (Grand Rapids: Eerdmans, 1984), Part I, and also his *Fundamentalism and American Culture* (New York: Oxford University Press, 1982).

[2]A more detailed development of these points as regards the case of psychology is in Mary Stewart Van Leeuwen, "Psychology's Two Cultures: A Christian Analysis," *Christian Scholars Review*, Vol. XVII, No. 4 (June 1988), pp. 406–24. A detailed philosophical analysis can be found in C. Stephen Evans, *Psychology as a Human Science: Prospects for a Christian Approach* (Grand Rapids: Baker, in preparation). A 40-year overview of evangelical scholarship in general can be found in George Marsden's "The State of Evangelical Christian Scholarship," *Reformed Journal*, Vol. 37, No. 9 (Sept. 1987), pp. 12–16 (reprinted in *Perspectives on Science and Christian Faith*, Vol. 40, No. 3, pp. 157–159).

[3]Mark A. Noll, "Christian Thinking and the Rise of the American University," *Christian Scholars Review*, Vol. IX, No. 1 (1979), pp. 3–16, (quotation from p. 6).

[4]For an account of little-known exceptions in both Britain and America, see David N. Livingstone, *Darwin's Forgotten Defenders: The Encounter Between Evangelical Theology and Evolutionary Thought* (Edinburgh: Scottish Academic Press, 1987).

[5]Carl F.H. Henry, *The Uneasy Conscience of Modern Fundamentalism* (Grand Rapids: Eerdmans, 1947). See also Marsden, "The State of Evangelical Christian Scholarship."

[6]Marsden points out that, in 1947, the transdenominational movement was known either as fundamentalism or evangelicalism (usually the former), but that it was fundamentalist in character. The theological distinctions between the two have developed since then.

[7]All three reviewers were from Wheaton College, which was very much the intellectual flagship of the American fundamentalist/evangelical movement.

[8]Bernard Ramm, *The Christian View of Science and Scripture* (Grand Rapids: Eerdmans, 1954).

[9]Ramm is careful to note that his approach is not unique: some form of it has been typical of both Catholic and Reformed theology throughout the centuries, and American evangelical thought could have continued in this tradition but for the cultural retreat and defensiveness of fundamentalism. See also Livingstone, *op. cit.*

[10]Robert D. Culver, "An Evaluation of *The Christian View of Science and Scripture* from the Standpoint of Christian Theology," *Journal of the American Scientific Affiliation*, Vol. 17, No. 4 (Dec. 1955), pp. 7–10, (quotation on p. 7).

[11]Witness the following comment from Ramm's letter to the *J.A.S.A.* in conjunction with the latter's positive evaluation of the book: "With some of the very mean criticisms I have been receiving, it is a comfort to get some Amens from solidly evangelical men." See Vol. 7, No. 4 (Dec. 1955), p. 7. But in an interview in the *Festschrift* volume, Ramm estimated that over 25 years, positive letters about the book outnumbered negative ones by about twenty to one. See, "An Interview with Bernard Ramm and Alta Ramm," *Journal of the American Scientific Affiliation*, Vol. 31, No. 4 (Dec. 1979), pp. 179–86, and also Ann H. Hunt's summary of press reactions to the book on pp. 189–90 of the same volume.

[12]Donald MacKay, *The Clockwork Image* (London: Intervarsity Press, 1974); *Human Science and Human Dignity* (London: Hodder and Stoughton, 1979); *Brains, Machines and Persons* (Grand Rapids: Eerdmans, 1980). For critical analyses of MacKay's position, see for example Clifton J. Orlebeke, "Donald MacKay's Philosophy of Science," *Christian Scholars Review*, Vol. VII, No. 1 (1977), pp. 51–63; and William Hasker's "MacKay on Being a Responsible Mechanism: Freedom in a Clockwork Universe," *Christian Scholars Review*, Vol. VIII, No. 2 (1978), pp. 130–40; MacKay's response to same (pp. 141–48 of the same volume); and Hasker's response to MacKay's response (pp. 149–52 of the same volume).

[13]Donald M. MacKay, "Objectivity in Christian Perspective," *Journal of the American Scientific Affiliation*, Vol. 36, No. 4 (Dec. 1984), p. 235.

[14]The quotation cited is not an isolated example of MacKay's conviction that a pre-Kuhnian, Popperian philosophy of science was the only proper one for Christians. In another article, "Value-Free Knowledge: Myth or Norm?" (*Faith and Thought*, Vol. 107, 1980, p. 202), he voiced concern over younger Christian colleagues being "seduced" into rejecting the norm of value-free knowledge, and saw such post-positivistic leanings as "symptomatic of the practical atheism of our day." The author also recalls his personal visit to the Calvin Center for Christian Scholarship in 1981, at which time the center fellows (who were studying the relationship of Christianity to the behavioral sciences) were urged to "let the Kuhns and the Habermas' go their own pagan way, and stand instead on the unshakable Word of God."

[15]Perspectivalism as a philosophy of integration has been a strong theme in the pages of the *J.A.S.A.* since its original, basically positive endorsement of Ramm's book.

[16]Thomas Van Dahm, "Economics." In Robert W. Smith (ed.), *Christ and the Modern Mind* (Downers Grove, IL: InterVarsity Press, 1972), pp. 215–23, (quotation from pp. 216–17).

[17]John Scanzoni, "Sociology." In Smith, *op. cit.*, pp. 123–33, (quotation from pp. 123–24). Note that despite his implicit separation of methods for science and theology, Scanzoni's epistemology for both is very much in the tradition of the 19th-century moral philosophers, who were not only Baconian inductivists (assuming that observed "facts" could be organized into generalizations without dispute), but also "propositionalists" with regard to the nature of Scripture (assuming that, regardless of genre differences, all parts of the Bible could be reduced to an interlocking set of logical propositions). Both mainstream pre-Kuhnian scientists and mainstream evangelical biblical scholars would be startled by Scanzoni's simplistic epistemology masquerading as sophisticated philosophy of science and theology.

[18]The distinction between the "context of discovery" of hypotheses (in which *any* source of inspiration is allowable) and the "context of justification," or testing of those hypotheses (in which only the so-called "logic of the scientific method" is said to operate) is a distinction made famous (and for a long time normative) by Karl Popper. See Popper's *The Logic of Scientific Discovery* (New York: Basic Books, 1959).

[19]For a further critical analysis of these tensions, see Evans, *Psychology as a Human Science*; Stanton L. Jones (ed.), *Psychology and the Christian Faith* (Grand Rapids: Baker, 1986), especially chapters 1, 3, 7–9; and Mary Stewart Van Leeuwen, *The Person in Psychology: A Contemporary Christian Appraisal* (Grand Rapids: Eerdmans, 1985). There are a number of historical reasons for the decision of clinical/counselling psychologists to work primarily from a non-scientized model of humanness. But in addition there is a pragmatic factor which also weighs heavily: academic psychologists have traditionally been able to summon research subjects on command (from undergraduate classes especially); consequently, they have not had to worry much about any offense given to these subjects by their reductionistic and often deceptive manipulations. (The same is true of clinicians using a medical or behavioral model with severely disturbed patients who have temporarily lost their civil rights and freedom of choice and movement.) By contrast, counselling psychologists have to work in an open market: condescending and dehumanizing behavior towards clients results, in the long run, in having none.

[20]See for example MacKay, *Human Science and Human Dignity*; David Myers, *The Human Puzzle: Psychological Research and Christian Belief* (San Francisco: Harper and Row, 1978); E. Mansell Pattison, "Psychology," in Smith, *op. cit.*, pp. 185–203; G.C. Berkhouwer, *Man: The Image of God* (Grand Rapids: Eerdmans, 1962); and Douglas John Hall, *Imaging God: Dominion as Stewardship* (New York: Friendship Press, 1986). For an opposing treatment, see Sidney Greidanus, "The Use of the Bible in Christian Scholarship," *Christian Scholars Review*, Vol. XI, No. 2 (1982), pp. 138–47.

[21]For an excellent development of this point, see C. Stephen Evans, "Healing Old Wounds and Recovering Old Insights: Towards a Christian View of the Person for Today," in Mark Noll and David Wells (eds.), *Christian Faith and Practice in the Modern World: Theology from an Evangelical Point of View* (Grand Rapids: Eerdmans, 1988), pp. 68–86. Evans points out, among other things, that if it were only the relational, and not the substantial image of God that mattered, Jesus Christ could just have easily been incarnated in the form of a tomato, rather than as a person.

[22]For an elaboration of this criticism, see especially Nicholas Wolterstorff, *Reason Within the Bounds of Religion* (Grand Rapids: Eerdmans, 1976).

[23]Thomas Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1962 & 1971). See also Frederick Suppe, *The Structure of Scientific Theories* (Urbana: University of Illinois Press, 1977); and Imre Lakatos and Alan Musgrave, *Criticism and the Growth of Knowledge* (Aberdeen: Cambridge University Press, 1970). For a good summary of the state of philosophy of science from a Christian perspective, see Del Ratzsch, *Philosophy of Science: The Natural Sciences in Christian Perspective* (Downers Grove, IL: InterVarsity Press, 1986).

[24]For an elaboration, see Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy*, rev. ed. (University of Chicago Press, 1962).

[25]For a more detailed discussion, see Evans, *Psychology as a Human Science*, and also David Lyon, "Valuing in Social Science: Post-Empiricism and Christian Responses," *Christian Scholars Review*, Vol. XII, No. 4 (1983), pp. 324–38.

[26]Robert Wuthnow, "Science and the Sacred," in: Phillip E. Hammond (ed.), *The Sacred in a Secular Age* (Berkeley: University of California Press, 1985), pp. 187–203.

[27]See Wuthnow's bibliography for a list of such studies, but note in particular *The Connecticut Mutual Life Report on American Values in the '80s: The Impact of Belief* (New York: Research and Forecasts, Inc., 1981); Stephen Steinberg, *The Academic Melting Pot: Catholics and Jews in American Higher Education* (New York: McGraw-Hill, 1974); and Fred Thalheimer, "Religiosity and Secularization in the Academic Professions," *Sociology of Education*, Vol. 46 (1973), pp. 183–202. It should be noted that the findings of these studies are supported by some uniquely evangelical data: InterVarsity Christian Fellowship in North America reports that its volunteer faculty advisors to student groups on secular campuses come overwhelmingly from the natural sciences, with only a small percentage from the humanities and almost none from the social sciences. It is also clear that this reflects not differential rates of volunteerism, but the much greater percentage of Christian faculty among natural scientists in comparison with social scientists and humanities scholars (personal communication with James Sire and Michael Maudlin, June 1987).

[28]Wuthnow, *op. cit.*, pp. 197–98.

[29]Fred Thalheimer, "Religiosity and Secularization in the Academic Professions," *Sociology of Education*, Vol. 46 (1973), pp. 183–202.

[30]Evans, *Psychology as a Human Science*. See also David Braybrooke, *Philosophy of Social Science* (Englewood Cliffs, NJ: Prentice-Hall, 1987).

[31]Recent articles in the *Christian Scholars Review* which attest to the recognition and validity of these three faces include: Arthur J. Moen, "Paradigms, Language Games, and Religious Belief," (Vol. IX, No. 1, 1979, pp. 17–29); Ronald J. Burwell, "Sleeping With an Elephant: The Uneasy Alliance Between Christian Faith and Sociology," (Vol. 10, No. 3, 1981, pp. 195–208, with responses); Mary Stewart Van Leeuwen, "The Unfulfilled Apprenticeship of North American Psychology," (Vol. XI, No. 4, 1982, pp. 291–315, with responses); James J. Olthuis, "On Worldviews," (Vol. XIV, No. 2, 1985, pp. 153–64); and Richard Perkins, "Values, Alienation, and Christian Sociology," (Vol. XV, No. 1, 1985, pp. 8–27, with a response by Stephen Evans in Vol. XV, No. 3).

[32]Examples from psychology include: Kenneth J. Gergen, *Towards Transformation in Social Knowledge* (New York: Springer-Verlag, 1982); Rom Harre, David Clarke, & Nicola De Carlo, *Motives and Mechanisms: An Introduction to the Psychology of Action* (New York: Metheun, 1985); Donald Polkinghorne, *Methodology for the Human Sciences* (Albany: State University of New York Press); Peter Reason and John Rowan (eds.), *Human Inquiry: A Sourcebook of New Paradigm Research* (New York: Wiley, 1981).

# A Values Framework for Teaching Global Science

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*Science educators are beginning to include the issues of global resources and environment in secondary science curricula, specifically the "science, technology and society" curricula (STS). The author argues that STS education may legitimately be influenced from a biblical perspective by introducing the subject of values. One way of accomplishing this is to use a values framework which subsumes the conceptual themes of the STS curriculum. For example, the themes of conviction, mutuality, orderliness and finitude can be subsumed by the values of self-benefit, the common good, and restoration-conservation.*

In 1962 Rachel Carson published *Silent Spring* and within three months 100,000 copies were sold. Six years later on April 22nd, America's first "Earth Day" celebration was held. On January 1st, 1970, President Nixon signed the National Environment Policy Act. Americans were beginning to take natural resources and environment issues seriously. Christians were equally enthusiastic over the new issues, if not a little embarrassed. Evangelicals especially had been stung by Lynn White's article (1967), "The Historical Roots of Our Ecologic Crisis." He claimed that the cause of the irresponsible exploitation of our natural resources was to be found in a Christian theology based on Genesis 1:28. Partly in response to criticism, but I think mainly in response to the Gospel, a number of Christians have written about Christian positions with regard to natural resources and environmental issues. An early example is Schaeffer's *Pollution and the Death of Man* (1969). Later examples are *Earthkeeping: Christian Stewardship of Natural Resources* (1980) and *Tending the Garden: Essays on the Gospel and the Earth* (1987), edited respectively by Wilkinson and Granberg-Michaelson.

A major result of this aroused interest in natural resources and environment issues is that these issues have found their way into secondary school and college curricula. I find this altogether proper, and my subject in this article is the presentation of these issues in the classroom. Specifically, I comment on current education practice, potential areas of conflict with Christian beliefs, and give a few thoughts on how educational practice might legitimately be influenced from a biblical point of view.

It is important to bear in mind that there are both legitimate and illegitimate ways of bringing a biblical influence upon public education. An example of the latter would be an attempt to bring sectarian doctrine into the public school classroom. A legitimate influence would be to encourage the teaching of values, especially those Christian values which also have been traditional values in our society.

Since I am writing about educational issues, I have chosen to use the educational terminology "global science" and "science, technology, and society" (STS), which include the subjects of domestic and global natural resources and environment protection.

## Current Events in Global Science Teaching

Teaching global issues and awareness is not a new idea. Secondary schools have for years offered world geography courses which include material on global resource distribution, the study of climate zones, foreign cultures, and political systems. In more recent years environmental issues have also been included. Educators understand that the events of today's world are unintelligible to the citizen who knows little about natural resources and environmental issues. We are reminded of this by television virtually every day. The President of the United States visits Canada and is confronted with "Acid Rain" protestors. And even more heart-wrenching was the picture of 37 flag-draped caskets; the casualties from the missile attack on the USS Stark, stationed in the Persian Gulf to protect vital oil resources. The events of today's world literally demand that we teach our children more about these issues.

There is another reason educators have been paying more attention to global resources and environment. Traditional science courses taught at the secondary level are coming under increasing attack as being irrelevant for most students. The typical secondary science class is taught for the 3 percent who will go on to be science majors in college. The other 97 percent of the students are largely uninterested (Yager, 1987). For these students, the alternative science courses have always been health science or watered-down biology, which often lack academic credibility and seldom are any more attractive than regular science courses.

In recent years the importance of global resources and environmental issues has opened other, more credible alternatives to the traditional science class; that is, the "global science" and "science, technology and society" courses—both commonly referred to as STS courses (see Bybee, 1985; Patrick & Remy, 1985). The proponents of these courses hope that the typical student will become more interested in science because of these courses and will generally be better informed about the world in which he or she lives. Their hope that these courses will be of greater interest rests on the broader scope of STS courses, which includes social science and current affairs material. The STS movement shows great promise, but it also contains some content in need of revision.

## The Presuppositions of Curriculum Writers

The Christian encounter with public education these days always seems to be negative. It takes the form of legal suits such as the recent ones in Tennessee (Mozert vs. Hawkins County Public Schools, 1986), Alabama (Smith vs. Board of School Commissioners of Mobile County, 1987), and Louisiana (Edwards vs. Aguillard, 1986), or the withdrawal of students to alternative private schools. The conservative church is known more for its criticisms of public education than for any interest or support. I am not saying that there are no just causes for criticism, only that it is unfortunate that the most salient aspect of church/education relations is a negative, hostile one. That ought not to be the case with "global" issues; mainly, because of the church's great interest in foreign missions. As Bernard Ramm has written: "Being *world-minded* and missionary-minded is considered a necessary feature of a healthy Christian

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mentality" (1954, emphasis added). I would not be surprised to find that high school students from conservative churches are more likely to recognize a place such as Gabon or Uruguay than their unchurched friends. I know that my own knowledge of world geography has been enhanced as a result of the many missionaries I have heard speak in church.

*It is unfortunate that the most salient aspect of church/education relations is a negative, hostile one.*

Given the conservative church's interest in foreign missions one might predict that these churches would support teaching for global resource and environment awareness, if for no other reason than to improve their children's knowledge of the nations that compose the American church's foreign mission field. However, to say that the teaching of a given subject is favored is quite distinct from supporting a particular curriculum structure and values used in the classroom to actually teach that subject. Support here requires agreement with a particular philosophy—herein is the source of conflict.

Most people who write curriculum materials for public schools are not known for fundamentalist Christian values or conservative political leanings which are so often allied with Fundamentalism. With respect to STS curriculum materials, one is likely to find that writers:

1. value environmental conservation above resource development (e.g., object to the harvesting of timber in a wilderness area);
2. value clean energy above economical energy (e.g., solar energy over fossil fuel energy);
3. generally accept zero-sum economics, (i.e., one nation's wealth is another nation's poverty);
4. accept conservative estimates of available resources (e.g., Club of Rome estimates);
5. tend to be less critical of communist and socialist regimes than of other authoritarian regimes because distribution of wealth under the former is perceived to be more equitable;
6. knowingly or not, espouse a materialistic philosophy in their work.

These points—values in a broad sense of the word—are reflected in the material the writers produce. And in addition, the publishers (especially of textbooks) are concerned with marketability. Beside the many things that go into making something marketable, there are the things better left out. In fact, when it comes to controversial subjects such as religion and values, many publishers follow the rule "when in doubt, leave it out!" The result is that these topics are often downplayed or completely ignored. The absurd extremes to which this kind of thinking can be taken was evident recently in a public school district newsletter in Washington, D.C. In an article about the origin of the Christmas tree tradition, the writer referred to Martin Luther as a German clergyman. In a letter to the editor of the Washington Post, a parent commented that this kind of revisionist history made about as much sense as referring to Abraham Lincoln as an attorney from Illinois! (Further examples of this can be found in Paul Vitz' study of religion in school textbooks, 1986) The point is, textbook writers tend to be politically and morally liberal and their publishers tend to be pragmatic. The combination virtually assures the elimination of traditional values and religion as topics in the textbooks.

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I am not implying that the values listed above are necessarily unchristian, with the exception of materialist philosophy. I would imagine that many ASA members hold some or all of these values. But these are not values espoused by conservative church members, even less so by hyper-orthodox church members.

## Two Curriculum Resource Examples

To illustrate the above general statements, I would like to briefly discuss two curriculum resources that include material on global resources and environment, materials that might be used in an STS course, though strictly speaking these are not STS programs. The first has already come under attack. The University of Denver sponsors the Center of Teaching International Relations (CTIR). Among its many activities the Center produces resource materials for the general field of global education. Most educators consider the material well-balanced. If in fact the CTIR curriculum writers hold to the above six points, they show few signs of it in their work. Their materials are of the type supported both by William Bennett and Terrel Bell, the current and former United States Department of Education Secretaries. However, the Center's global education

material has recently been attacked by several people, including Phyllis Schaffly, as being pacifistic because it discusses the horrors of nuclear war; capitulationist, because it discusses the nuclear freeze issue; and socialistic, because it discusses the problem of Third World debt. The critics of CTIR have not chosen their target very well. There are groups with specific agendas for global education which do deserve criticism, but CTIR has exerted great care to develop balanced materials (see Crawford, 1986). I mention this case because I want to point out that some people, especially hyper-orthodox Christians, are not happy with educational materials unless they are sympathetic to their particular positions.

The adjectives pacifistic, capitulationist, and socialistic could better be used to describe a global education resource book produced by The Institute for Peace and Justice (IPJ). This Institute distributes several resource books for teachers on topics broadly defined as peace and justice issues. One titled *Global Dimensions* (McGinnis, 1984) includes material on global resources, distribution and use. Though this resource book is intended for use at various education levels *including elementary and secondary*, it is overtly radical. For example, it accuses the International Monetary Fund specifically, and all Western nations in general, of deliberately exacerbating and perpetuating Third World suffering. It openly advocates the large-scale redistribution of wealth and power. It ignores all forms of sovereignty and freedom except for economic freedom. Quite distinct from the writers at CTIR, the writers at The Institute For Peace and Justice hold an extreme position on the above six points and openly support those points in their curriculum materials.

*As a rule, textbooks treat fairly the relationship between humanity and nature . . .*

Are the IPJ materials likely to gain widespread use? I doubt it. Most school districts across the nation are conservative in nature. Typical school board members are not likely to favor such materials, and even if they did, the potential for trouble would act as a restraining force. This type of material is so obviously political in nature, so biased in presentation, that it literally shouts, "Stay away from me!"

I am concerned that organizations such as The Institute for Peace and Justice feel that it is appropriate to promote their materials for use in public schools, especially when they make the false claim that their materials are fair and well-balanced. But I am much more concerned about the loss of Christian credibility that results from hyper-orthodox Christians lumping together very different organizations such as The Center for Teaching International Relations and The Institute for Peace and Justice. I am also much more concerned that hysteria will divert attention from more realistic concerns about what is christianly acceptable in the public schools, and will divert energy away from constructive, constitutionally proper ways in which Christians can influence public education.

*There is a long-standing tradition that values and morality have little place in science textbooks. However, value-neutrality is a myth.*

### What is a More Realistic Concern?

Of concern should be the low status, to the point of irrelevance, given to traditional values and religion in textbooks and curriculum resource materials. We can see this in the typical philosophical statements that undergird curricula. John W. Christensen's textbook *Global Science* is a good example of the type of STS material appearing more and more frequently in secondary schools. One of the things I like about Christensen's book is that the major organizing themes are explicitly stated. You do not have to "read between the lines" to discover his philosophical position, and so his book makes for a good example. Christensen's global science themes are:

1. Humans are partners with nature.
2. The world we live in is orderly and law abiding.
3. The earth and its resources are finite.
4. The goal of society should be to achieve the highest standard of living that is compatible with our environment.

Let us examine these one at a time. I think that as Christians we would agree with theme #1: that humans and nature are partners, given that we and our environment are all a part of God's creation. As a rule, textbooks treat fairly the relationship between humanity and nature, but we should be watchful for the occasional teacher who would use this theme as a basis for an extreme environmentalist, political position or animal rights position. I would be concerned if this

theme were used to diminish the high view of humanity that is held within the Judeo-Christian tradition. On the other hand, this theme presents an opportunity for a class to examine the origins of the Western view of humanity and nature. To do so would necessitate raising the subject of religion and religious influences. Unfortunately textbook writers seldom take such an opportunity, and the importance of religion continues unnoticed.

The second theme is that we live in an orderly and law abiding world. As Christians we likely will have little trouble affirming this—although there are students from certain neighborhoods who may find this a bit puzzling given their personal experiences. This is something teachers should bear in mind. Here again we find that textbooks say nothing about the philosophical and theological roots of this Western notion of orderliness. Certainly this is a good place, an appropriate place, for the non-sectarian teaching of how religion has influenced our ideas and behavior. By omission our schools teach that religion is unimportant.

While the first two themes are conceptual statements whose development has been influenced by many factors including religion, the third theme, that the earth and its resources are finite, is more a statement of fact. About it I will only say that our Christian desire for truth should cause us to be wary of unbalanced definitions of finite. Let us remember that "finite" is very much smaller for Willy Brandt than it is for Herman Kahn or Julian Simon!

While as Christians we can live with themes 1, 2 and 3, theme 4 presents a specific problem: "The goal of society should be to achieve the highest standard of living that is compatible with our environment." This is a bald statement of materialism. Here we have a statement, one quite common in science education, that indeed does violate our Christian beliefs—in so far as the author purposely chose the wording "the goal" over "a goal"—and I think we must assume that he did. It should have read: "An important goal of society should be to achieve a modest standard of living without sacrificing long-term environmental health."

It is not surprising that materialism is the primary value in science-related textbooks. There is a long-standing tradition that values and morality have little place in science textbooks. However, value-neutrality is a myth. And since science knowledge is about the material world, the value that most frequently surfaces is materialism. Note that when a textbook author wants to point out the benefits of science or reasons for supporting scientific research, material examples are always chosen. To be fair to the science textbook writers, I should remind us that materialism in a text is also a reflection of the materialism endemic in our society.

To deal with the neglect of values and religion in education some may wish to get into the business of writing textbooks. Others may find that producing a resource booklet such as the ASA booklet, *Teaching Science in a Climate of Controversy*, is a realistic and effective approach. Of course if you teach an STS-type course you can implement your own ideas. Since I work in teacher preparation, I raise these issues with my students and give them examples of legitimate methods of dealing with religion and values in the classroom as explained in the following section.

## Values as STS Organizing Themes

I suggest to my students that they organize their STS courses around values and then embed conceptual themes within these values. The values I use, expressed as infinitive phrases, are: to benefit ourselves, to serve the common good, and to restore and conserve for the future. I chose these values because they are appropriate to the STS subject matter. They also are values generally recognized in our society. And these values are not only compatible with Christian belief, but are an expression of Christian concerns—in fact I would say that they are recognized in our society because of a Judeo-Christian influence on our society.

Embedded within these values are four conceptual themes:

1. "conviction"—All human activity is based on religious-philosophical convictions (often held unconsciously).
2. "mutuality"—There is a mutual interdependence in all of creation (humanity included).
3. "orderliness"—The world is orderly.
4. "finitude"—The earth's resources are finite.

Conceptual themes 2, 3, and 4 are commonly held in science education. However, "conviction" is included as a needed corrective for the lack of metaphysical material in the typical science curriculum.

The framework is composed of three subsets of directional questions. These questions are designed to collectively support the course values and conceptual themes. They are intended to direct student attention to the organizing values and conceptual themes of the course, as well as directing the teacher's choice of curriculum materials and methods. For example:

**Value #1: To Benefit Ourselves**

Directional Questions:

1. How do we benefit from the earth's resources? Why do we consider it good to use the earth's resources to benefit ourselves? e.g., Why do we think it is a good idea to drill for oil, dig for coal, build reservoirs, experiment with efficient methods for harnessing the wind?
(Conceptual Themes: conviction)

2. What are our American resources? What are the resources of other nations? What are the potential resources?
(Conceptual Themes: mutuality, finitude)

3. What are our resource-use patterns? What are the resource-use patterns in other nations?
(Conceptual Themes: mutuality, orderliness, finitude)

4. What are the consequences of our current use patterns? What are the consequences of the use patterns of other nations?
(Conceptual Themes: mutuality, finitude)

5. Can our value theme be corrupted? Has it been? By us? By others?
(Conceptual Themes: conviction, mutuality)

**Value Theme #2: To Serve The Common Good**

Directional Questions:

1. Why do we feel that it is good to share? What is the notion of "the common good?" Are there limits to sharing? Are there priorities within the common good?
(Conceptual Themes: conviction, mutuality)

2. What do we have that other nations need? What do other nations have that we need? Do some nations at times benefit at the expense of others? How could we all mutually benefit?
(Conceptual Themes: mutuality, finitude)

3. How does our first value theme, benefiting ourselves, fit with the value of sharing?
(Conceptual Themes: conviction, mutuality, finitude)

**Value Theme #3: To Restore and Conserve**

Directional Questions:

1. Why do we feel that a mountainside should be restored to near its original condition after a strip-mining operation has ceased? Why do we feel that it would be unwise to rapidly consume all of our petroleum resources?
(Conceptual Themes: conviction, finitude)

2. How do our resource-use patterns impact upon the availability of resources and our environment? How do the resource-use patterns of other nations impact upon the availability of resources and our environment?
(Conceptual Themes: mutuality)

To implement the framework, the teacher would go through the course textbook or syllabus noting all places appropriate for the use of the framework directional questions. When one of these places is reached during the class, the students would be engaged in a discussion or some other activity based on the directional questions. Thus, the content of the course is never separated from the course values and conceptual themes. Since the intention is to emphasize values, a teacher who used this framework would begin a course by focusing student attention on the issue of values. This can easily be done with discussion questions such as:

What are values? How do values influence us?

Where do values come from?

When we address the issue of the earth's resources, what values are pertinent?

What values are important to a *person in society* as opposed to a person as an individual?

What values are important to a *person as an individual* as opposed to a person in society?

Can you create a hierarchy of values important to people?

If all goes well, the teacher is able to pull from the discussion the central framework values and thus set the stage for the course. (Should it not go well, the teacher can always resort to a handout that identifies the central framework values in their historical and philosophical context.) Thereafter, the issue of values would be renewed each time a directional question was encountered. Although adopting this approach does not guarantee that materialism will not ultimately be emphasized by the teacher, it does guarantee that materialism will not gain centerstage by default.

In summary, the Christian responsibility in public education is to check the excessively unbiblical behavior that undermines the faith of young students, while also encouraging an academic climate where values and religion are given their due, but non-sectarian, attention. One way of doing this is to impress upon teachers the importance of these issues and to provide them with ideas on how values and religion may legitimately be taught in the classroom. I hope that my own values framework for STS courses is a good example of how this can be done.

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# Deep and Powerful Ordering Forces in the Universe

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*The Judeo-Christian concept of God provided the scientist with an ordered universe whose authenticity and rationality was assured by the reliability and rationality of its Creator. This contingent nature of the universe was less appreciated at the time of Isaac Newton because of an image of the world as a machine, a clockwork. However, relativity and quantum theory brought about a drastic revision of views of space, time and causality, and revived the concept of contingent order. Recent developments in the study of far-from-equilibrium processes demonstrate that deep and subtle ordering forces are at work even in what were thought to be random processes. There is a wholeness to the universe that cannot be broken.*

## I. Introduction

Ancient ideas of divine order in the universe were strongly biased toward polytheistic notions of a nature influenced in an arbitrary way by competing deities. By contrast, the Old Testament description of Genesis presents a picture of a single all-powerful deity whose creative activity is orderly, purposeful and good. The New Testament lends even greater distinction to the work of this transcendent God by revealing His intense ongoing concern for the order of this material world He had made. The Apostle Paul, in his letter to the Colossians, and the writer of the letter to the Hebrews both emphasize the immanent activity of God in His universe ("By Him all things consist," Colossians 1:15; "He upholds all things by the word of His power," Hebrews 1:3).[1]

The deep significance of this ordering principle has been increasingly appreciated, with the development of relativity theory, through the major philosophical upheaval of quantum theory and the uncertainty principle, and in the current studies of the relationship of order to disorder by Mitchell Feigenbaum, Ilya Prigogine and David Bohm. It is becoming increasingly evident that there are deep and powerful forces stipulating order in the universe.

## II. Historical Scientific & Theological Views of Order

### *A. Contrast Between Greek & Judeo-Christian Views of Mankind*

Theologian Thomas Torrance has stated that three major traditions have contributed to the understanding of mankind which prevails in modern Western culture.[2] The Greek and Roman traditions alike were characterized by a radical dualism of body and mind or soul, whereas the Hebrew tradition was distinctly non-

dualist, with body and soul forming an integrated unity. These distinctions have given rise to deep tensions which he says we must endeavor to understand as we function in a scientific-technological culture.

Greek dualism elevated the mind to almost God-like status, to a transcendent position where man could be occupied with enteral ideas such as truth, harmony, goodness and beauty. Earth and its mundane sensibilities were of less consequence. The result was what Torrance calls "a persistent rationalistic disjunction of theory from practice." The Romans had a different type of dualism, one that separated body from soul by virtue of an emphasis on the material realm. The Roman mind, he points out, was intensely pragmatic, focused on the business of technical achievement and devoted to law and order—to the respected and feared Roman justice. Rome built; their goals were an invincible army, a stable society, an incredible power structure.

*In the Incarnation, God takes on the form of man, assumes a place of suffering and struggle alongside His creatures, and in so doing confers on His earthly creation a greater sense of both reality and importance.*

By contrast, the Hebrew view was a unitary one. The one God, who ruled the universe, was intimately concerned with the fortunes of His creatures. He was involved in every aspect of their society, and they were actually His earthly agents for the blessing of mankind.

As Torrance says:

> It was characteristic of the Hebrew unitary view of body and soul . . . that the spiritual and the physical were not disjoined but held to be interlocked under the sustaining and holy presence of God. This is very evident, for example, in the teaching of the Old Testament about religious cleanness and uncleanness in physical life and behaviour, which is so foreign to any outlook governed by a sharp dualism of mind and body. But it is particularly evident in the conviction that God and his people were so closely bound together in the fulfilment of his supreme purpose for mankind in history, that he was not regarded as shut out of human affairs, infinitely exalted and transcendent though he is. God and his people were thought of as forming one covenanted society within the conditions of their earthly existence, while they on their part did not need to reach beyond those conditions or escape into some realm of timeless abstractions to enjoy spiritual communion with him. Integral to this Hebrew outlook was an essentially religious view of man, for human beings were regarded as related to one another and to the physical creation through the intimate presence of God and in reliance upon the constancy of his faithfulness and steadfast love. Hence, instead of religion being hived off into some arcane realm of its own, it became the inherent force affecting the way human beings regard and behave toward one another, and making for creative integration in everyday human life, thought and activity.[3]

Implied in the Hebrew conception of man's relationship to God was also a sense of personal relationship. God desired our love, and He also desired us to love our neighbors.

When we come to the Christian era, this sense of the personal is confirmed and greatly extended. In the Incarnation, God takes on the form of man, assumes a place of suffering and struggle alongside His creatures, and in so doing confers on His earthly creation a greater sense of both reality and importance.

### *B. The Concept of Order*

The crucial importance of the Judeo-Christian conception for our consideration of order lies in this emphasis on the transcendent God's intense interest in His creation and in His creatures. Not only was God, in the Christian view, an active participant in His world, but He had created it out of nothing, along with space and time. He was not, then, simply the First Cause and therefore part of what was made. Instead, everything that existed owed both its origin and its continuation to His creative will. Stanley Jaki, in *Cosmos and Creator*, discusses the distinctly Christian roots of the doctrine of creation out of nothing, or *creatio ex nihilo*, and attributes its first use to the theologian Tertullian (c. 200 A.D.). Its acceptance as a Christian doctrine was immediate and widespread, not only because it was consistent with the first chapter of Genesis, where the heavens and earth have their "beginning" through the all-powerful God, but also because it was a necessary emphasis in confrontation with the Hellenistic philosophy in which the world was considered eternal and divine. Jaki says of the doctrine:

> What is most telling about that declaration is its entry into Christian literature from the very beginning and the matter-of-fact manner in which that entry had been accomplished. There is no hesitation whatever on the part of those writers concerning the appropriateness of 'from what was not existing' to convey the true meaning of the making of the world by Almighty God. This is certainly a striking contrast with the Greeks' attitude toward the notion of creation out of nothing. That attitude was a spontaneous dismissal, nay scorn, of the whole idea. This is why it occurs only half a dozen times in the vast corpus of classical Greek literature. . . . The Greeks of old simply could not think of a God who had a truly creative power over the universe. More often than not God, or rather the divine, was merely the noblest part of the universe. Aristotle, for one, most emphatically warned that the universe should be thought of as an orderly house but without a master, or a well-ordered army but without a commander.[4]

To get at the significance of the Judeo-Christian development in our understanding of the nature of order in the universe, we need to consider the concept of contingence.

### C. *Contingence & Contingent Order*

When events are referred to as contingent, we mean that they just happen to be a certain way. However, in a fuller sense, we also imply by the word contingent that things do not have to be that way, and it is in this sense that the term has been applied to the Judeo-Christian concept of a universe created *ex nihilo*. Thomas Torrance deals with this application of contingence in the preface to his book *Divine and Contingent Order* as follows:

> In the history of thought this fuller sense was bound up with the Judeo-Christian conception that God freely created the universe out of nothing. This does not mean that he created it out of some stuff called 'nothing', but that what he created was not created out of anything. To think of the universe as having been brought into being in this way is to hold that the universe has been given a distinctive existence of its own, utterly different from God's. We describe it as contingent for it depends on God entirely for its origin and for what it continues to be in its existence and its order. The baffling thing about the creation is that since it came into being through the free grace of God it might not have come into being at all, and now that it has come into being it contains no reason in itself why it should be what it is and why it should continue to exist. Indeed God himself was under no necessity to create the universe.[5]

The impact of this view of the Creation was profound. If indeed the universe had a distinctive existence of its own, then it must also be endowed with its own authentic reality and integrity. Furthermore, its orderliness must also be contingent, being neither self-sufficient nor self-explanatory but rather having a reliability and rationality which depend upon and reflect God's own reliability and rationality. Since the universe is the free creation of an infinite God, we should not expect to be able to anticipate its character, but instead to be constantly surprised by its limitless variety of pattern and structure. As Torrance expresses it:

> It is because . . . freedom and rationality within the universe are contingent upon the infinite freedom and inexhaustible rationality of God that the universe meets our inquiries with an indefinite capacity for disclosing itself to us in ways which we could not suspect, manifesting structures or patterns which we are quite unable to anticipate *a priori*[6].

Yet our attitude toward this fascinating universe is not to be one of worship, for it is, like ourselves, a created thing. Thus, our investigation into its order is wholly appropriate, as God's servants seeking to "subdue the earth" and having "dominion" over the rest of its creatures.[7] In Donald MacKay's words, we are not an "unwelcome interloper," but rather "the servant-son at home in his Father's creation."[8] The distinctiveness of the Christian position is further brought out by R. Hooykaas in his *Religion and the Rise of Modern Science*:

> The Bible knows nothing of 'Nature' but knows only 'creatures', who are absolutely dependent for their origin and existence on the will of God. Consequently, the natural world is admired as God's work and as evidence of its creator, but it is never adored. Nature can arouse in man a feeling of awe, but this is conquered by the knowledge that man is God's fellow-worker who shares with Him the rule of the fellow-creatures, the 'dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth. . . . ' Thus, in total contradiction to pagan religion, nature is not a deity to be feared and worshipped, but a work to be admired, studied and managed. In the Bible God and nature are no longer both opposed to man, but God and man together confront nature.[9]

### D. *Order & Contingence in the Medieval Period*

Admiring God's work, then, was the fundamental basis for the scientific study of the universe. Its acceptance led, according to Torrance, to a brief period of scientific fruitfulness in the physics of space, time, light and motion in Alexandria in the fifth and sixth centuries, but was followed by a long period of quiescence due to a resurgence of the Greek ideas of causality.[10] Still retained was the idea of the created universe as rational because its Creator and Preserver was rational—so crucial to our scientific understanding of the universe—but largely lost was the idea of contingence.

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Instead, theologians preferred an emphasis upon the impassibility and immutability of God (i.e., God is not subject to suffering or change) which became allied with the Aristotelian idea of God as the Unmoved Mover.

Historian Lynn White, Jr. provides some valuable insights into the forces operating in the Medieval period which led to this narrowing of the concept of order in the universe.[11] By the year 1100 A.D., a Christian Latin theology was emerging which placed strong emphasis upon the transcendence of the Creator. God was above all human comprehension, and His action was seen to occur, ordinarily, by means of "secondary causes" which included the agency of His creature man. Since God had given man both freedom of will and powers of intellect, human judgement could be a reliable resource for establishing civil law and for understanding the order of the universe. Human will and intellect were assumed, of course, to be operating within the framework of the Creator's design, but the latter's will was increasingly seen to be expressed in the form of immutable laws; the so-called "laws of nature" (*lex naturae*). God orders His Creation by means of these established laws which man is to comprehend and obey. Otherwise, God's influence is distant and subtle. White sums up the emphasis of the Medieval Latin theology:

> Law, then, is inherent in God's purpose for all his creatures. It follows that he cannot be expected to tamper with it frequently in special circumstances. God is chiefly praised by the perfection with which his creatures exist according to the laws which he has established for and in them.[12]

This twelfth-century drive to stress the omnipotence of God and His underlying order was accompanied by a wave of translating scientific works from both Greek and Arabic sources. Among these authors was Aristotle, a scholar of tremendous intellect and remarkable breadth of knowledge. Unfortunately, he was also a pagan, which led to a resurgence of ideas of an eternal world, of gods and all else bound by inherent necessity, and of a universe without freedom. To combat these pagan aspects of the Aristotelian system, Thomas Aquinas proceeded to reinterpret Aristotle in a way which preserved essential Christian doctrines such as creation and personal immortality, demonstrating their logical consistency with a context ruled by human reason. This approach posed a tremendous threat to the Church's concept of the absolute omnipotence of the Creator and His revelation in Scripture. As White puts it:

> If sweet reason could provide so broad a foundation for Christian faith, the need for revelation was being called into question. To them the Thomistic-Aristotelian synthesis was a Trojan horse of resurgent paganism.[13]

The Church, in the form of Etienne Tempier, bishop of Paris, struck back within a few years of Aquinas' death with a pronouncement of automatic excommunication for the teaching of many Aristotelian and even Thomistic propositions. It further demanded that natural philosophers start thinking about nature in non-Greek terms. The result was a revitalization of philosophical thought during the next two centuries, in which the concept of causality was greatly narrowed and a strong inclination developed toward a purely empirical examination of natural phenomena.

According to Torrance, by the sixteenth and seventeenth centuries, scientists had rejected the view that in understanding the world the human mind required an antecedent set of ideas and concepts which owed nothing to experience.[14] Instead, they understood that the ideas and concepts were derivable from the world itself by empirical examination. The most unique feature of this approach was that experiments were designed to encourage the discovery of coherent patterns which could not otherwise be known, and then these patterns were used to generate explanatory theories. Once again, the stimulus for this new thrust in the scientific study of the world came as a result of a resurgence of the Christian doctrine of creation out of nothing, at the time of the Reformation. The result of this revival was to introduce once more the concept of a universe continuously depending upon God for its reality and its order; a contingent universe.

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### *E. Newtonian Order*

The new community of scientists, largely devout believers but convinced of the importance of the predominant role to be played by human reason, found a philosophical leader in Isaac Newton. He was a deeply religious man, and his conception of the relationship of God to the universe was pivotal in his thinking. According to Newton, the universe owed its rationality to the ultimate rationality and stability of God its Creator. Yet there was, in Newton's view of God's relationship with the universe, a strange inconsistency; for he saw God as unmovable and detached in His absoluteness, yet at the same time the immanent source of its precision and consistency. The latter was especially important where there were what Newton observed as "irregularities" in the systematic motions of the planets and stars. As Torrance points out in *Divine and Contingent Order*, this latter "regulative" function had unfortunate consequences for the future relationship between science and theology, for, as scientific explanations improved the irregularities disappeared, and with them the need for the immanent Creator.[15]

*Since the universe is the free creation of an infinite God, we should not expect to be able to anticipate its character, but instead to be constantly surprised by its limitless variety of pattern and structure.*

Newton also addressed the question of the mechanistic explanation in its relationship to the origin of the universe, emphasizing the very important point that the origin of the universe's immanent order is not completely explainable by reference to the mechanical system itself but depends rather upon a different cause: the will and counsel of its Creator. Newton's "strangely ambiguous conception" of God's ordering activity is summed up by Torrance as follows:

> On the one hand Newton's God is inertially attached to the universe in a grand synthesis which makes him through absolute time and space the supreme regulative principle by which the whole system of the world is held together, while on the other hand he is so transcendently related to the universe that he is deistically detached from it in his eternal impassibility and immutability. Through identifying absolute time with the eternal duration of God, and absolute space with the infinite presence of God, which together constitute the medium in which all things are contained, structured, and moved, Newton accounted for the natural and immutable order of the universe which operated through mechanical causes and with mathematical precision. Nevertheless, mechanical causes of that kind, Newton claimed, could not be extrapolated to account for the origin of the kind of order that obtains within the universe—for that a different kind of 'cause' is required, 'the agency of will'. Expressed differently this means that the laws of nature do not apply to those creative processes by which what is nature came into being, but only to those observable processes of a nature that is already in being. This is a point of considerable significance, for it means, in Newton's view, that the universe cannot be conceived to be a mechanical system complete and consistent in itself, for its immanent order is not completely explainable within that system, but the universe may be conceived as a consistent mechanism if it is related to 'the counsel' of a 'voluntary and intelligent Agent' beyond it, the living God who rules over all.[16]

Torrance goes on to discuss the aforementioned regulative role of the Creator and then emphasizes one primary point of Newton's system which is critical for our appreciation of current views of universal order. This was his recognition that the universe is not reducible to a mechanical system, that it is not complete and consistent in itself, but requires a non-mechanical Agency to complete its intelligibility and make it accessible to scientific investigation.

## III. Modern Science & the Revival of Contingent Order

Admittedly, it was difficult in Newton's day to appreciate the need for the immanent Creator, constantly willing the order and consistency of His Creation, especially as philosophers of that time attempted to define the whole realm of nature with all its multivariable phenomena in terms of exclusive mechanical law. But with the advent of Einstein and his theory of special relativity, a massive shift began in the way scientists viewed the physical world.[17] Einstein demonstrated that matter and energy are related by the equation $E = mc^2$, where c is the constant and universal value for the velocity of light. Of special importance, the speed of light is the same regardless of the motion of the observer, and mass is found to increase as an object's velocity approaches the speed of light. The fundamental changes for our consideration of order were that space and time were not longer separate entities, but were more correctly a single entity—space-time—and matter was seen as a form of energy. Within another decade, Einstein had propounded his second great theory, General Relativity. This theory dealt with gravitation, which was presented as a mathematical expression that involved the distortion of space-time. The profound implication of curved space-time was that the universe was finite, a conclusion which ultimately led to the "big-bang" theory for the origin of the universe. Most importantly, where Newton had absolutized time and space, relativity theory showed time to be an intrinsic ingredient of the transformations of matter, and space was seen no longer as empty but rather filled with energy and matter. When we come to

space-time, we see a picture of what Torrance calls:

> a continuous, dynamic material field, with a reciprocal action between it and the constituent matter and energy of the universe, unifying and ordering everything within it.[18]

The liberating activity of Einstein's work to loose science from the Newtonian yoke is expressed by Torrance as follows:

> Newton insisted on presenting the dynamic universe and interpreting continuous motion within the *idealized* framework of a geometry of relations between rigid bodies independent of time. This had the effect of clamping down upon everything in the universe a hard deterministic or mechanical structure. If that idealized Euclidean framework is dismantled, then the universe is found to manifest itself, not as a closed deterministic system, but as a continuous and open system of contingent realities and events with an inherent unifying order. As such its internal consistency must finally depend on relation to an objective ground of rationality beyond the boundaries of the contingent universe itself. That is, as I understand it, the effect of Einstein's reconstruction of classical physics: a finite but unbounded universe with open, dynamic structures grounded in a depth of objectivity and intelligibility which commands and transcends our comprehension.[19]

If Einstein's work opened the door to new and unexpected relationships between time and space, matter and energy, then the advent of quantum theory shook the very foundations of the edifice of science. In Newtonian mechanics, it was assumed that the description of the initial state of any system allowed an accurate prediction of its state at any future time. In the past 50 years, physics has abandoned strict causality of this kind by virtue of the demonstration by Heisenberg that there is an element of uncertainty when we attempt to simultaneously establish both position and velocity of elementary particles. The precise orbits of planetary electrons in atoms were now seen as idealizations. In the words of Donald MacKay:

> If we try to establish the exact position and speed of two atomic particles which are going to collide, we will never be able to do it accurately enough to determine exactly how they will rebound. The more exactly we observe the position, the less exactly we can specify the speed, and conversely. So the most elementary process envisaged by the mechanistic theory of classical physics—the action of one particle on another—turns out not to be precisely calculable. The cog-wheels of the classical clockwork model of the universe seem to have loose teeth! This has, of course, made a tremendous difference to the theory and practice of atomic physics. Moreover, it does mean that in our present thought-model of the physical universe as a whole, absolute causality, in the sense of the unwinding of everything predictably from the initial conditions, has gone.[20]

The significance of quantum indeterminacy for our consideration of order is that a way is now open for chance, in its contingent sense, to interact with the "laws of nature." As Polkinghorne points out, the interplay of chance and lawful necessity is the way the world develops new directions and possibilities.[21] The contingent nature of these apparently random processes is evidenced by their intelligibility and their fruitfulness. As he says:

> The universe is full of the clatter of monkeys playing with typewriters, but once they have hit on the first line of ***Hamlet*** it seems that they are marvelously constrained to continue to the end of at least some sort of play.[22]

However, this apparent role of randomness in the fundamental workings of the universe has been, for many in science, a sign of emptiness and meaninglessness. Jacques Monod speaks of man's aloneness "in the unfeeling vastness of the universe," and Stephen Weinberg's conclusion is that it is all pointless.[23] But, in fact, if we understand change as contingent upon a higher intelligibility and rationality, we can search for and find deeper meaning and a powerful ordering structure behind the whole panorama of events in the universe.

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***To combat pagan aspects of the Aristotelian system, Thomas Aquinas proceeded to reinterpret Aristotle in a way which preserved essential Christian doctrines . . .***

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Torrance's recommendation to the scientific community is to be done with the "chance-necessity dialectic," and instead to see what appears accidental as coordinated with a higher kind of order, as did Heisenberg when he claimed that the accidental was rather more subtle than we imagined and related to "the central order of things."[24] Torrance goes on the suggest that we also take a "trajectory of temporal motion into our basic equations" in order to comprehend the subtle cohesion of contingent events.[25] The latter would be especially valuable in our understanding of the remarkable unidirectional processes of the universe, including evolutionary directions in living systems and in the expanding cosmos.

Indeed, it is recent developments in research on these non-linear processes which lead to a new appreciation of the depth and power of ordering forces in the universe.

## IV. Recent Developments Pointing to Deep & Powerful Ordering Forces

### *A. Thermodynamics of Far-From-Equilibrium Systems*

### *1. Order Through Fluctuations*

Belgian Nobel laureate Ilya Prigogine tells us that the science of thermodynamics brought with it a new concept of time as unidirectional.[26] The mechanistic world view which dominated Western science from the time of Newton had sought to organize nature into all-inclusive schemes, universal frameworks in which all the parts were logically or causally interconnected. There were to be no gaps left open for spontaneous, unexpected events which were not wholly explicable on the basis of the immutable laws of nature. But by the middle of the nineteenth century, scientists were introducing new concepts which had to do with heat engines and energy conversion, and the science of thermodynamics was born. One of its key components was the Second Law, which introduced the idea of disorder or "entropy," and explained the frequently observed inefficiency associated with energy conversion. In these cases, some of the energy had been converted to an unusable form represented by the increased molecular disorder of the system. The implication of the Second Law of Thermodynamics was far-reaching; there was an irreversible direction to natural processes. Time had an arrow, and it pointed in the direction of an inescapable loss of energy in the universe. The new thermodynamic ideas about a direction in natural processes were foreign to the machine-minded, who saw the world as clockwork, the planets timelessly orbiting the sun, and all systems equilibrating and operating in a deterministic fashion. The response of the mechanists was to regard the irreversible processes with which thermodynamics was concerned as rare and inconsequential.

*The profound implication of curved space-time was that the universe was finite, a conclusion which ultimately led to the "big-bang" theory for the origin of the universe.*

Prigogine's thesis is that irreversible processes are in fact the predominant kind, and classical mechanics succeeds only as it idealizes otherwise irreversible processes by ignoring friction and other limiting features. And, of utmost importance, in moving from the reversible equilibrium situation to the irreversible far-from-equilibrium one, a whole new character of natural processes is revealed, and a new kind of order appears. Examples of these ordering processes come readily to mind. The flow of water from a faucet goes through a series of ordered structures as the flow rate is changed. Superconductivity in metals at certain low temperatures reveals a collective ordering of electrons. Living systems reveal a very high level of order in what are, of necessity, far-from-equilibrium conditions. One of the most fascinating visual effects is seen in a chemical phenomenon called the Belousov-Zhabotinsky reaction. When malonic acid, bromate, and cerium ions are placed in sulfuric acid in a shallow dish at certain critical temperatures, a series of pulsating concentric and spiral circles are seen to develop, just as if they were life forms. This behavior is the result of giant oscillations of millions of molecules, operating in concert, in the reaction system. The key feature of this kind of chemical phenomenon is the presence of autocatalysis; one or more of the reacting species is able to catalyze its own synthesis, and the whole system seems to pivot on this autocatalytic step. In contrast to chemical reactions in which reagents and products are distributed randomly in the solution, in the Belousov-Zhabotinsky type of reaction there are local inhomogeneities; in one region, one component may predominate, while in another part of the reaction vessel its concentration may be exhausted. The cooperative effect of a vast number of such reactant molecules leads to the pulsating, highly ordered arrangements. It is Prigogine's thesis that these structures are the inevitable consequences of far-from-equilibrium reactions. The term he uses for this phenomenon is "order through fluctuation."

A simpler type of far-from-equilibrium chemical system is the chemical clock, studies by Prigogine and his collaborators by means of a model which he refers to as a "Brusselator." The model is distinguished by another kind of catalytic feature, "crosscatalysis," in which two components reciprocally affect each other's synthesis. The fluctuations in this model system are found to be of a highly specific periodicity, reflected in a remarkable change in composition, from all of one component to all of a second component, practically instantaneously. Here we have an example of oscillations in time. In the Belousov-Zhabotinsky reaction the oscillations are both time-and space-dependent, with waves of the two predominant species of molecules passing periodically through the system.

Another instance of order through fluctuations, this time in a physical system, is the Bernard instability, in which one heats a liquid layer from the bottom and thereby establishes a temperature gradient from bottom to top. At low temperature differences, heat is transferred simply by conduction and the fluid as a whole remains at rest. But at some critical temperature value a convection current appears spontaneously, and a huge cooperative movement of the molecules of the liquid occurs which forms a grid of hexagonal cells. Prigogine emphasizes that according to the laws of

statistics the original microscopic convection current should have been doomed to regression. Instead, the minute fluctuation is amplified until it invades the entire system. As Prigogine expresses it:

> Beyond the critical value of the imposed gradient, a new molecular order has been produced spontaneously. It corresponds to a giant fluctuation stabilized through energy exchanges with the outside world.[27]

### 2. *The Living System*

If non-linear autocatalytic reactions are somewhat uncommon in the inorganic world, they are the rule when one examines the metabolic processes of the living system. The characteristic of living things is homeostasis, the maintenance of an ordered flow of energy to the cells and tissues of the organism and a conversion of that energy into useful structure and needed function. The metabolic pathways of the thousands of components involved are regulated by feedback loops and crosscatalytic steps rather similar in character to those of chemical clocks. Prigogine has noted one interesting distinction between the inorganic and the biological—the existence of complexity in the reaction mechanism in the former and of complexity in the reacting molecules (the proteins, nucleic acids, *etc.*) in the latter. This he attributes to the uniqueness of the biological system in having "a past": the complex biomolecules are a product of evolutionary selection to perform a highly specific function.[28]

Prigogine goes on to illustrate the extent to which metabolic processes in living systems demonstrate the character of fluctuating, self-ordering systems. For this he uses the well-characterized process of glycolysis, the fundamental energy-producing cycle during which the sugar glucose is broken down through a series of metabolic reactions to yield the energy-rich substance ATP (adenosine triphosphate). Each glucose molecule degraded leads to the conversion of two molecules of ADP (adenosine diphosphate) into ATP, and the ATP is recycled into ADP as its high energy is utilized in metabolism. It has been demonstrated that this metabolic sequence displays oscillatory behavior and that its rate-controlling steps operate at far-from-equilibrium conditions. In Prigogine's words:

> Biochemical experiments have discovered the existence of temporal oscillations in concentrations related to the glycolytic cycle. It has been shown that these oscillations are determined by a key step in the reaction sequence, a step activated by ADP and inhibited by ATP. This is a typical nonlinear phenomenon well suited to regulate metabolic functioning. Indeed, each time the cell draws on its energy reserves, it is exploiting the phosphate bonds, and ATP is converted into ADP. ADP accumulation inside the cell thus signifies intensive energy consumption and the need to replenish stocks. ATP accumulation, on the other hand, means that glucose can be broken down at a slower rate.
>
> Theoretical investigation of this process has shown that this mechanism is indeed liable to produce an oscillation phenomenon, a chemical clock. The theoretically calculated values of the chemical concentrations necessary to produce oscillation and the period of the cycle agree with the experimental data. Glycolytic oscillation produces a modulation of all the cell's energy processes which are dependent on ATP concentration and therefore indirectly on numerous other metabolic chains.
>
> We may go further and show that in the glycolytic pathway the reactions controlled by some of the key enzymes are in far-from-equilibrium conditions. Such calculations have been reported by Benno Hess and have since been extended to other systems. Under usual conditions the glycolytic cycle corresponds to a chemical clock, but changing these conditions can induce spatial pattern formations in complete agreement with the predictions of existing theoretical models.[29]

*The mechanistic world view which dominated Western science from the time of Newton had sought to organize nature into all-inclusive schemes, universal frameworks in which all the parts were logically or causally interconnected.*

Prigogine has also examined the complex aggregation behavior of the slime mold *Dictostelium discoideum*. Depending upon the nutritional state of the environment, the unicellular amoebae can grow and migrate as free-swimming organisms, or, under starvation conditions, undergo a spectacular transformation in which several thousand cells aggregate to form a foot-like structure which provides support for a mass of spores. Prigogine describes the first stage of the aggregation process as beginning with the onset of "displacement waves" in the population of amoebae, directed toward a center of attraction which appears to be produced spontaneously. This migration of cells appears to be in response to a gradient of the biochemical messenger, cycle AMP, first produced by the cell which forms the "attractor center." Here again we see the characteristics of a chemical clock; but here, in this simple differentiation phenomenon, the self-organization mechanism actually leads to communication between the cells. Indeed, one of the hallmarks of these self-organizing systems seems to be their coherence. The individuals involved behave as a unit, as if their movement were the result of long-range forces. Yet preceding these ordering processes there is an inherent instability, as if each system was composed of subsystems which were constantly fluctuating. It is these fluctuations, when powerful enough and timed properly, which can shatter the pre-existing organization

and lead to the new level of organization. Prigogine emphasizes that the point of change, the "bifurcation point," is unpredictable; it is indeterminate in the philosophical sense. But it is also unpredictable in direction—whether the transition will be to chaotic behavior or to a new higher level of order.

It is tempting to apply these characteristics of the self-organizing system to the origin of life. Prigogine has suggested that biogenesis may have occurred by just such a progression of events, with simple self-organizing chemical systems reaching points of bifurcation, then, by virtue of available energy, moving to progressively higher forms of complexity and finally to the first primitive cell. In his words: "One would then obtain a hierarchy of dissipative structures, each one enriched further by the informative content of the previous models through the 'memory' of the initial fluctuations which created them successively."[30] Peacocke's excitement about this possible route to life is apparent as he says:

> Because of the discovery of these dissipative systems, and of the possibility of 'order-through fluctuations,' it is now possible, on the basis of these physico-chemical considerations, to regard as highly probable the emergence of those ordered and articulated molecular structures which are living. Instead of them having only an inconceivably small chance of emerging in the 'primeval soup' on the surface of the earth before life appeared, we now see that ordered dissipative structures of some kind will appear in due course. To this extent, the emergence of life was inevitable, but the form it was to take remained entirely open and unpredictable, at least to us.[31]

We seem now to be back to the picture of a contingent order, built into the stuff of life by the Creator. The living system remains unpredictable by virtue of its sheer complexity but also because an openness, a multiplicity of bifurcation points, appears to be inherent in its origin and in its operation.

### 3. *Universal Constants in Chaotic Behavior*

The mathematical analysis of non-linear phenomena has proved difficult. The usual approach to these many and varied systems is to simplify them to approximate a linear situation. Arthur Fisher, in an article in *MOSAIC*, quotes a graduate student at Los Alamos National Laboratory's Center for Nonlinear Studies as saying:

> Your textbook is full of linear problems, and you become adept at solving them. When you're confronted with a nonlinear problem, you're taught immediately to linearize it; you make an approximation, use a special case. But when you venture into the real world, you realize that many problems are non-linear in an essential way and cannot be linearized meaningfully. You would just lose the physics.[32]

One of the most fascinating studies of non-linear phenomena is that of Mitchell Feigenbaum, who has found that there are only a limited number of patterns which lead to chaotic behavior. That is, transitions to chaos are *ordered*. One of these patterns is called period doubling, the process by which the periodic behavior of a system alters and finally becomes erratic as a particular parameter (e.g., temperature) is changed. In the usual periodic process there is a fixed time interval between repetitions. As some parameter is changed, this interval does not change gradually or randomly, but is found to double at each change. And the process of successive doubling is found to recur continually until at a certain value of the parameter under change, in Feigenbaum's view, it has doubled ad infinitum, so that the behavior is no longer periodic. Chaos has set in, but by a very precise route of period doubling.

*In moving from the reversible equilibrium situation to the irreversible far-from-equilibrium one, a whole new character of natural processes is revealed, and a new kind of order appears.*

It is tempting to conclude from the results obtained in this new science of chaotic behavior that there are subtle yet powerful forces of order throughout nature. And the expectation is that there is more to come. As one of the "chaos scientists," David Ruelle, says: "There is a whole world of forms still to be explored and harmonies still to be discovered."[33]

### *B. Order as Wholeness*

In a recent book, *Looking Glass Universe: The Emerging Science of Wholeness*, authors John Briggs and David Peat present the work of a number of scientists who are convinced that the study of the world by disassembling it into parts leads to a very significant distortion.[34] Of special note is the contribution of physicist David Bohm, who insists that some of science's most popular ideas lead to very misleading conclusions. For example, in considering the nature of order, Bohm points out that its opposite is popularly thought to be disorder or randomness. Instead, what appears as disorder may be a condition of a higher degree of order. An example is the profoundly puzzling double-slit experiment.[35] Electrons are considered elementary particles, and photons are considered to be single indivisible quanta of energy. When a stream of photons is fired at a target with two slits in it, the photons will interfere with each other and form an overlapping wave pattern on a screen behind. The

same result is obtained if a stream of electrons is fired at the target. However, if photons or electrons are fired at the target one by one, one would expect that, in the absence of interference, a simple scatter pattern would be observed behind each of the slits. Instead, a wave pattern is still obtained, as if all of the electrons had been fired at the same time! Explanations for this phenomenon seemed desperate. One suggestion was that each individual electron somehow goes through both slits and interferes with itself. A second approach proposed that each particle was somehow aware of the fate of its predecessors and those to follow it, and it was the aggregate of these "awarenesses" which led to the wave pattern on the screen. Quantum physicists, rejecting either idea, simply concluded that the laws of physics don't apply to individual particles or quanta—only to large numbers where the rules of probability apply. For David Bohm, the result of the double-slit experiment suggests that a very high degree of order exists where we previously thought we were dealing with the random behavior of individual particles. It is consistent with a picture of a whole or unbroken universe, in which there is no separation into parts which are ordered and parts which are disordered.

A second example of wholeness is seen in the strange behavior of elementary particles studied in high voltage accelerators.[36] When protons are smashed in an accelerator, they divide into a number of other particles, but after several very rapid transitions they are found to return to the form of the original proton. To use Briggs and Peat's term, they "divide back into themselves." A similar behavior is observed when quarks, the presumed fundamental particles, are split away from mesons. The freed quarks immediately recombine to reform new mesons. The quantum mechanical picture is that of a wholeness that can't be divided.

Bohm's "science of undivided wholeness," as Briggs and Peat explain it, is best described by analogy to the photographic phenomenon of the hologram.[37] Whereas an ordinary photograph is really an abstraction, a mapping of certain aspects of three-dimensional reality onto a two-dimensional form, thereby dividing the scene into parts, the hologram is a composite of the entire three-dimensional scene. This is because the holographic image is constructed by directing a laser beam (light of uniform phase) through a holographic plate on which a scene has been recorded in a very special manner. By means of a half-silvered mirror, laser light is split into two beams, one to illuminate the object and the other to act as a kind of reference beam. The light striking the object is scattered and recorded on the plate as a mixture of phases, much like sound from a stereo set. The reference beam, by comparison, contains light all in one phase. The mixing of the two beams at the plate results in an interference pattern. As Briggs and Peat describe it, the result is like "a very fine pattern of light and dark patches, a kind of code."[38]

With this interference pattern recorded on a photographic plate, it is possible to produce a holographic image by shining laser light through the plate and projecting the pattern on a screen. The image produced appears three-dimensional, and the plate itself could be said to contain a record of the reference and scattered beams. The fascinating thing about the holographic record is that *every* part of the plate contains a whole image. If one tears off a piece of an ordinary photographic negative, it contains only a piece of the original picture. But if a piece of a holographic plate is torn off, projection of a laser beam through the fragment gives the *whole* image, though with "diminished crispness."

*By the time of Isaac Newton, the universe was largely seen as clockwork, with God, as clockmaker and occasional adjustor, largely distant from His Creation.*

David Bohm sees the hologram as a forceful analogy for the whole and undivided order of the universe, a frozen version of what is occurring on an infinitely vaster scale in each region of space all over the universe. The universe is seen as a vast array of light waves and other electromagnetic radiations, constantly interacting with each other and with matter, generating interference patterns which are ever-changing and evolving, recording incalculable amounts of information about the objects and events encountered. Within the record one would expect to find information about an object's geometry, internal structure, and perhaps even the nature of its change with time. Most fascinating, perhaps, is Bohm's idea that these interactions occur even at the subatomic level, where elementary particles, also describable as wave patterns, are capable of interaction with the external wave forms.

As Briggs and Peat describe it:

> Remember that matter is also waves. Therefore the very matter of objects is itself composed of interference patterns which interfere with the patterns of energy. What emerges is a picture of an encoding pattern of matter and energy spreading ceaselessly throughout the universe—each region of space, no matter how small (all the way down to the single photon, which is also a wave or "wave packet"), containing—as does each region of the

holographic plate—the pattern of the whole, including all the past and with implications for all the future. Each region will carry this encoding of the whole somewhat differently, as in fact different "parts" of a holographic plate will each give the whole picture but with slightly different limitations on the number of perspectives from which it can be seen.

It is a breathtaking view, an infinite holographic universe where each region is a distinct perspective, yet each contains all.

Everything mirrors everything else; the universe is a looking-glass.[39]

In David Bohm's words, in his book *Wholeness and the Implicate Order*:

There is the germ of a new notion of order here. This order is not to be understood solely in terms of a regular arrangement of objects (e.g., in rows) or as a regular arrangement of events (e.g., in a series). Rather, a total order is contained, in some implicit sense, in each region of space and time.

Now, the word 'implicit' is based on the verb 'to implicate.' This means 'to fold inward' (as multiplication means 'folding many times'). So we may be led to explore the notion that in some sense each region contains a total structure 'enfolded' within it.[40]

## V. Theological Correlates to New Concepts of Order

The pioneers of science marched to the frontier with the conviction that God had created a rational and ordered universe, one which would answer their inquiries rationally, if sometimes surprisingly. Then, too, it was to be enjoyed, to be of benefit, but not to be worshipped, for it was only a creature. But as a creature the universe had an order and an authentic reality which was contingent, being neither self-sufficient nor self-explanatory, but depending upon and reflecting God's own reliability and rationality.

By the late Medieval period, the concept of order was narrowed to place major emphasis on God's transcendence. God's order was seen as expressed in the form of natural laws, and it was human reason which was given the responsibility to discern these fixed rules of the universe. By the sixteenth century, the valid means of discernment had been firmly established as empirical examination followed by the testing of explanatory theories. By the time of Isaac Newton, the universe was largely seen as clockwork, with God, as clockmaker and occasional adjustor, largely distant from His Creation. What was largely lost in this somewhat static view of order was the concept of the universe as contingent.

Revival of the concept of contingent order came with the advent of modern relativity and quantum theory. Space and time were understood to be no longer absolute and in fact were seen to be inseparable. Furthermore, space-time was curved, and the universe was therefore finite. Quantum theory and Heisenberg's Uncertainty Principle eliminated strict causality, opening the way for contingent order—for chance to interact with the fixed laws of nature. From a theological viewpoint, the chance events take on a deep theological meaning, for they may properly be seen as the expressed will of the Creator of a higher kind of order.

*The extent of the Creator's power and the strong sense of His presence at every level of the created order is awesome. Yet, by this order He brings coherence and rationality to make what is otherwise totally baffling intelligible, as though the scientific history of our world was like a great musical masterpiece composed for our ears.*

Hints of the nature of this order come from the work of Ilya Prigogine on far-from-equilibrium systems. Prigogine stresses the preponderance of these non-linear processes in the universe, their characteristic instability and unpredictability, but also the surprising degree to which perturbations lead to higher and more complex levels of order. In the course of these transitions, large groups of molecules function as units, suggesting a high degree of intermolecular communication. The same type of behavior seems to be a general characteristic of living systems and provides a useful framework to explain their origin. Feigenbaum's work on period doubling of non-linear systems also emphasizes the extent of ordering processes in the universe, for even in transitions from order to apparently random behavior, systems follow quite specific, prescribed routes. So, whether perturbation of a far-from-equilibrium system leads to a higher level of order or to chaotic behavior, the transitions are themselves ordered. Indeed, there appear to be deep and profound ordering forces at work in all natural processes.

Similarly, the implications of Bohm's view of wholeness for a deeper understanding of order in the universe are profound. It would seem very appropriate to explore theological correlates in dealing with this picture of order, this seamless enfolding, in which not only matter and energy but also space and time are brought together in one vast hologram of the universe.

Such a construct demands something or someone even greater as its mediator, and it is intriguing to recall the biblical description of the immanent Creator Jesus Christ, God's Son, given in the letter to the Hebrews:

> He reflects the glory of God and bears the very stamp of his nature, upholding the universe by his word of power.[41]

Donald MacKay tells us, in his *Science and Christian Faith Today*, that we may think of the last phrase, "upholding the universe by his word of power," as "*holding in being* the universe by his word of power."[42] This distinction allows us to rid ourselves of the image of God as only a machine-tender or caretaker, and gives us instead the picture of an immanent Creator, whose intimate involvement with His vast creation at every moment insures its very existence as well as its order. The extent of the Creator's power and the strong sense of His presence at every level of the created order is awesome. Yet, by this order He brings coherence and rationality to make what is otherwise totally baffling intelligible, as though the scientific history of our world was like a great musical masterpiece composed for our ears. Indeed, A.R. Peacocke makes just such an analogy when he writes of God's "music of creation":

> . . . he is more like a composer who, beginning with an arrangement of notes in an apparently simple tune, elaborates and expands it into a fugue by a variety of devices of fragmentation and reassociation; of turning it upside down and back to front; by overlapping these and other variations of it in a range of tonalities; by a profusion of patterns of sequences in time, with always the consequent interplay of sound flowing in an orderly way from the chosen initiating ploy (that is more technically, by inversion, stretto, and canon, etc.). Thus does a J.S. Bach create a complex and interlocking harmonious fusion of his seminal material, both through time and at any particular instant, which, beautiful in its elaboration, only reaches its consummation when all the threads have been drawn into the return to the home key of the last few bars—the key of the initial melody whose potential elaboration was conceived from the moment it was first expounded.[43]

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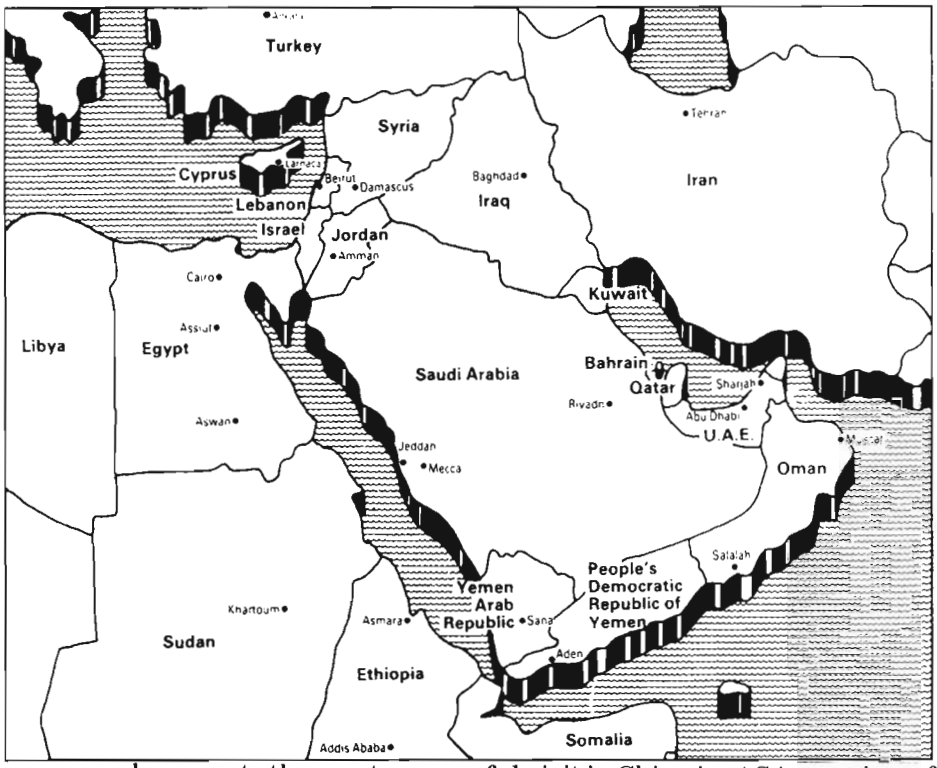
*TO ALL ASA MEMBERS AND FRIENDS...*

## LOOKING AHEAD TO A POSSIBLE MIDDLE EAST SEMINAR... AFTER OUR ANNUAL MEETING IN THE EAST IN THE '90s... TO PROBE WITH SCIENTISTS IN CYPRUS - EGYPT - TURKEY - OTHERS




Bob Herrmann, who reports the most successful visit in China by ASA members following the '87 Annual Meeting in Colorado Springs, has suggested that we explore the possibility of such a post meeting in Nairobi, Kenya, followed by a tour of several cities in the Middle East (not as dangerous as some of our inner cities!) after the Annual Meeting in the East in 1990. *To me, a GREAT IDEA!* If you have suggestions let Bob or me know so we can begin to plan.

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# What Christians Should Think About Creation Science

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This article is part of a search for a *modus vivendi* between evolutionary scientists and those Christians who oppose it on theological grounds. I believe that this *modus vivendi* does not include the current "creation science" program. The argument has three parts.

My first claim is that even a Christian who accepts the principle of literalism in interpretation does not thereby have a sufficient reason to be sympathetic to creation science as it is currently practiced.

My second argument is that the view of science which the creation scientists use in their critique of evolution is flawed, and that creation science, despite what is sometimes claimed by its friends, does not have good scientific credentials.

Third, I reject the claim that evolutionary science is, in any sense, a new or non-Christian religion.

Not long ago, I published an article titled "Discussing Creation Science."[1] One of my arguments in that article was that widely held beliefs should not simply be ignored. In this article, I want to do what I can to make that argument obsolete. My thesis here is that Christians, even biblical literalists, have good reason to reject creation science. In defense of this thesis, I want to discuss, in turn, three questions: (1) Does evolution contradict the Bible?, (2) Is evolution good science?, and (3) Is evolution a religion?

## Does Evolution Contradict the Bible? The Theological Case Against Creation Science

Let us begin by separating two questions which are fundamentally different from one another, but are often confused. These two questions are: (1) How did the world (i.e., the universe) get to be here at all?, and (2) How did it get to be the way it is?

With respect to the first question, the Christian answer is fairly clear—the world was created by God. This claim, along with the claim that God is our Father, forms the opening sentence of the Apostles' Creed. The doctrine is usually understood to include the following points[2]:

(1) That God made all things.
(2) That He made them from nothing.
(3) That He did so at the beginning of time.

In other words, all orthodox Christians are creationists—they reject such alternatives as the eternity of the world (the answer of Aristotle, among others) and spontaneous exnihilation. But this is fundamentally a metaphysical or theological question; it is not a scientific question, and does not admit of a scientific answer.[3]

The second question is very different from the first. It is a scientific question, in the sense that it can be subjected to empirical inquiry, and we can come up with more or less plausible answers on the basis of natural reason and ordinary experience. The logically possible answers to this second question include that the world always existed in more or less its present state (Aristotle, again) and that it developed into its present state from earlier, and in some sense simpler, states. It is on this question that modern evolutionary science and contemporary creation science differ.

The importance of distinguishing these two questions cannot be overemphasized. The taxonomy of possible responses to them, which is most commonly found in recent creation science literature, confuses the two questions by suggesting that the two basic positions in the current controversy are creationism and evolutionism. They do concede that there are "theistic evolutionists" as well, but usually insist that these are just a type of evolutionist. Henry Morris, for example, at one point referred to these middle-ground positions as "a quicksand of pseudo-creationist evolutionism,"[4] and elsewhere said that, after the Scopes trial, "multitudes of nominal Christians capitulated to theistic evolution, and even those who retained their belief in creation retreated from the area of conflict. . . ."[5]

Modern evolutionary scientists have done their part to further the confusion. Frustrated at creation scientists' attempts to pass their work off as good science, they balk at using the term "creation science" at all and usually refer simply to "creationism."

But creation and evolution are not even answers to the same questions. All mainline Christians are creationists, as I suggested earlier. Many are evolutionary creationists. Those who call themselves "creation scientists" might better be called static creationists,[6] though one could be a static creationist without being a *scientific* creationist, a distinction which I will make clearer presently.[7]

Is there good reason to be a static creationist? Two kinds of reason are commonly offered—theological arguments (based on the alleged content of divine revelation) and scientific arguments (based on observation of the natural world). Let us first consider the possibility of theological arguments for static creationism.

There are, of course, Christians who assert that the Bible does have something to say about how the world got to be the way it is. But let us be clear about how much one has to accept in the way of hermeneutical premises before one could assert static creationism on the basis of theological argument. Defenders of the thesis often emphasize their adherence to the principles of inspiration or inerrancy, but these are clearly not enough. The former might be characterized as maintaining that:

> The books of both the Old and New Testament . . . [were] written under the inspiration of the Holy Spirit [and] have God as their author.[8]

And the latter that:

> The books of Scripture must be acknowledged as teaching . . . without error that truth which God wanted to put into the sacred writings for the sake of our salvation.[9]

Any attempt to get static creationism out of the Bible requires something stronger than either of these claims, something like:

> When all the facts become known, they will demonstrate that the Bible in its original autographs and correctly interpreted is entirely true and never false in all it affirms, whether that relates to doctrine or ethics or to the social, physical, or life sciences.[10]

Or even, given the term "correctly interpreted" still needs spelling out:

> The Bible is to be interpreted with strict exactness of word and meaning . . . by focussing upon the author's words in their plain, most obvious sense. . . . There is no room for special consideration for figurative literary forms such as poetry or metaphor.[11]

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# SEARCH

## Scientists Who Serve God

## HE WORKS (AND PLAYS) IN INDUSTRY


In 1956, chemist Robert L. Bohon accepted a position with the 3M Company of St. Paul, Minnesota. One big attraction, he admits, was a chance to play the violin in the symphony orchestra open to all 3M employees. Another was the challenge of using his scientific skills to develop new commercial products and industrial processes. His work has also helped diminish chemical pollution of the earth's environment.

Bob Bohon was born in 1925 in Decatur, Illinois. When he was about eight years old, his parents bought him a violin and a set of lessons from a traveling "Music Man." Bob's father, who sold caskets, let his son melt down discarded lead casket handles and cast the metal into toy soldiers. That boyhood metallurgical interest was further stimulated by a good high school chemistry teacher and later by courses at the local James Millikin University. A medical deferment for poor eyesight enabled Bob to stay in school throughout World War II.

**Becoming a chemist with a practical bent**

To major in chemical engineering, Bohon enrolled at the University of Illinois in Champaign-Urbana, where he soon met a first-year education major named Lois. They married in the summer of 1947. That was a year after Bob received his B.S. and started on a doctoral program in physical chemistry. The Bohons became active in a young adult group in University Baptist Church.

In 1945 Bohon began working part-time in a new commercial lab set up in Champaign by one of his physics professors. Told to wear old clothes, he spent his first day at Anderson Physical Laboratory painting a room solid black, as a darkroom for optical instruments. One of the first commercial infra-red spectrometers was used to study the behavior of glass surfaces, under contract from Owens-Illinois Glass Co. In 1950 Dr. Bohon became the full-time head of the lab's infra-red section, studying many different kinds of materials.

**Doing research that made a difference**

To earn his Ph.D., Bohon determined the solubility in water of certain hydrocarbons. Day after day he made painstaking measurements as part of a project supported by both the Illinois State Water Survey and the U.S. Public Health Service. The discovery that water molecules could wrap around hydrocarbons to form actual compounds explained winter freeze-ups of natural gas lines and helped solve many other problems. The tip-off was a dip in the curve when the data were plotted against temperature; a dip that delighted Bohon's major professor. Similar but more stable compounds now known to chemists are called "clathrates," or "inclusion compounds."

Scientists enjoy seeing their work put to constructive use. Bohon's data and thermodynamic calculations were published in the *Journal of the American Chemical Society.* A petroleum engineer wrote to thank him for helping account for mysterious losses from an oil refinery. No one had realized that so much oil could "leak" into waste water.

Today, Robert Bohon heads a large laboratory in a major chemical company. He's had the satisfaction of seeing environmental scientists, using sensitive modern methods, confirm findings he once made as a graduate student.

And for over thirty years, Bob Bohon has also had the satisfaction of playing the violin in the 3M Company orchestra.

Ω

*Scientific Investigation*

# A VERSATILE CHEMIST IN A VERSATILE COMPANY

Even if it hadn't sponsored an orchestra, 3M Company was what Robert Bohon was looking for: a diversified manufacturing company with a lasting commitment to research and development ("R&D"). In 1987, more than a fourth of 3M's sales came from products that R&D had brought to market in the past five years.

At first Bohon probed reaction rates of heat-sensitive iron-soap-phenolic mixtures used in the coated papers for 3M's Thermofax, the world's first dry-copy process (later overshadowed by "plain-paper copiers").

**From blow-ups to foul-ups**

In 1959, with the space race on, Bohon was shifted from the Corporate Research Laboratories (CRL) for a four-year stint in a government-sponsored crash program. Again he used his thermal-analysis skills, this time to explore solid rocket propellants. The inherently unstable compounds were hard to study because they frequently blew up in the lab. Today more stable solids are used as rocket booster fuels, even though they give less thrust per pound.

Back at CRL, Bohon stepped into technical management, directing first a Materials Evaluation group and then Special Research Services. He added to his skills by investigating new analytical techniques. In 1985 he began directing the CRL Analytical & Properties Research Lab, his present post. For eleven years in between, he ran an environmental lab providing analytical support for Environmental Engineering & Pollution Control at 3M Company.

Bohon's lab showed that 3M's Tartan Turf, designed to replace grass on athletic fields, retained the mercury catalyst used in synthesizing the polyurethane material. Mercury, a toxic heavy metal, could be released to the environment as the plastic weathered. The company took the product off the market, leaving the field to Monsanto's rival Astro Turf. That hurt.

**Protecting both the company and the environment**

In the early 1970s, Congress passed laws to clean up the water we drink, the air we breathe, and solid-waste disposal sites. Proud of his company's exemplary record, Bohon admits that the first environmental work it did was "mostly defensive." Yet before the Toxic Substances Control Act (TSCA, nicknamed "Tosca") became law in 1976, his company had been cooperating voluntarily with regulatory agencies.

TSCA mandates that before manufacturing any new *chemical*, a U.S. company must supply the Evironmental Protection Agency (EPA) with a thorough report on its environmental impact. Most of the thousand chemicals 3M makes are used within the company, but it did more than the law requires by assessing the impact of each of its many finished *products*. As an international company now operating in 50 countries, 3M was aware of global environmental problems and of growing international regulation.

Bohon's role at 3M led him to serve many hours on international committees wrestling with technical solutions to pollution problems. The Organization for Economic Cooperation & Development (OECD) draws together a Business & Industry Advisory Committee (BIAC) from each of its 24 member-nations. Bohon was a charter member of the US/BIAC subcommittee on chemicals. He met with European scientists to hammer out realistic testing guidelines for the Dangerous Substances Act, the European Economic Community's version of TSCA.

In general, he says, environmentalists have the concern, politicians have the responsibility, but industrial scientists frequently have the know-how to control worldwide pollution.

Bob Bohon feels good about his contribution to that goal.

Ω

## THEY STICK TOGETHER

"3M" (MMM on the New York Stock Exchange) stands for Minnesota Mining & Manufacturing Co. It was founded in 1902 in Two Harbors, Minn., when an abrasive grit mined for sandpaper turned out to be no good. Forced to do research to save the enterprise, 3M soon invented "wet or dry" abrasive papers and pressure-sensitive tape, both quickly adopted by the auto industry.

Today, Scotch brand transparent tape, strapping tape, and masking tape are well-known consumer products, and the 3M Company "mines" any technology it can apply to a flat surface to make something useful. Consumer products account for 10% of sales, industrial products 45%, and products for service industries another 45%. The mix includes videocassettes, computer diskettes, Scotchgard textile stain protector, Post-it note pads, diaper tapes to replace safety pins, and patches that slowly dispense medicine when stuck to the skin. As a sponsor of the 1988 Olympics, 3M showed off sportswear made of Thintech, a new breathable waterproof fabric—trimmed for nighttime safety, of course, with Scotchlite reflective material.

Worldwide, 1987 sales added up to almost $9.5 billion, of which 3M spent $624 million on R&D, bringing its total R&D expenditures for the past five years to over $2.5 billion. The company employs over 80,000 people, about 50,000 of them in the U.S., almost half of those in Minnesota.

Robert Bohon thinks of himself not as an expert in any particular area of chemistry, but as competent in a number of areas. In his Christian life also, he comes across as versatile and service-oriented. He sees science and religion "converging" in individuals who are open to both.

In such individuals one senses a kind of wholeness, not because they have two kinds of truth but because they come at truth from more than one direction, "giving it all they've got." In one of Bohon's favorite New Testament passages (John 10:10), Jesus said, "I came that they may have life, and have it abundantly." Bob admires the creative approach to Christian service taken by the Church of the Saviour in Washington, D.C., as chronicled in several books by Elizabeth O'Connor.

Bohon was once reading O'Connor on a flight to the nation's capital to advise on environmental regulations when a man in the next seat asked what he was reading. Bob told him about Church of the Saviour. Visiting that congregation on another trip years later, Bob and Lois were warmly greeted by a stranger who introduced himself as that very passenger. He thanked Bob for pointing him to a caring church where he found his own place of service.


Bob & Betty Bohon

**Faith is no straitjacket**

Some scientists master a technique and apply it to all kinds of problems. Others focus on a problem and bring to it all the skills they can muster. Science needs generalists as well as specialists, analyzers and synthesizers, experimentalists and theoreticians, managers and technicians. In the Christian life, also, there is room for many approaches.

Scientists must learn their discipline, but science is open to all who commit themselves to it. Similarly, all who humble themselves and learn from Jesus Christ may enter through "the narrow gate" of Christ's death and resurrection. God's forgiveness and acceptance are great levelers.

Then comes on-the-job training in the laboratories of life. Christians go to work in Christ's name with whatever skills they have, facing whatever needs he brings to their attention. As the apostle Paul wrote in Romans 12, each "member of Christ's body" has a different function, some more general, some more specialized. While serving Christ in different capacities, all are to rejoice in hope, be patient in tribulation, pray steadily, help other believers, practice hospitality, and generally be "imitators of Christ."

**Abundant life comes spiced with variety**

Alert scientists are seldom bored, because new problems keep cropping up. Life is equally exciting to alert Christians. On a journey where the tickets are free but offered only to admitted sinners, one should expect a variety of passengers. The church is rich in styles from the formal and liturgical to the free and charismatic; in theologies from Arminian to Calvinist; in cultural expressions from Chinese peasant to middle-class American.

On their journey of discovery, Christians can take along a spiritual fruit-basket of love, joy, peace, patience, kindness, goodness, faithfulness, gentleness, and self-control (Galatians 5:22). With so much to do, and with such varied traveling companions, they need all those traits.

One of Lois Bohon's favorite passages in Ephesians 3:20-21: "Now to him who by the power at work within us is able to do far more abundantly than all we ask or think, to him be glory in the church and in Christ Jesus to all generations, for ever and ever. Amen."

Ω

*Theological Reflection*

# WANTED: VERSATILE CHRISTIANS

## A WORLDWIDE FAITH

Christianity is a huge multinational enterprise uniting about one-third of the world's five billion people, but without producing uniformity. In fact, crossing so many boundaries guarantees great cultural diversity.

Some 19 out of 20 Christians live outside the United States. The worldwide growth of Christianity, and its survival in some countries where churches have been officially persecuted, has been amazing. Many Third-World countries to which missionaries have taken the gospel in the past now have strong indigenous churches sending missionaries to other countries.

Even in the U.S., Christianity looks more and more like a "rainbow coalition." The city of Los Angeles has some 280 traditional (Anglo-Saxon) Presbyterian churches, but they are already outnumbered by *Korean* Presbyterian churches in that city.

Christians in industry interact with non-Christians on a daily basis around the world. Christians with technical skills can go where traditional missionaries are not welcome. Developing countries send their most promising youth to study technical subjects in the U.S., where American Christians can befriend them. Science and technology seem to be paving the way for the spread of the gospel.

In a sense, science and Christian faith are "converging" on a global scale.

Bob Bohon has met many other scientists who play musical instruments. It helps them express emotion, he thinks, balancing their strongly developed analytical side. To this Christian chemist/musician, life *should* be a symphony blending various melodic themes, or perhaps a choral anthem sung in individual parts.

The Bohons' own life blends family, church, and career. Bob and Lois have three grown children, the eldest born a year after Bob finished graduate school. Joking about her "major roles" as "chauffeur and audience," Lois adds that her experience selling real estate some years back was of help in buying a lot in White Bear Lake and building their present home.

**Close harmony**

Lois also did some teaching but she especially loved working at the Science Museum of Minnesota for eight years, first as a volunteer and then on the paid staff, helping to coordinate the work of other volunteers. She has been a "quiet feminist" in American Baptist Church circles, frequently being the first woman in some role like trustee or moderator. At the regional level she has actively supported internships for American Baptist women in ministry.

Bob has also served the local church and denomination in many ways. Together Bob and Lois helped found Woodbury Baptist Church, an extension of First Baptist in St. Paul. In the early 1970s, as director of Woodbury's choir and member of the Fellowship of American Baptist Musicians, Bob learned of several inspiring Christian musicals written for young people. Soon he was gathering youngsters from many churches to rehearse and perform such shows as "Tell It Like It Is," "Natural High," and "The Carpenter."

With their second daughter in high school and many of her generation seeming to lose their way, Bob found it exciting to work with serious but joyful young people. After producing and conducting a musical each year for four years, though, he had to give it up. "It took all my spare time," he says, "and Lois and I were both exhausted."

**Hanging in there**

Besides the American Chemical Society and North American Thermal Analysis Society, Bob has been active in the American Scientific Affiliation (ASA), a nationwide fellowship of evangelical Christians in science and technology. He once arranged for the North Central ASA section to meet at 3M Company.

In graduate school days, the Bohons joined other young couples at potlucks after Sunday school and worship at "Uni Baptist" in Champaign. Those informal gatherings brought them closer to Jesus Christ and to each other. So rich was their spiritual experience, in fact, that the Young Adult Fellowship has continued to hold reunions every few years. The same "young adults" (most of whom now have grandchildren) gather to share their ups and downs, pray for each other, and sing together once again their favorite hymns of faith.

To Bob and Lois Bohon, it means a lot to be with friends who have gone their separate ways but have held on to Jesus Christ for over forty years.

And, Bohon says, the singing is wonderful.

Ω

*Thoughtful Worship*

# LIFE AS A SYMPHONY

This issue of **SEARCH (No. 04)** was prepared by Walter R. Hearn of Berkeley, California. Design and layout by ASA managing editor Nancy C. Hanger. Opinions expressed in SEARCH are those of individuals and may not be representative of the entire ASA membership. Scripture quotations are from the Revised Standard Version unless otherwise noted.



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There are, of course, Christians who accept this strongest claim. The Creation Research Society, for example, maintains an institutional commitment to the claim that "all of [the Bible's] assertions are historically and scientifically true in all of the original autographs . . . [and] that the account of origins in Genesis is a factual presentation of simple historical truths."[12] I must confess that I am impressed with the insight into Scripture available from (and to) those who do not accept this last principle.[13] Literalists, I fear, are in danger of doing to the Bible just what "the American woman" did to *Macbeth* in James Thurber's sketch, "The Macbeth Murder Mystery."[14] In that piece, the woman tries to read *Macbeth* as a whodunit. She asks all the wrong questions, and ends up entirely missing the point. But I do not want to argue that literalism is false here. For to argue only that Christians should not be literalists and that, having given up literalism, they should abandon static creationism as well would not be to say anything particularly profound.

What I want to argue here is rather that there is a difference between static creationism[15] and creation science and that, though literalists may feel themselves to be committed by the logic of their position to the former, they are by no means committed to the latter. In other words, even literalists (1) need not, and (2) should not associate themselves with creation science.

Given the appropriateness of literalism as a principle of biblical interpretation, there is nothing unreasonable about accepting static creationism. Scientific arguments lead at best to the probable truth of their conclusions. If one had the word of God that the contrary were true, it would indeed be irrational to prefer the merely probable scientific argument to the overwhelming appeal to a reliable authority.

*All orthodox Christians are creationists . . .*

But creation science does not assert merely that static creationism is true. The whole point of calling it "creation *science*" is to emphasize the claim that this work is centered on "the scientific evidences for creation and inferences from those scientific evidences." And whatever the Bible may say about how the world was created, it surely does not say anything about whether we ever had, now have, or ever will have *scientific* (i.e., empirical) evidence of how this creation occurred.

*And whatever the Bible may say about how the world was created, it surely does not say anything about whether we ever had, now have, or ever will have* scientific *(i.e., empirical) evidence of how this creation occurred.*

Literalism, then, is silent about whether the arguments of the creation scientists are good ones. To answer that question we need to look at the scientific evidence.

### Is Evolution Good Science? The Scientific Case Against Creation Science

The scientific problems with creation science can be divided into two parts—problems with their critique of evolution and problems with their constructive case for static creationism.

The creation science critique of evolution suffers from three problems. First, many creation scientists do not seem to understand evolutionary science. Evolution is, in one sense, not so much a particular theory as it is an approach to questions (note the plural) of origins. Since there are a number of distinct questions of origins that might arise (about the central features of the universe or of the solar system, about life, about the diversity of species, or even about the diversity of human languages), there are a number of distinct, supplementary, and even logically independent evolutionary theories. Evolutionary biology, for example, has nothing to say about the origin of life. It was developed in answer to the quite distinct question of the origin of (i.e., the diversity of) species, as Darwin's title indicates. The question of the origin of life is the subject of another evolutionary theory, one on which, though much work has been done, much remains still to do.[16] Much of the creation science critique of evolution suffers from the unwillingness of the critics to sort these theories out.

That they do not understand particular evolutionary theories is also clear. Henry Morris, for example, argues that discovery of the coelacanth posed a serious problem for Darwinian theories of evolution:

> The chief candidate for such a transitional form [sc., between fishes and amphibians] was long supposed to have been the coelacanth. . . . The coelacanth was believed to have finished

> this transition sometime in the Mesozoic. . . . Evolutionists were embarrassed when it was discovered in 1938 that these fishes are still alive and well, living in the waters near Madagascar.[17]

But discovery of the coelacanth presents no problem for Darwinism. Morris overlooks the fact that Darwinian evolution suggests the diversification of species by branching—at one point in their history, some coelacanths, under environmental pressure, diverged from the hitherto prevalent form. These coelacanths became amphibians, while others, not subjected to the same environmental pressures, remained in the pretransitional state. Similarly, Walter T. Brown argues that "Natural selection cannot produce *new* genes; it only *selects* among preexisting characteristics," which is true enough, but irrelevant, as no modern evolutionary theory denies this.[18] Unfortunately, these misunderstandings are not isolated cases; they are typical of what one can find in creation science literature.

*There are a number of distinct, supplementary, and even logically independent evolutionary theories.*

Second, creation scientists tend to misrepresent the character of disputes among evolutionary theorists. There is, for example, currently a dispute over whether the evolution of species occurs at a steady rate over time. Some palæontologists argue that biological equilibria are punctuated by (geologically) brief periods of fairly rapid change. Many biologists deny this. Somehow many of the defenders of punctuationalism have found their conclusions cited by creation scientists as though they denied the fact of evolution, when in fact they have only challenged certain details of how evolution occurs.

Third, creation scientists seem to misunderstand the force of anomalous facts, those that cannot readily be explained by the current theory. Though, of course, in some sense scientists should be (and are in fact) disturbed by facts that seem inconsistent with theory, such facts never have, and indeed should not, be taken as requiring immediate abandonment of the theory. Newton's theory of gravitation was never *completely* successful in predicting the locations of the planets. First it was the orbit of the moon that created the problems. By the time that was solved, Uranus had been discovered, and its orbit remained seriously anomalous until the discovery of Neptune. In the mid-nineteenth century the problem was Mercury, whose orbit was only reconciled with theory on Einstein's development of the general theory of relativity. Even now, there remain problems with the orbits of the outer planets. To adapt a phrase from Imre Lakatos, theories not only come to birth, but they lead their lives, in a sea of anomalies. Theories must be judged then, not on the basis of whether they are free of any anomalous facts, but on the basis of whether they continue to make progress in the solution of the problems that face them, and whether they tend to lead to new insights into the natural world. Evolutionary theories have a good track record here; creation science does not. Indeed, creation science literature rarely contains more than (often misguided) criticisms of evolution.

The main thrust of the constructive case for static creationism is based on combining the critique of evolution discussed above with the assertion that the static creationist account of origins and (implicitly non-theistic) evolution are the only alternatives.[19] But clearly these do *not* exhaust the possibilities. Critiques of evolution, even if they were decisive, would not help us decide between the creation scientists' static model and others (say, the Aristotelian one, in which the world has not evolved, but was not created either).

And as for positive evidence in favor of a static world (or a young world, or a worldwide flood), there is very little to be had. Some of the more candid of the creation scientists tacitly admit this.[20] They emphasize the kind of work that remains to be done. But in general it can be said that creation science is very different from ordinary science. Unlike evolutionary scientists, creation scientists do not accept their theory on the basis of its broad explanatory power. They do not make any efforts to extend its scope or deepen its reach. They do not take their theory's problems seriously. Their work does not lead to new discoveries. Rather, they spend their time and effort fighting a rear-guard action against evolutionary theories.

*Theories must be judged . . . on the basis of whether they continue to make progress in the solution of the problems that face them.*

Much more could of course be said on this question. Indeed, the literature is already extensive.[21] Literalism might lead its adherents to hope that science will someday uncover evidence of a static world, but in the interim literalists should take care to avoid any rash claims about what evidence is already to hand. As St. Augustine writes:

> [If those who are not bound by the authority of the Scriptures] find a Christian mistaken in a field which they themselves know well and hear him base foolish opinions on the Scriptures, how are they going to believe the Scriptures regarding the resurrection of the dead . . . when they think that the pages of Scripture are full of falsehoods regarding facts which they themselves have learnt from experience and light of reason?[22]

A full appreciation of this point might indeed tell against static creationism itself. But even those whose understanding of the Bible commits them to static creationism can lessen the scandal by acknowledging the tension between their theological beliefs and contemporary science. They do nothing for the cause of Christianity by pretending to have scientific arguments when they do not.

## Is Evolution a Religion?

Evolution is often presented by its opponents as though it were an alternative to the Christian religion. Henry Morris, for example, *defined* evolutionism as "worshipping the forces and systems of nature instead of their Creator,"[23] and once wrote that:

> The issue of Biblical creationism is the most urgent issue confronting Christianity today. The evolutionary system is at the root of most of the spiritual and moral problems that have arisen to hinder the gospel and its proclamation today.[24]

And Duane Gish says, "creationists have repeatedly stated that neither creation nor evolution is a scientific theory (and each is equally religious)."[25]

The criterion of religion on which Gish seems to be relying is that evolution rests on assumptions that cannot be proven. If by "unproven" Gish means "not deducible from premises known to be true," then he is right that evolution rest on unproven assumptions. But then so does all of the rest of science, and so probably do most of our everyday beliefs as well. But if by "unproven" he means only "untested," as would be more appropriate in a discussion of scientific knowledge, then it is just not the case that evolutionary theories are unproven.

But unprovenness is in any case not the test of whether a belief is a religious one. A better understanding of religion can be found in a list of "religion-making characteristics" offered by William Alston.[26] He suggested that religion is characterized by the following kinds of things:

1. A belief in supernatural beings;
2. A distinction between sacred & profane objects;
3. Ritual acts focussed on sacred objects;
4. A moral code with supernatural sanction;
5. Religious feelings (e.g., awe) aroused by sacred objects or ritual;
6. Prayer;
7. A view of the world as a whole and the individual's place in it;
8. Organization of one's life based on that world view;
9. A social group bound together by these traits.

Do these features characterize evolutionary science? It seems clear to me that they do not. Some people might, of course, try to make a religion centered on evolution, as Carl Sagan seems almost wont to do for science in general, but that is not an essential feature of evolutionary biology, and it is certainly not a feature of evolutionary theories of explanation as they are understood and accepted by most natural scientists. Although some atheists may have turned to evolution as a basis for an account of man's place in the world (criterion #7), many Christians have been equally able to incorporate evolutionary insights into a very Christian view of the world.[27] Indeed, Charles Kingsley, an Anglican theologian contemporary with Darwin, wrote in a letter:

> I have gradually learnt to see that it is just as noble a conception of Deity, to believe that He created primal forms capable of self-development into all forms needful *pro tempore* and *pro loco*, as to believe that He required a fresh act of intervention to supply the *lacunas* which He Himself had made. I question whether the former be not the loftier thought.[28]

*[Creation scientists] spend their time and efforts fighting a rear-guard action against evolutionary theories.*

## Conclusion

Let us briefly summarize the points made. Evolution and creation do not answer the same questions. Although all Christians are committed to creation (I want to say creationism, but at this point the confusion that would create is unavoidable), only biblical literalists are committed to the static world, young world, and other core beliefs of creation science. Even literalists have no theological warrant for believing that there is good *scientific* evidence for these beliefs and, therefore, have no reason to embrace creation science.

Some form of evolutionary theory is the best scientific account of the origins of the main features of the universe, of the diversity of species, *etc.*, though that does not, of course, guarantee that evolutionary theories are correct. But at this point, creation science is not a viable alternative. It has not offered a serious critique of evolutionary theories, and it has not done any of the constructive work that is incumbent on any theory aspiring to scientific status.

Finally, evolution is not and does not claim to be a religious alternative to Christianity. It is a scientific theory (or, more precisely, a cluster of independent theories answering diverse questions, but united by a common pattern), and that is all. It could be wrong (though at this point there is no non-literalist reason to believe that it is), but it is not dangerous. There are many important battles for Christians to fight, but, even for literalists, a battle again evolution is not one of them.

## NOTES

[1]*The American Biology Teacher* 50 (1988): 78–81.

[2]See, for example, St. Thomas' account in the *Summa Theologiæ*, Ia IIæ, Qq. 44–46.

[3]Even a world which, in James Hutton's phrase, shows "no vestige of a beginning,—no prospect of an end," would not necessarily be a world *without* a beginning.

[4]Henry M. Morris, *History of Modern Creationism* (San Diego: Master Books, 1984), p. 197.

[5]*Ibid.*, p. 67.

[6]Actually, this term does not capture the full set of views which characterize creation science. For, if the definitions offered by the Arkansas and Louisiana creation science laws are to be considered authoritative, creation science is equally characterized by at least three other theses: namely, (1) a recent creation, (2) a creation that took only seven days, and (3) a worldwide flood. It is important to note that these are independent theses.

[7]Creation scientists make this same distinction. See, for example, Morris, *op. cit.*, pp. 362–365.

[8]"Dogmatic Constitution on Divine Revelation (*Dei Verbum*)" 3:11. Reprinted in Walter M. Abbott (ed.), *The Documents of Vatican II* (New York: Guild Press, 1966).

[9]*Ibid.*

[10]P.D. Feinberg, "Bible, Inerrancy and Infallibility of," in Walter A. Elwell (ed.), *Evangelical Dictionary of Theology* (Grand Rapids: Baker Books, 1984).

[11]Adapted from J.J. Scott, Jr. "Literalism." In Elwell *op. cit.*

[12]Morris, *op. cit.*, p. 339.

[13]Conrad Hyers' interpretation of *Genesis* 1 (in "Biblical Literalism: Constructing the Cosmic Dance," in Roland Mushat Frye (ed.), *Is God a Creationist? The Religious Case Against Creation Science* (New York: Scribers, 1983), pp. 95–104, but especially pp. 101–102) is an especially good example for precisely the text at the heart of the current controversy.

[14]Reprinted in *The Thurber Carnival* (New York: Random House, 1957).

[15]I take this term, for the sake of simplicity but at the expense of precision, to include the Young World Thesis and Flood Geology.

[16]For an introduction to this work, see Richard E. Dickerson, "Chemical Evolution & the Origin of Life," *Scientific American* (September 1978); or Sidney W. Fox, "Creationism & Evolutionary Protobiogenesis," in Ashley Montagu (ed.), *Science & Creationism* (Oxford: Oxford University Press, 1984).

[17]In *Scientific Creationism* (general edition) (San Diego: Creation-Life, 1974), pp. 82–83.

[18]"The Scientific Case for Creation: 108 Categories of Evidence," In J. Peter Zetterberg (ed.), *Evolution vs. Creationism: The Public School Controversy* (Phoenix: Oryx, 1983). To be sure, Brown does later discuss mutations, which, according to the theory, do produce "new" genes, but his discussion of mutations is as flawed as is his discussion of natural selection.

[19]See, for example, Morris' comment that "if for whatever reasons, [men] did not want to believe God's revelation of special creation, then the only alternative was evolution" (*History*, p. 18).

[20]E.g., Wayne Frair & Percival Davis, *A Case for Creation* (Chicago: Moody, 1983).

[21]See for example, Laurie R. Godfrey (ed.), *Scientists Confront Creationism* (New York: Norton, 1983); Philip Kitcher, *Abusing Science: The Case Against Creationism* (Cambridge, MA: MIT Press, 1982); Ashley Montagu (ed.), *Science & Creationism* (Oxford: Oxford University Press, 1984); Michael Ruse, *Darwinism Defended: A Guide to the Evolution Controversies* (Reading, MA: Addison-Wesley, 1982); J. Peter Zetterberg (ed.), *Evolution versus Creationism: The Public Education Controversy* (Phoenix: Oryx, 1983); and others. The quality of these works, of course, differs not only from volume to volume, but from article to article within the anthologies. Some are excellent; some, unfortunately, are as intemperate and lacking in insight as are the works of the creation scientists they criticize.

[22]*De Genesi ad Literam*, I.19. Translated as *The Literary Meaning of Genesis* (New York: Newman, 1982).

[23]Morris, *op. cit.*, p. 19.

[24]Letter from Morris to Tim LaHaye, Febrary 12, 1970. Reprinted in Morris, *op. cit.*, p. 352.

[25]*Discovery*, July 1981.

[26]"Religion," *The Encyclopedia of Philosophy* (New York: Macmillan/Free Press, 1968).

[27]See, for example, some of the essays in E. McMullin (ed.), *Evolution & Creation* (Notre Dame: University of Notre Dame Press, 1985).

[28]*The Life & Letters of Charles Darwin* (New York: Appleton, 1898), Volume II, p. 82.

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The joy of God be in thy face,
Joy to all who see thee;
The circling of God be keeping thee,
Angels of God shielding thee.

From: *New Moon of the Seasons*, Alexander Carmichael

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# Communications

## *Integrating Psychology and Christianity: A Biographical Sketch of Mary Stewart Van Leeuwen*

Mary Stewart Van Leeuwen is a woman who has made pointed scholarly contributions to the field of psychology for over fifteen years. Her work is aimed particularly at a Christian readership. Nevertheless, her major contributions have been received with skepticism by this audience (e.g., Foster, 1984), and for the most part have had little impact on the mainstream of scientific psychology. This lack of acceptance had yielded unfortunate consequences as Christian psychologists have much to learn from the direction and quality of Van Leeuwen's professional contributions; that is, the thoughtful integration of psychology and Christianity.

K.E. Farnsworth (1985) provides a unique contribution to current understanding of the integration of psychology and Christianity. Two basic methodologies compose the integration process for Farnsworth: (a) critical integration, or evaluating issues from a perspective placing Christian values as predominating standards, and (b) embodied integration, or evaluating issues from a perspective that allows for a balanced input from a variety of disciplines. The purposes of these methodologies are, respectively: (a) orthodoxy (right knowing), and (b) orthopraxy (right doing). The thesis proposed by Farnsworth is that integration takes place from a carefully balanced application of the above methodologies. At a final stage in the process of integration, the application of critical and embodied integration at a personal level results in a personal conviction and commitment to action. This final stage is what Farnsworth refers to as the beginning point of *wholehearted* integration; a commitment to living the balance of orthodoxy and orthopraxy.

What Farnsworth has proposed is a simple and straightforward challenge to Christian psychologists, calling them to a balanced and committed lifestyle of right knowing and right doing; however, wholehearted integration is a difficult process at the least. Fortunately, this task is not impossible as there are those who have been successful within the field of psychology. Mary Stewart Van Leeuwen is a psychologist who has met Farnsworth's challenge with vigor, serving as a role model for other Christian psychologists.

This paper is an effort to highlight the professional contributions of a living, productive psychologist; allowing the reader to be better able to appreciate the significance of Van Leeuwen's work. The purpose of this paper is best supported through providing the reader with: (a) a sketch of significant biographical information; and (b) a brief review of Van Leeuwen's contributions as an academic psychologist, noting several important criticisms of her work.

The biographical information presented here will help the reader to become better acquainted with the person of Mary Stewart Van Leeuwen. The reader will then be able to evaluate her work in light of her personal history—that is, a professional lifestyle of wholehearted integration. The review presented here is not comprehensive, and is intended only to highlight what Van Leeuwen and her critics view as the most salient issues presented in her work. It is hoped that as a result of this snapshot of Mary Stewart Van Leeuwen and her work that the reader will be challenged to become more familiar with her writing, and to imitate her example as a psychologist committed to the wholehearted integration of psychology and Christianity.

### *Brief Biography*

Mary Stewart Van Leeuwen was born in London, Ontario, Canada on May 29, 1943.[1] Being born and raised in Canada provided the opportunity for her to speak and write fluently in both French and English. In 1965, she earned a bachelor of arts degree, with honors in psychology, at Queen's University, Kingston, Ontario. Subsequently, she served as a secondary school teacher of French and English at Chikankata Secondary School, Mazabuka, Zambia; under the auspices of the Canadian University Service Overseas.

Feeling the need for further education, she entered Northwestern University to study psychology. In 1970, she obtained a Master of Arts degree in social psychology. She went on to complete her Ph.D. in social and cross-cultural psychology at Northwestern in 1971; the dissertation was titled: "A Cross-Cultural Test of the 'Carpentered World' Hypothesis using Three Geometric Illusions in Zambia."

From 1971 through 1985, Mary Stewart Van Leeuwen served as an assistant and associate professor in psychology at York University, Toronto, Canada. Since 1985 she has been a professor of interdisciplinary studies in the department of philosophy at Calvin College, Grand Rapids, Michigan.

Significant professional opportunities that Mary Stewart Van Leeuwen has had throughout her academic career include consulting and contributing editorial positions with *Journal of Psychology and Theology, Journal of the American Scientific Affiliation, Reformed Journal, The Banner Radix*, and *Christianity Today*. Other activities have included positions as a grant evaluator for the Social Sciences and Humanities Research Council of Canada, and as a manuscript consultant for the *Journal of Cross-Cultural Psychology*. Further, she has given numerous presentations at professional conferences, as well as invited lectures at a variety of colleges and universities in Canada, the U.S. and Europe. Although she was a member of the American Psychological Association while a student at Northwestern, Mary Stewart Van Leeuwen has not been a member of APA during her later professional career. She has suggested that APA did not meet her needs as a professional. Nevertheless, she has been a member of the International Association for Cross-Cultural Psychology, the Christian Association for Psychological Studies, and a fellow of the American Scientific Affiliation.

Being a productive scholar has not meant a sacrifice in the area of family. In 1975, Mary Stewart was married to Raymond C. Van Leeuwen, a professor of Old Testament. She suggested that her husband has been a valuable resource for her writing by providing timely and sensitive feedback, and challenging her to resist lapses into shoddy biblical hermeneutics. The Van Leeuwens have two sons, Dirk and Neil.

## *Professional Influences*

As is evidenced by her writing, Mary Stewart Van Leeuwen has had interests in the areas of social and cross-cultural psychology, the psychology of gender differences, philosophy of science, theology, and psychological research methodology. Her most recent work includes a longitudinal study of the cognitive style of gender in subsistence lifestyles in West Africa, and a book in preparation: *Gender, Sex, and Christian Freedom*. Although she received formal training as a social psychologist, she has described herself as ⅓ psychologist, ⅓ theologian, and ⅓ philosopher of science, at heart; a moderate postmodern philosopher of science in the Kuhnian tradition.[2]

Further, she has generally characterized her work as an attempt to challenge academic psychologists in their conceptions of the science of psychology and the nature of persons, within a theological context. A general thesis of several writings (Van Leeuwen, 1982a, 1982b) has implicated modern psychology's buying into the scientific methodology of empiricism as a disastrous apprenticeship that has not served psychology well.

Psychology is a relatively young discipline, yet its historical roots are quite extensive. Though psychology has largely benefited positively from such a broad heritage, the discipline has also been faced with a difficult struggle to establish an identity that is unique among its parent disciplines. For the most part, psychology has taken on desirable and/or useful aspects of its parent disciplines, and discarded other aspects.

In general, psychology operates from an empirical perspective—that knowledge or an understanding of truth comes only through the investigation of observable events. Psychology has taken as its own this methodology of scientific inquiry used by the more traditional sciences such as physics and chemistry. Though the use of this methodology was necessary in helping the discipline in early identity establishment, psychological methodology has met with criticism. Van Leeuwen (1982a) writes:

> In so becoming a "sorcerer's apprentice," North American psychology has implicitly, if not explicitly, affirmed its faith that "expanded empiricism" is *transferable* to its own subject matter. That assumption, I believe, has turned out to be largely unjustified. The magician's tools have not produced very much reliable knowledge about the laws of human behavior, and what is worse, they have introduced into human science a manner of treating human subjects which is (at best) morally dubious not only to Christians but to non-Christian humanists. (pp. 291–292)

Here, Van Leeuwen has not demanded that psychology cease to be an empirical discipline, but rather she has waged an attack on psychology's carelessness in becoming an empiricistic discipline.

In her subsequent major contribution to the field of psychology (Van Leeuwen, 1985), Mary Stewart Van Leeuwen made an effort to suggest an alternative approach for psychology—humanizing the methodology:

> Human actions . . . cannot be understood merely by observation and description from an outsider's point of view. . . . Consequently methods are needed that will enable the scientist to understand, in active cooperation with the subjects, how the subjects see their particular situation. (pp. 73–74)

The contributions of several philosophers have been important in influencing her writing in this area: C. Stephen Evans, Thomas Kuhn and Ernan McMullin; social psychologists Rom Harre and Kenneth Gergen; and British neuroscientist Donald MacKay (cf., Evans, 1977; Gergen, 1982; Harre, 1980; Harre & Secord, 1972; Kuhn, 1971; MacKay, 1982; McMullin, 1978).

## *In Perspective*

Critics of Van Leeuwen's (1982a, 1982b) manuscripts have generally suggested that she has presented a much needed exploration of the current state of psychology. Hayton (1983) wrote: "The issues that she outlines are at the heart of psychology" (p. 362). Nevertheless, Foster (1984; cf., Hodges, 1985) represents those who have suggested that she has presented an overly negativistic picture of psychology:

> Psychologists are not slaves to a method who blindly apply the experimental approach to any problem that comes their way; rather, most psychologists have a clear sense of the strengths and weaknesses of the scientific method when applied to humans

> and continue to use it because of the unique perspective it affords. (p. 242)

More recent research has attempted to further champion Foster's notion of the psychologist as one who uses rather than who is used by method; nevertheless, this research too has relied on traditional methodologies. Howard and Conway (1986) wrote: "Every vital science should constantly strive to develop new conceptual and methodological perspectives in order to better understand its subject matter" (p. 1249). However, they applied the traditional factorial design methodology to their innovative hypotheses. Can psychology ever apply new methods?

Critiques of Van Leeuwen's (1985) manuscript have continued earlier skepticism. Vunderlink (1986) and Foster and Ledbetter (1987) have suggested, and rightly so, that Van Leeuwen's arguments for humanizing psychology fall short of providing a worthwhile alternative to current methodological approaches. Further, Vunderlink accuses Van Leeuwen of going too far in her humanization, making the same mistake as reductionist-extremism. Nevertheless, new theory and research in the feminist tradition is making a quite concerted effort to establish appropriate alternative methodologies for the study of women's issues. Gilligan (1982), and others (cf., McHugh, Koeske, & Frieze, 1986) suggest an emphasis on humanistic and relational elements in the implementation of psychological research methodologies. This trend in recent feminist theory and research appears to support the practicality of applying Van Leeuwen's innovations. It appears to be in the psychology of gender and women's issues that Mary Stewart Van Leeuwen's continued writings may be most readily accepted: as noted earlier, her current writing efforts are centered in a manuscript that addresses gender issues.[3]

## *Conclusion*

Obviously, Mary Stewart Van Leeuwen has made significant contributions to the field of psychology. Her continued contributions would appear to show promise as they speak to the importance of gender issues in relation to humanizing psychology. Regardless of whether her work is widely accepted, Mary Stewart Van Leeuwen has presented Christian psychologists with a unique challenge; that is, to successfully engage in wholehearted integration.

Wholehearted integration is a difficult process. Nevertheless, Mary Stewart Van Leeuwen has proven to be a positive role model for female and male psychologists interested in integrating their Christian commitment with their profession (cf., Van Leeuwen, 1976). The content of her writing has conveyed the need for and contributed to orthodoxy in psychology, while she has demonstrated orthopraxy through the process of her writing. She has seen the need for change within psychology and has tried to effect such change; a valuable strategy for other Christian professionals no matter what their discipline may be. Mary Stewart Van Leeuwen has clearly applied her convictions with committed action: a commitment to living the balance of orthodoxy and orthopraxy.

## *ACKNOWLEDGEMENT*

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## *NOTES*

[1]Unless otherwise noted, all biographical information was provided by Mary Stewart Van Leeuwen through a telephone interview with the author on October 11, 1987, and subsequent written correspondence of December 8, 1987.

[2]The reader is reminded that much of Kuhn's work has been a reaction to the traditional sterile perspective of empirical scientific investigation—that the scientist can be "divinely" objective toward, and having no effective influence on, the phenomena under investigation (cf., Mahoney, 1976).

[3]Her latest book, *Gender, Sex and Christian Freedom* (Wheaton, IL: InterVarsity Press), is to be finished in Fall/Winter 1988.

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## *Intra-Denominational Conflict in American Religion: Insights from Classical Sociological Theory*

When I embraced the Living Christ as my savior in 1970, I was in telephone engineering with Western Electric. I had little church background and the only religious conflicts known to me were the issues of prayer under the aegis of the State and the use of public school buses for transporting Catholic school students. Little did I know that in a few short years theology and sociology would be my major concerns, and that I would be living through a long, bitter religious struggle as my conversion happened to be in a Southern Baptist church.

The *overt* issues in the struggle are many and have changed several times over the last fifteen to twenty years. Broadly speaking, they fit fairly well into the traditional Fundamentalist-Modernist controversies. But, there is a newer religio-politico-ethical dimension that shows some similarity to the drastic differences between two nationally prominent Baptists: Jesse Jackson and Pat Robertson. As I noted, the overt issues have changed. However, the struggle continues, with increasing intensity, and with no overt issues being resolved. That fact was my first clue that there was something underlying the struggle that was missed by most people, including myself. That "something" will be addressed in the bulk of this paper.

In the last ten years, the struggle has polarized the Convention to the extent of forcing many wonderful people into theological "parties" (cf., I Corinthians 1:10–16), as if doctrinal purity is God's foremost concern (cf., Matthew 25:31–46, 7:13–29). This whole process has been sad and painful—as well as baffling. However, a year or so ago, in the middle of my graduate work, I came upon some classical sociological theorists who provided some useful insights into what was happening. It seemed that the process could be viewed, largely, as a normal fact of democratic organizational life. This was a striking idea and seemed to make more sense the more I thought about it. It certainly was more revealing than the "Fundamentalist Grab for Power!" and "Liberals Deny the Word of God!" "theories" championed by many combatants.

While investigating the idea further, it occurred to me that Southern Baptists were not alone in this struggle. It thus seemed worthwhile to share this perspective on organizational change with my fellow ASA members, who, regardless of denominational affiliation, might find it useful for understanding conflicts in their own church bodies.[1]

For that reason and others, I will not deal with the issues as defined by the parties. My primary purpose is to present a viewpoint that is useful for all believers, and the "official issues," in my opinion, are not helpful for understanding the dynamics of conflict. I also want to avoid the usual emotive terms and so more easily build toward some thoughts on how Christians in intellectual disciplines can be peacemakers before, during, and after major conflicts in their denominations.[2]

My primary guides are Robert Michels and Vilfredo Pareto: European theorists not well known outside sociology.[3] Max Weber and Karl Marx colored my thinking but are not major sources for this paper.[4]

Sociologically speaking, many American denominations, despite polity distinctives, could be viewed as large, democratic, voluntary membership organizations. This social fact sets the stage for the whole process. For an organization to be democratic, individual effect on decisions is essential. With small numbers of people, direct personal involvement is not very difficult. However, when the numbers reach just a few hundred, direct democracy becomes virtually impossible.

As size begins to block effective action, there is a commonsense realization that there must be full-time leaders to carry on the day-to-day work and streamline operations. In earlier times it would have been clear that some of the members had high interest and skills. These would have already tended to dominate the life of the organization and so quite naturally would be the group from which the leaders would be chosen. The other members would rely upon them for information, "minding the store," and holding regular meetings to discuss major issues. Some of these people simply rise to power due to real and perceived abilities. Others desire power and succeed due to real abilities and/or guile. In either case, they get power due to characteristics that set them apart from the rank and file.

The leaders now find themselves in a different world. Because of their status they begin to "run with a new crowd" and, quite naturally, are influenced by the values and mores of this class made up of other organizational leaders. This situation gradually leads them to view the world differently than the members, plus they learn the realities of getting things done in the "real world." As time goes on the differences get greater until they become noticeable enough to arouse suspicions in the membership.

There are also other factors operating. Desirable leadership qualities include innovative thinking and practical savvy. These are good for solving technical and political problems and making new applications of old ideas. Innovation, though, means change, and there's the rub. Most of us want rapid technical and economic change without changes in social (status/value) relations—an impossible dream in my view. Given that many hold their social relations to be theologically derived or justified, we can understand why anxiety/hostility is aroused by change—valid or not. Enough innovation on the part of the leaders, and they are ripe for being accused—rightly or wrongly—as the source of the trouble.

Since the leaders have the time and facilities to organize and control information, they generally have little difficulty fending off attacks as long as the majority of active members believe them—correctly or not. Attackers can be labelled variously as "Johnny-Come-Latelies," "well meaning but misdirected," "radicals," etc.

As time goes on, the class differences become ever greater so it becomes more and more difficult for the leaders to

legitimize their actions in the eyes of the members. Even the regular electoral processes may not ease tensions. The "new blood" tends to be chosen from above more than from below as the leaders groom, through established channels, those who are "assets to the organization," or coopt potential threats to the status quo.

Working parallel to that process is a gradual policy shift which is hard for the rank and file to see since it occurs in small—duly approved—increments. The reason for the approval is that most of the shift is actually in line with the organization's ideals and objectives and simply represents adjustments to conditions not at issue in earlier times. The dark side of this change comes from the accumulated effects of two facts of life. First, there is always some disagreement with any change and second, not all changes are correct. When the shift is perceived by enough of the body politic, or it is sensed that "things just aren't like they used to be," a major struggle for a return to a "rose-colored past" is on the horizon.

By this time, there is enough dissatisfaction among the members to fuel a reaction. The changes causing this come from inside and/or outside, and the leaders are perceived as unwilling or unable to cope in ways thought appropriate by the members. We see conservative control/security needs rise to prominence as well as persons who can take advantage of them. Those needs are a solid base from which to challenge the "powers that be."

The technique is to elevate, in the minds of the dissatisfied, an ideal as if it (correctly or not) was *the key to success* in the early organization. It must also be shown that recent leadership has departed from that "historic position" and is thus illegitimate.

The conservative bandwagon sweeps the new people into office where they begin to steer a new course. (Note that bandwagons tend to be formed around simplistic and extreme positions. Who ever heard of a zealous crusade for moderation?) But do the new leaders "live happily ever after"?

One way of looking at this is to view reactionaries as strong in ideology but weak in innovation and therefore easily displaced by leaders who can get things done in the real world. Another perspective posits the world of leadership as confronting the new leaders with the same values and mores it presented to the old leaders. It thereby changes them too, and repeats the process.[5] I suspect there is validity in understanding new and old leaders through both internal qualities and external class relations.

From this vantage point, it appears that democratic organizations are doomed to a constant cyclical pattern or, more hopefully, an upward spiral. This brings me to the final part of the discussion and the point of interest to Christian academicians.

## *Role of Christian Educators*

The subculture of academe has many demands. It is thus easy for teachers to concentrate on issues confined to that culture and lose touch with "outsiders." This process is not bad as such, but it is a major factor supporting the concepts called "US" and "THEM" around the world. All class (cross-cultural) relations have that quality. In light of this, what can we do?

The first thing is to keep on teaching. That helps students see beyond the confines of their backgrounds. Being able to see farther can enable them to better evaluate leadership decisions and those who challenge them. They may also be less likely to fall prey to waves of popular sentiment.

But what about those who did not pursue higher education? Do college professors have any responsibility to them? Can something be done to reduce the social gap between "the intellectuals" and "just plain folks," or blur the distinctions between "us" and "them"? I believe so, and it may be that James 2:1–13 can be helpful.

Members of all social groupings tend to be more comfortable with "their own kind." They also tend to fear, and devalue, those of whom they are not well informed or are outside their common experience. The suspicions founded on lack of knowledge may be reduced somewhat if knowledgeable persons make it a point to share their perspectives, whenever appropriate, exercising care to avoid both erudition and condescension. Many welcome this between disciplines, but it can be useful across social lines as well. And it works both ways. Each side can be enriched by seeing through the eyes of the other.[6]

Writing is another technique that could be used to communicate to those outside academe. (There is already plenty of writing by and for those inside!) In the last year or so the ASA *Newsletter* has noted that using letters to editors is a good way to clear the air in the Creationism/Evolutionism debate. That is an excellent example of cross-professional writing. But what about other subjects at issue? Many people write letters to editors. Instead of scorning the obvious ignorance of many of them, it would be more helpful to write correctives focusing on one issue at a time and in plain language. In my experience this has produced some happy and gratifying results.

## *Concluding Remarks*

And what, sociologically speaking, might be gained by weakening the barriers between the leadership/teaching and membership classes? Doubtless there will still be conflict, but with fewer group distinctions mutual understanding should be better, thus lessening hostilities. This is remarkably similar to "love covers a multitude of sins" (Proverbs 10:12b; I Peter 4:8).

Biblically speaking, bitter conflict and a party spirit are antithetical to the very identity of the Body of Christ (I Corinthians 1:10–4:21). Why else did our Lord say: "Love one another! As I have loved you, you also love one another. By that love you will be identified as my disciples" (John 13:34b,35a)? Apparently personal and class relations within the Body say much about its true identity. So it seems that,

despite the difficulties (Matthew 5:6–10), working at reducing the size of the class gap makes not only political sense, but spiritual sense as well.

## NOTES

[1]For related information and studies see Ammerman; Barrow; Beckford; Bruce; Cohen & Ben-Yehuda; Fox; Liebman & Wuthnow; Moberg; Niebuhr; O'Dea, Perkins; Wilson.

[2]Even though what follows focuses on organizational leadership it is clear from Baptist and Lutheran experience that teachers tend to be included in the agenda of conservative challengers.

[3]They did most of their work in the years surrounding WWI. Michels, a German, is best known for his "Iron Law of Oligarchy" which has been well supported by subsequent research (Collins & Makowsky, p. 215). It provides the primary structure for this paper. Pareto, an Italian, questioned why changes in who exercised power never created social improvement, and proposed a socio-psychologically oriented explanation.

[4]To aid clarity I have applied ideas from them all in a narrative form. Each has made important contributions to our understanding of conflict. If any wish to access the information, my most important sources are listed below.

[5]Isolationism is a factor which could slow the process. This can come from emphasizing "the separated life" to the point of avoiding all association with "the world" and even other churches. If the old leadership was seen as contaminated by modernity, etc., it would justify a more insular existence on the part of the new leaders.

[6]At times this process is anything but easy, but perhaps those are the most important times.

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## *Von Neumann, Jewish Catholic*

John von Neumann's life was a paradox. He has been called "one of the greatest mathematicians of the first half of the twentieth century" and "one of the best weapons men of the world." He combined intellectual brilliance and political astuteness. He was a paragon of science and technology, of pure and applied mathematics. He belonged to that so-called Hungarian phenomenon, which included also Dennis Gabor, Leo Szilard, Eduard Teller, and Eugene Wigner.

He was born in Budapest in 1903. His father Max was a rich banker, who became ennobled in 1913, and his mother Margaret Kann was a family person. He had two younger brothers. As a child, Johnny, as he was later familiarly called by all, had a nurse and then a governess. At ten he entered schooling at the Lutheran Gymnasium for boys. He was a precocious reader and a prodigy in arithmetic (particularly mental calculations). His mathematical genius was noted, and he was tutored by Leopold Fejer of the University of Budapest (he did not, however, skip any grades). At eighteen he was admitted to the University. He was free to leave it, and returned only for examinations. He visited the University of Göttingen, where he met David Hilbert. He received a degree, at twenty-two, in chemical engineering from the Eidgenossische Technische Hochschule in Zurich. The following year he was awarded a doctorate in mathematics by the University of Budapest; his dissertation was on set theory.

He became a Rockefeller Fellow at Göttingen, where he studied the new quantum mechanics and operator theory. The following year he was appointed a *privat dozent* (licensed lecturer) at the University of Berlin. Two years later he held a similar position simultaneously at the University of Hamburg. At twenty-six he was Visiting Professor for a semester at Princeton University, and then alternated terms there and at Berlin for two years. When twenty-nine, he published the *Mathematical Foundations of Quantum Mechanics*. The next year he was appointed professor at the new Princeton Institute for Advanced Study, and also married Marietta Kavesi, daughter of a Budapest physician. His only child, Marina, was born two years later. Both his wife and daughter left him after another two years. The following year he married the twice-divorced Klara Dan, daughter of a wealthy Jewish family. (She remarried after von Neumann's death and finally drowned strangely on a lonely La Jolla beach).

During World War II, von Neumann was a consultant for the Army Ballistic Research Laboratory, the Navy Bureau

of Ordnance, and the Manhattan (Atomic Bomb) Project in Los Alamos, New Mexico. His work at Los Alamos was probably the turning point of his career. At forty-one, with Oskar Morgenstern, he published *The Theory of Games and Economic Behavior*, with its emphasis on bluffing. At forty-eight he became a member of the Air Force Scientific Advisory Board and of the Atomic Energy General Advisory Committee. He soon became chairman of the most important sub-committee (on weapons) of the former. He was made chairman of the SAB Nuclear Weapons Panel at fifty, and the year following was put on the DOD Atomic Advisory Panel.

After many sleepless nights, the following year von Neumann decided to take leave from the Institute and to accept a five-year term on the AEC, where at times he acted for the chairman Lewis Strauss. During this time, a pain in his shoulder revealed cancer of the bone. He had to cancel the Silliman Lectures at Yale on "The Computer and the Brain," but he continued to work—even harder. He died at the age of fifty-three.

Von Neumann had extraordinary mental abilities: he was fast thinking, fast talking, fast moving, and he had a photographic memory. His intellectual work was prodigious. Yet he was a man of the world, not a recluse. He knew many people and liked to gossip about them—a raconteur. Von Neumann was a *bon vivant*; he had a large residence with fine china and good silver. His house was a social center in Princeton, and he enjoyed the night-life of cabarets. He was urbane and cosmopolitan. Johnny was friendly and likeable; he was jovial and had a good sense of humor (including double-entendres and dirty limericks). He was never condescending, ever accessible, and always had a warm smile. Although he did not personally like J.R. Oppenheimer, he publicly defended Oppenheimer's national actions. There was, however, some arrested emotional development, such as an insensitivity to the feelings of women and a lack of sentiment. He advocated unlimited atomic testing, regardless of the hazards of fallout; in his case, possibly due to the insecurity of his Hungarian background with its internal anti-Semitism and its external Soviet pressure.

Von Neumann published about 150 papers, of which 130 were in mathematics. In 1954 he indicated that his most significant mathematical ones were on the theory of operators, a rigorous formulation of quantum mechanics (including Heisenberg and Schröndinger presentations), through the use of the Hilbert space and a proof of the quasi-ergodic theorem in statistical mechanics. His general approach was from the standpoint of axiomatization.

Jacob Bronowski, a mathematician collaborator of von Neumann, regarded von Neumann's two outstanding creative contributions to be his theory of games (cf., the minimax theorem, 1928) and his logical design of calculating machines (cf., the MANIAC). He used the latter for solving the dynamical equations of air motion with respect to weather phenomena.

Von Neumann said in his autobiographical *The Mathematician* (1947): "The most vitally characteristic fact about mathematics is, in my opinion, its quite peculiar relationship to the natural sciences." As a collaborator of his on the theory of shockwaves (a nonlinear phenomenon), I assisted in searching how nature itself solves nonlinear equations. Later, we used numerical analysis for what he called "experimental mathematics," i.e., to seek solutions for simple models with the hope of identifying corresponding analytical functions.

It was in 1940 that von Neumann turned his attention primarily to applied mathematics, which was particularly evident in his chief contributions to the use of atomic energy. He was responsible for the implosion method of detonating an atomic bomb (tested at Alamagoro and used at Nagasaki), as well as the development of the hydrogen bomb. He was a catalyst with respect to the improvement of electronic calculators and of nuclear weapons. He had no faith in disarmament. He was an advocate of the ICBM.

He received honorary Doctorates of Science from Princeton, Harvard, Pennsylvania, Case, Istanbul, and Maryland. He was made a member of the National Academy of Science at thirty-three. He was a Corresponding Member of the Royal Dutch Academy of Science and an Associate Member of the Academia Nacional de Ciencias Exactos. President of the American Mathematical Society for two years, he was a member of the American Philosophical Society and of the American Academy of Arts and Sciences, the American Mathematical Association, and a fellow of the American Physical Society. He was editor of the Princeton *Annals of Mathematics* and co-editor of the Dutch *Compositia Mathematica*.

Von Neumann received the Navy Civilian Distinguished Service award and the Presidential Medal of Merit. In 1956 he was given the first Fermi Gold Medal and $50,000 Fermi Award for his contributions to atomic energy. Nevertheless, Bronowski, citing "an age-old conflict between intellectual leadership and civil authority," felt that von Neumann had "wasted the last years of his life." He was accused of being in "love with the aristocracy of the intellect" instead of favoring "the democracy of the intellect." Bronowski felt that von Neumann gravitated to "enterprises that brought him to the centres of power." On the contrary, those very centers sought him because he could and would help in the solution of human problems. Not everyone can be a *persona grata* both to the theoretical and to the practical—a bridge between the passively indifferent and the actively powerful. To my mind, to have an aristocracy of the intellect serve the democracy of society is an ideal for which von Neumann was peculiarly a model *par excellence*.

Some people claim that von Neumann was an agnostic. I must confess that we never discussed religion. It may be that his very silence was an indication of his sincerity. On the other hand, he showed little interest in the philosophical aspects of quantum mechanics. It is noteworthy that he was uninhibited by ethical considerations in weaponry. I was surprised, therefore, when he died a Roman Catholic. To be sure, his first wife had been Catholic. I presume that he was a nominal one in those early days of his marriage. In his last illness, he asked for a clergyman, but he surprised them by insisting upon a Roman Catholic priest. A Benedictine was

succeeded by a Jesuit for instruction. The attending Air Force chaplain told me that Johnny could quote the Penitential Psalms in Latin. I attended the Catholic burial service at the Walter Reed Army Hospital, where he died. He was buried in Princeton, New Jersey.

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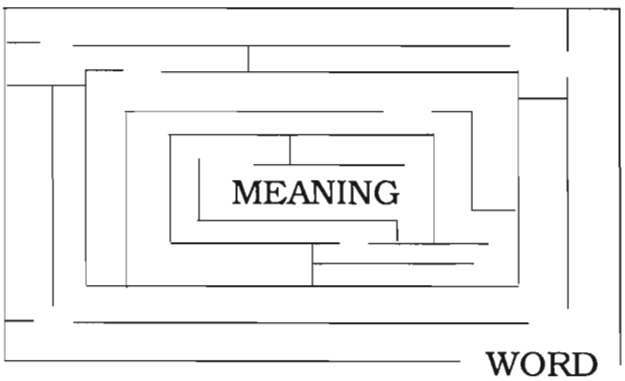
*Twenty-third in a series by Raymond J. Seeger on scientists and their religion.*

# *Penetrating the Word Maze*




*Taking a look at words we often use—and misuse. Please let us know whether these attempts at clarification are helpful to you.*

*Today's word is* "freedom."

**The Dictionary definition:** *"the absence of necessity, coercion, or constraint in choice or action"* [Webster's Ninth New Collegiate Dictionary, Merriam-Webster, Springfield, MA (1987)].

* * * * *

If my shoes are tied so tightly that my circulation is threatened, I will indeed experience freedom if the laces are loosened. If they continue to be loosened until my shoes fall off, I will lose my walking freedom. So it is with freedom in general. Freedom can be increased in certain cases by removing excessive coercion or restraint, but the very existence of freedom demands the presence of some restraints.

Unfortunately the dictionary definition can be quite misleading. If taken literally, such a view violates what we really mean by "freedom."

Suppose we were free of all restraints in the physical world—of gravity and all physical laws—we'd have physical chaos, not freedom.

Suppose we were free of all restraints in the social world—no social laws, no courtesy, no consideration for others—we'd have social chaos, not freedom.

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This column is a regular feature of *Perspectives on Science and Christian Faith*, written by Richard H. Bube, Professor of Materials Science and Electrical Engineering at Stanford University, Stanford, California.

Suppose we were free of all restraints in the spiritual realm—no God, no Ten Commandments, no Lord and Savior—we'd have spiritual chaos, not freedom.

To suppose that freedom means the absence of all constraints is an anarchist's view. People who hold to this abstract and unrealistic ideal of freedom strive for a kind of existence that is incompatible with the real created world. They forget both the essential limitations of a finite universe and the self-centeredness of the human heart. If they persist, they can result only in the destruction of their own actual freedom, as well as that of others.

Certainly science and engineering teach us that freedom in this real created universe depends not on our being rid of constraints, but on our understanding and knowing *what constraints there are* and creatively working within them. If I wish to remain free and active, then I must realize the constraints that are imposed upon me: I cannot walk off the top of a tall building, I cannot eat poison, I cannot take dope, and I cannot lie down in front of a crocodile.

These same kinds of constraints operate in interpersonal relationships as well. To be free in the vital dynamic sense of the word in this real world means that I do not demand the absence of constraints on personal selfishness, personal greed, injustice between persons, or social persecution. Nor do I demand the absence of constraints on killing, hating, stealing, committing adultery, lying, slandering, or coveting.

Sometimes people try to draw a contrast between physical "laws" that are "never broken," and "laws" governing interpersonal relationships that are often broken. The attempted contrast is a spurious one. It is indeed not possible to attempt to "break" a physical "law" with impunity; if I challenge the "law" of gravity by walking off the top of a tall building, I suffer the consequences of my action. Neither is it possible to attempt to "break" a "law" governing interpersonal relationships with impunity; if I try to violate personal relationships by treating human persons as if they were impersonal objects, I also suffer the consequences of my actions just as surely.

A shrinking world demands a voluntary transformation of individual freedom into social responsibility. A challenge to Christian responsibility is the choice of limitations on our own freedoms so that we may better serve others. What does it mean to follow Christ by choosing servanthood—except to be willing to lay aside our freedoms in order to live responsibly before God?

To be truly free is to recognize the inbuilt constraints of our created situation and our created nature, and to live within these constraints.

*Feel free to write the Editor or Author with responses to these comments.*

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# Book Reviews

**CREATION AND THE MODERN CHRISTIAN** by Henry M. Morris. El Cajon, CA: Master Books, 1985. 298 pages, index. Paperback; $8.95.

Henry M. Morris, founder and director of the Institute for Creation Research, has devoted more than forty years to a crusade. His "creation science" movement is in confrontation with most scientists, theologians and biblical scholars (including evangelicals). Earlier works, such as *The Genesis Flood* (Whitcomb and Morris, 1961) detailed his position, which keys a biblical literalism to radical diluvial theory using quotations from technical literature and the Bible. Theory has not been substantially revised with accumulated evidence, nor have misquotations, errors and inconsistencies been acknowledged or corrected. Here, he admits that *The Genesis Flood* is out of date but only because "the case is much stronger today." Interpretation is confounded with Scripture, which is considered to be inerrant; therefore, agreement with his views appears to be a necessary prerequisite to salvation.

*Creation and the Modern Christian* is specifically addressed to Christians, unlike most of his previous books. It seeks to enlist us into battle against "evolutionary humanism" (which is equated with virtually all interpretations of origins except the loaded literalism of Morris). This perceived enemy is held responsible for every evil and is correlated with communism. Morris claims to offer biblical, theological and scientific evidences. Instead, he removes context, adds assumptions, and distorts statements. He expresses alarm at apparently widespread apathy, indecision and compromise within the Church, so urges a creationist revival. Surely, recognition of our unity in Christ must transcend opinions upon politics or theories, while proud contention violates Micah 6:8. The Bible forbids malice, which permeates this book, and calls us to love our enemies. Thus, I find the Morris message offensive; contradictory to the Bible as well as science.

There are two sections, each divided into three chapters ("Creation and the Last Days," and "Creation and the Witness of True Science"). Both sections attack the supposedly satanic basis and consequences of evolutionary interpretations, together with geological concepts, far more than they deal with any doctrine of creation or scientific evidence. Morris perceives a holy war, an Armageddon allowing no neutrality. He raises the specter of secular humanist conspiracy controlling contemporary society—a gross exaggeration!

He deftly bounces definitions between broad and narrow senses, subtly revising a few (for example, the Second Law of Thermodynamics). Having defined evolution in the opening chapter, he proceeds to extend the designation to include geologic timescale, uniformity principle (analogous to Jeremiah 33:25), and the fossil succession discerned by diluvialist geologists. Morris mocks historical geology, portraying a dogmatic gradualism far beyond the long-rejected Lyellian extremes, and misuses II Peter 3:3–6 against geologists. He scorns every dating method, stratigraphic column, thrust fault; and ridicules the fossil record with false rumors, especially in paleoanthropology.

The proofreading is deplorable, with dozens of typographic errors. More seriously, false assertions are rife. Progressive creation, which Morris calls a "19th Century compromise" (p. 39) and "an ancient pagan concept" (p. 41) really derives from the views of St. Augustine of Hippo. The supposedly synonymous theistic evolution theories originated in the 18th century, through William Herschel and Immanuel Kant, about the same time as day-age and gap theories. Morris alleges that plaintiffs at the 1981 trial (Rev. Bill McLean vs. Arkansas Board of Education) sided with humanism, under the ACLU. Most of the 23 plaintiffs represented churches and synagogues; they included his own denomination. George Marsden's reference to creationism being based upon a philosophy of "naive realism" is twisted to imply that evolution is "sophisticated unrealism." Contrary to astronomers, Morris asserts that all stars are eternal. Creationism is lauded as the source of Americanism, and even if proved, it would hardly relate to Christians in other nations.

A chain of citations from other polemics traces racism and imperialism to evolutionary views, though both offenses occur among creationists as much as among opponents. Charles Darwin is labelled "a white racist" in blatantly false witness. Stephen Jay Gould's stand for human rights and against racism is ignored, while Morris insinuates that Gould is "a self-confessed Marxist," without citing a source. The charge sounds not only irrelevant but ridiculous. Arguing that evolution is too cruel and wasteful a process to reconcile with a loving God, Morris ignores the harshness of biblical history, which is reconcilable. He implies that evolutionary views distinguish false prophets, but readers may compare the criteria in Matthew 7:15–20.

"Forewarned is forearmed, and the modern Christian urgently needs to be prepared for the certain conflict ahead," declares Morris' introduction. Indeed, let us beware of deceit from either side, in a dispute which reminds me of small groups waging trench warfare in ditches while ignoring the road allowing peaceful travel. This book echoes Psalm 35:20 but not Psalm 51:6, provokes needless strife, and does not contribute to understanding of science or the Bible.

*Reviewed by John R. Armstrong, Honorary Assistant in Deacon's Orders, St. Philip the Evangelist Anglican Church, Calgary, Alberta, Canada.*

**CREATION OR EVOLUTION: A False Antithesis?** by M.W. Poole and G.J. Wenham. Oxford: Latimer House, 1987. 84 pages. £3.00.

Concerned with "a diversity of views held by those who share a belief in the Bible as the Word of God," M.W. Poole of Kings College London and Scripture scholar Gordon Wenham have attempted to resolve the apparent conflict between concepts of biological origins based upon creation and theistic evolution. They conclude that *both* creation and evolution are consistent with Scripture, though they have roots in revelation and scientific investigation, respectively.

Main points of discussion are the distinction between scientific evolutionary theory and anti-theistic philosophical accretions to it, an interpretation of Genesis 1–3 with evolutionary implications, a summary of 14 "typical creationist views" posing serious intellectual problems from both scientific and scriptural viewpoints, and a warning against the intrusion of logical fallacies in discussion and deliberate clouding of issues by fabricated ignorance.

Strict creationists, largely unfamiliar with and prejudiced against accurate scientific explanations of biological origins, will find the book very disturbing, especially since illogical statements by creationist authors like Henry Morris and Duane Gish are systematically, if at times a bit tediously, analyzed and put to rest. North American readers have been exposed to abundant critical reviews of this type and will find little new material. The authors are correct in identifying creationists as rarely professional life scientists qualified to assess scientific conclusions, or the lack of them, in issues involving religion. They astutely point out a genuine dearth of professionals, like Charles Darwin himself, educated in both theology and the life sciences who can present a coherent analysis of the necessary interrelationships between science and religion.

Wenham's interpretation of Genesis 1–3 introduces the problem of hermeneutics but gives no definitive explanation of passages usually related to evolution. It does, however, suggest a number of valuable logical guidelines. Gradual evolution of man, contrasted with immediate creation from inert matter, concurs with the view of other authors (such as Augustine) that God is equally glorified by such a human creation. Interpretations such as immediate creation are extrapolations from actual biblical expressions and not scripturally verified. God is the source of laws discovered by the scientific method, so the pursuit of science is also the pursuit of God. Sequential creation is consonant with sequential evolution, particularly since Scripture does not clearly indicate *creatio ex nihilo* of every living being. Genesis is primarily a story of the why, not the how, of creation.

The book's preoccupation with identifying beliefs and fallacies of creationism leaves the reader waiting in vain for a coherent exposition of the tenets and demonstrations of theistic evolution. To some, theistic evolution is an oxymoron comparable to creation science, an accommodation that reciprocally prostitutes religion and science. Creationists shun it as an abomination of Scripture, while atheistic evolutionists brush it off as a needless deference to simple-minded believers. Unfortunately, the substantial literature in theistic evolution is largely overlooked both from scientific and theological viewpoints. One might also have expected at least a summary of weaknesses, which do exist, in evolutionary theory described by professional scientists, but the reader is referred elsewhere for such critiques.

By far, the best part of the book is its clarification of frequently confused terms. Evolution as process is distinguished from evolution as mechanism. Evolutionism and creationism are clearly identified as philosophies, not processes. Biological evolution is not a foundation for atheism or

## *Books Received and Available for Review*

*(Please contact the book review editor if you would like to review one of these books)*

R. Alexander, *The Biology of Moral Systems*, Aldine Publishing Company

L. Bailey, *Capital Punishment: What the Bible Says*, Abingdon

H. Bedau, *Death is Different: Studies in the Morality, Law, and Politics of Capital Punishment*, Northeastern University Press

K. Blue, *Authority to Heal*, InterVarsity Press

J. Braddock, *Science and Nonsense*, The Book Guild

A. Cairns-Smith, *Seven Clues to the Origin of Life*, Cambridge University Press

G. Collins, *Can You Trust Psychology?*, InterVarsity Press

W. Clift, *Jung and Christianity: The Challenge of Reconciliation*, Crossroad Publishing Company

C. Derrick, *Too Many People: A Problem in Values*, Ignatius Press

P. Davies, *The Cosmic Blueprint*, Simon and Schuster

A Dundes (ed.), *The Flood Myth*, University of California Press

F. Dyson, *Origins of Life*, Cambridge University Press

H. Engelhardt, Jr. & A. Caplan, *Scientific Controversies*, Cambridge University Press

A Fuller, *Psychology and Religion*, University Press of America

R. Gentry, *Creation's Tiny Mystery*, Earth Science Associates

F. Harrold & R. Eve (eds.), *Cult Archaeology and Creationism*, University of Iowa Press

R. Hurding, *The Tree of Healing: Psychological and Biblical Foundations for Counseling and Pastoral Care*, Zondervan Publishing House

H. Judson, *The Search for Solutions*, John Hopkins University Press

M. Lockwood (ed.), *Moral Dilemmas in Modern Medicine*, Oxford University Press

K. Perrotta & J. Blattner, *Christian Allies in a Secular Age*, Servant Books

G. Radnitzky & W. Bartley, III (eds.), *Evolutionary Epistemology, Rationality, and the Sociology of Knowledge*, Open Court

E. Regis, Jr. (ed.), *Extraterrestrials: Science and Alien Intelligence*, Cambridge University Press

R. Reisser, T. Reisser & J. Weldon, *New Age Medicine: A Christian Perspective on Holistic Health*, InterVarsity Press

J. Scharfgenberg, *Sigmund Freud and His Critique of Religion*, Fortress Press

B. Siegel, *Love, Medicine and Miracles*, Harper and Row

L. Smedes, *Choices: Making Right Decisions in a Complex World*, Harper and Row

W. Swatos (ed.), *Religious Sociology: Interfaces and Boundaries*, Greenwood Press

E. Volpe, *Test-Tube Conception: A Blend of Love and Science*, Mercer University Press

R. Wentz, *Why Do People Do Bad Things in the Name of Religion?* Mercer University Press

J. Whitcomb, *The Early Earth* (revised edition), Baker

any other philosophical or theological belief. These are important points to remember when both creationists and secular humanists try to convert life science classrooms into ideological battlegrounds while pretending that their agendas are pure science.

Although brief, this book of seven chapters (including introduction and postscript) is a handy, fair, and optimistic treatment of a difficult topic. It is part of the Latimer Series of Publications edited by the Theological Work Group of Latimer House, which provides biblical and Reformation theology literature for the Church of England and the Anglican Communion.

*Reviewed by Lazarus Walter Mactor, Professor of Biology, The University of Akron, Akron, OH 44325.*

**EVOLUTION: A Theory in Crisis** by Michael Denton. Bethesda, MD: Adler & Adler, 1986. 368 pages. Hardcover; $19.95.

Denton is a medical doctor and molecular biologist at Prince of Wales Hospital in New South Wales, Australia. Since 1985, when his book was originally published in England by Hutchinson Books, Denton's forceful critique of Darwinian macroevolutionary theory has steadily established itself as one of the most important (and controversial) works on evolution in this century.

One of the most cogent endorsements thus far comes from MIT Emeritus Professor Murray Eden. In a letter to Denton, he said the book "should be required reading for anyone who believes what he was taught in college about Darwinian evolution. It seems to me, you have demolished rather thoroughly the simplistic view of evolution taught nowadays in virtually all elementary biology courses." Even more perceptively, however, Eden adds, "For those who think that only Bishop Wilberforce and religious fundamentalists disagreed with Darwin in his day and the creationists in our own, your arguments should come as a shock. . . . "

Denton's central thesis is that while Darwin's microevolutionary theory is now well-supported by biological evidences, his "grand claim"—macroevolutionary development across the greater divisions of nature and common ancestry of all life—is utterly devoid of any empirical support. It is only the "priority of the paradigm" that buttresses the current domination of Darwinian macroevolution (parallel to the domination that the phlogiston theory of Ptolemaic astronomy once enjoyed). It is the ingrained paradigm that renders invisible the countless gross implausibilities or problems that the theory entails.

Denton, who has identified himself recently as an "agnostic," does not offer anything to take the place of the Darwinian paradigm. He merely points to other gaps in our current knowledge and offers a vague hope that some "unknown property or characteristic" of life might be discovered which would explain the development of life. Furthermore, Denton avoids any direct discussion of the plausibility of an intelligent cause, although his excellent chapter "The Puzzle of Perfection" presents a very sophisticated and tightly argued case for *intelligent design* at the molecular level of the biology of the cell.

Chapters 1–4 present a very careful historical review of the development of Darwin's thought and the factors that led to its rapid acceptance in spite of cogent arguments against it from naturalists such as Owen and Agassiz. Denton's critique begins in chapter 5, and surveys evidence from many fields that, taken together, argue overwhelmingly for life being a *discontinuous phenomenon* (as per classical typology of the pre-Darwinian naturalists), and not the continuous phenomenon that Darwinism requires. Separate chapters are found on homology, taxonomy, the fossil record, and an excellent one called "Bridging the Gaps" which explores the problem of "hypothetical reconstruction" of plausible intermediates.

The most provocative chapter is surely the one on molecular biology, called "A Biochemical Echo of Typology." Here Denton marshals an extensive body of evidence for a phenomenon he refers to as "equidistant isolation" of amino acid sequences in homologous proteins. The problems of harmonizing this pattern with Darwinian evolution are discussed lucidly, and the several molecular clock explanations are analyzed and found wanting.

The plausibility of mutations and natural selection producing genuine macroevolutionary transitions is helpfully analyzed in "Beyond the Reach of Chance." It is here that Denton attempts to deal with the claims of the punctuated equilibrium proponents by showing how remote the chances are for minor variations which afford "biologically coherent" intermediates, let alone macromutational origin of new genetic texts.

Response from the scholarly community has varied widely. French biologists, many of whom are intellectual heirs of the late Pierre Grassé, have enthusiastically responded to the French translation. British and American reviews by evolutionary scientists have been surprisingly positive, given the forcefulness of Denton's anti-Darwinian thrust, although a few have attempted to dismiss Denton as a religiously motivated "demolition expert" of Darwinian evolution. Niles Eldredge wonders aloud (*Quarterly Review of Biology*, Dec. 1986) if Denton represents a "case of parallel evolution towards 'secular creationism.' "

To summarize, Denton has argued persuasively—in a broad sweep of historical analysis and yet welcome richness of biological detail—that Darwinian macroevolution is indeed a theory deeply mired in intellectual crisis. He shows, without succumbing to polemical tones, why the Darwinian paradigm manages to retain its powerful grip on the scientific world. This reviewer found Denton's work to be an unprecedented intellectual and spiritual feast, displaying the awesome wonders of the "discontinuous phenomenon" that is life. Christians who are interested in the struggle of science to come to terms with the origin of the biosphere in all its variety should read this book and ponder its argumentation. The result, I submit, will not be greater heat but new and welcome light.

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**BIOETHICS (3rd ed.)** by Thomas A. Shannon (ed.). Mahwah, NJ: Paulist Press, 1987. 620 pages. Paperback; $14.95.

In a day of expensive books, this thick volume is a bargain indeed. The editor is Professor of Social Ethics at Worcester Polytechnic Institute and Visiting Associate Professor of Medical Ethics at the University of Massachusetts Medical Center. First published in 1976, the book has undergone continual changes and updatings. The third edition retains seven articles from the first edition, ten of the articles that were new in the second edition, and fifteen brand new articles for a total of thirty-two.

Every major area of ethical concern in bioethics is covered to some degree in this book: abortion, severely handicapped children, death and dying, research and human experimentation, ethical dilemmas in obtaining informed consent, genetic engineering, and the allocation of scarce resources. The approach taken is an ethical one with only occasional references to theological or biblical foundations. Nevertheless, the viewpoints are well thought out and presented, with differing opinions being represented by different authors writing on the same or similar topics.

"Instruction for Respect on Human Life in Its Origin and on the Dignity of Procreation; Replies to Certain Questions of the Day," by the Congregation for the Doctrine of the Faith, is included as a 30-page appendix. This appendix expresses the results of an official Catholic investigation of the issues. The general thrust of the appendix is markedly more "conservative" than any of the individual chapters in this book.

This collection of essays has far too many highlights to be mentioned in a brief review. As examples, however, let me cite just three.

In a chapter on abortion titled "Breaking Through the Stereotypes," by Sidney and Daniel Callahan, the authors start by confessing their own unresolved issues:

> Apart from some of the nastier reasons people impute to each other, just why is it that there are such profound differences about abortion? For at least twenty years now we have asked that question of each other, just as we have asked how our own differences and those of others might be reconciled. Ever since the topic of abortion became of interest to us, in the 1960's, we have disagreed. Well over half of our thirty years of marriage have been marked (though rarely marred) by an ongoing argument. For all of that period, one of us (Daniel) has taken a pro-choice position and the other (Sidney) a pro-life position (to use, somewhat reluctantly, the common labels). . . . Over the years, every argument, every statistic, every historical example cited in the literature has been discussed between us. . . . Yet we continue to disagree. How can that be? (p. 47)

Leon Kass provides an insightful chapter on " 'Making Babies' Revisited," providing one of the more conservative inputs to the volume and stating in his own arguments against the use of laboratory techniques involving *in vitro* fertilization and embryo implantation. Among his attention-getting ways of looking at things are the following:

> Once the genies let the babies into the bottle, it may be impossible to get them out again. (p. 470)

> One should not rush into potential folly to avoid being the last to commit it. (p. 472)

> We complain about rising medical costs, but we insist on the most spectacular and the most technological—and thereby the most costly—remedies. (p. 473)

Finally in a challenging chapter on "Harvesting the Dead," Williard Gaylin tackles the arguments for and against the possible widespread development of cadaver banks, bodies kept biologically alive after brain death. He concludes his evaluation with the words: "Sustaining life is an urgent argument for any measure, but not if that measure destroys those very qualities that make life worth sustaining."

Everyone concerned with the ethics of the wide range of issues covered in this book should at least know of the perspectives expressed by a variety of authors. The book deserves to be widely read and discussed in Christian groups.

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**COMMUNICATION BETWEEN MAN AND DOLPHIN** by John C. Lilly. New York: Harmony Books/Crown Publishers, 1987. 161 pages, appendices, bibliography, index. Paperback; $10.95.

John Lilly commenced working with bottle-nosed dolphins (*Tursiops truncatus*) in 1955. He once terminated that work only to resume it years later, both times on philosophical grounds. Lilly's unique vision is "to understand the thinking, the feeling, the doing, the talking of another species," an endeavor he describes as a "grand, noble achievement that will change man's view of himself and of his planet" (pp. 9–10). However, despite a dedication to success in interspecies relations, this book actually holds out little hope that we will substitute communication for depredation or cooperation for exploitation.

Lilly's basic premise, supported by his research as well as ancient tradition, is that cetaceans are actually more intelligent than *Homo sapiens*. Moreover, they are eager to communicate with us. The possibilities which would flow from the ability to talk with other species hold a provocative promise which goes beyond underlying sciences to reach out to every member of the human race.

The implicit potential for an enlarged perspective on the cosmos and its Creator is particularly intriguing to Christians,

especially those of a scientific persuasion. Only the most timid among us could fail to be drawn to the exploration of the mind of another of the Lord's creatures, one which the author asserts is every bit as complex as our own. Could this creature also be possessed of soul, of *spirit*?

Unfortunately, the author's antipathy toward religion precludes his inquiry in this direction. According to Lilly, religion is the source of anthropocentrism; which he despises, especially in approaching another intelligent life form. Thus, another question of interest to Christians—whether our relationship to cetacea lies outside our dominion over the creatures or represents a profound aspect of it—is one Lilly would denounce amidst the philosophical re-evaluation he espouses.

His position on cetacean intelligence is a startling concept to be sure, but one deserving of careful analysis and meaningful response. Unfortunately, this particular work falls far short of any promise dolphins may hold out for mankind. Having dissuaded Christian followers, Lilly proceeds to lose both the scientific and the lay readership.

So startling an apologia demands sharp thinking, precise arguments and more. It demands strong scientific, moral, and, yes, religious bases to be convincing. To be successful there must also be a receptive audience. Lilly's targeted audience includes a cross-section of scientists and laymen. Whether the reader is antagonized or thrilled by Lilly's passionate defense of dolphins as a truly unique species, initial response is ultimately deadened by the man's prose.

The overall tone is set by several forewords by the author and his associates. The text proceeds through a bewildering maze of natural history, anecdote, communication theory and hardware, comparative neurology, acoustics (physical and biophysical), law and public policy. Even "the ecology" is brought in; the term used variously for ecosystem, the environment, biota or the biosphere—depending on context. There is a substantial bibliography, primarily publications of the author and his colleagues, but a needed glossary is omitted.

Much of this material is repetitious, reprints of Lilly's earlier writings. Far more daunting, however, is the internal repetition. Lilly conveys little sense of progress and even less urgency. With no consistent point of view and a surprising lack of style, the prose is unworthy of Lilly's obvious dedication to the subject. Too much intellectual territory is covered with only superficial attention. In a book too speculative for a scientific audience, ponderous scientific jargon deters the lay reader. Out of this chaos the most empathetic reader emerges regretting the absence of tight editing—or the lack of another champion of communication with cetaceans.

For all the faults of this work, the author has something valuable to say. Only successful communication with dolphins, if truly possible, can refute or confirm his claims. Thus, it is essential that the thrust of Lilly's efforts be taken seriously, notwithstanding personal limitations suggested by his writing.

As a result of this work, readers may be prompted to follow how John Lilly, the individual, will grow in his personal philosophies. Is he prophetic or merely eccentric? To what extent will his reception within the scientific community and among the public at large affect our continuing relationship with cetacea, especially dolphins? That his call for a new ethic should fall on deaf ears would be a shame. Dolphins and mankind alike would be better served through investigators with fresh insights and varying approaches lending perspective to Lilly's work.

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**THE SOCIETY OF MIND** by Marvin Minsky. New York: Simon & Schuster, 1986. 339 pages, illustrated. $19.95.

Twelve years in the making! Learn how to build a mind from common household objects! Seriously, Marvin Minsky has for a number of years been thinking about how intelligence can come from nonintelligence, and in the middle 1970's he and Seymour Papert "tried together to write a book about societies of mind but abandoned the attempt when it became clear that the ideas were not mature enough" (p. 324). Minsky has finally completed the work under his name alone. His premise is that the mind is not as unitary as we often think, but is instead a community of "agents" sometimes working against each other and sometimes with each other, but constituting together the mind, the self, consciousness, and so on.

Since it has been estimated that computers today, as large and amazing as they are, are only about one four-millionth as powerful as the human brain and have only one four-millionth the "memory" of the brain, Minsky has tackled no mean task. Of course he is not trying to do neurophysiology or lay out plans for constructing an intelligent robot. Yet, because of his background in artificial intelligence research one might think this would be a technical manual about sophisticated computer learning systems or the like. It is instead nearer to philosophy than to computer science. Rather than detailed specifications, Minsky gives a broad conceptual picture of how he thinks it is possible to "build a mind from many little parts, each mindless by itself" (p. 17). He sees this as parallel to the dissolution of the mystery of life. Living things are found to be composed of smaller and smaller parts right down to chemicals, so "no longer does an educated person have to seek any special, vital force to animate each living thing" (p. 19). Similarly, the mind is decomposed to agents, none of which are intelligent or have consciousness or any of the other qualities of mind.

A child's mind, as he or she plays with blocks, is composed of a host of agents. The "play" agent is in control rather than the "sleep" or "eat" agent. The "play with blocks" agent is at present stronger than the "play with puppy" agent. And the "build" agent is dominant over the "wrecker" agent. The "build" agent is able to activate the "find," "get," and "put"

agents. The "get" agent can call on the "grasp" and "move" agents, and the "grasp" agent can control the hand's "open" and "close" agents, and so on.

For Minsky, there is no need for the concept of soul as the "essence of a self" (p. 41). "The value of a human self lies not in some small, precious core, but in its vast, constructed crust" (p. 41). The book itself is constructed from almost three hundred one-page sections. Its value lies in its vast, constructed crust—even if one believes it is wrong. Yet each section is also interesting, well written, and often quite insightful. Since one of the creeds of orthodox artificial intelligence is that there is nothing to the mind except brain and there is nothing to brain except "circuits," and since Minsky is such an important figure in the field, this book will be influential in future discussions of mind, brain, and cognitive science. It will affect the direction of research in artificial intelligence, and it will affect you as you ask: "What are humans that God is mindful of them?"

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**ECOLOGY AND RELIGION: Toward a New Christian Theology of Nature** by John Carmody. New York: Paulist Press, 1983. 185 pages. Paperback; $6.95.

*Ecology and Religion* was written from a Roman Catholic perspective by a professor of religion. He presents reasons why we should all be active environmentalists. Because many of these reasons are theological, he wants us to realize that our activities undertaken in defense of the environment are part of our duty to God.

Carmody begins with a description of pollution in a Brazilian industrial city. It illustrates not only the horror of pollution but also the greed of the industrialists and of foreign investors, who take the Brazilians' money and leave the pollution with them. This description is very well chosen because it shows the interrelatedness of ecological problems with economic and political factors.

Carmody then summarizes the science of ecology. As a trained ecologist, I find that his summary does not accurately reflect the kind of scientific research that ecologists do. He implies that ecology is the study of almost everything, including the noosphere (Teilhard de Chardin's imagined worldwide mental network). Ecologists, like other scientists, are narrow in their scientific research and certainly do not study noospheres. But the interrelatedness of all physical and social factors is certainly every bit as real as Carmody insists.

He then presents background information: on pollution problems; on technological issues (such as nuclear power and resource use); on ethical and religious issues. This last category includes such diverse issues as the disparity between rich and poor people, and the rights of women. He defends the idea that, since God is present in Nature just as Christ's body and blood are present in the Eucharist, Nature is holy to God and should not be treated as just raw materials. This section of the book contains much documentation.



Finally, Carmody develops a Christian theology of Nature and how humans should treat it. He begins by reminding us that the exploitation of Nature is sinful because it is an abuse of God's generosity, and because it is caused by the selfishness of our consumerist lifestyle. He then reviews the importance of the stewardship of the promised land in Israel's covenant with God. He defends the idea that Jesus is reconciling all of the natural world to Himself. Carmody recounts the unfortunate wall of division between God and His Creation that was erected in early Christian theology and persists in modern religious, economic, and scientific thinking.

Carmody undertakes the systematic development of his theology by stating that we are united with Nature in being the expression of God's exuberance; that the presence of God in the natural world must be discerned by faith; that all of Nature, as well as history, happens within the omnipresent God. He concludes that Nature has an independent right to exist. Not only for this reason but for the sake of posterity, which is endangered by our greedy destruction of Nature, "I have no right to luxuries whose general possession would bring nature to its knees" (p. 134). Therefore, churches should proclaim the necessity of a simple lifestyle. The limitation of population growth, so desperately needed for our survival, would result automatically from justice, because the citizens of all countries would feel secure, not feeling the need to produce large families. For these reasons, environmental problems cannot be separated from the concerns of social justice. He also concludes that nonviolence and a reconciliation between mankind and Nature are spiritual values in need of greater emphasis.

If a Christian is already convinced of these things, he will find much reinforcement in Carmody's book. But a skeptical reader may remain unconvinced, not because of faulty reasoning or facts but because of unclear writing. Carmody calls us to radical repentance and to battle, but "if the bugle gives an indistinct sound, who will get ready for battle?" (I Corinthians 14:8). The writing is frequently an undigested mixture of complexity and slang. The occasional passages of vivid language, intended to shock us into action (for instance, in referring to the "pirates of oil and real estate" as "minions of Beelzebub" and to polluters as "Bastards . . . spawn of stupidity and greed") seem foreign to the style of the rest of the book. I understood and appreciated most of the individual topics he addressed, but I could not follow the line of reasoning that connected them. Nevertheless, the ideas that make up this book, taken individually, are very insightful, informative, and well worth reading.

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**MAKING HIGHER EDUCATION CHRISTIAN** by Joel A. Carpenter and Kenneth W. Shipps (eds.). Grand Rapids: Christian University Press, 1987. 304 pages. Paperback; $16.95.

Scholarship is slow business. Evangelical scholarship has been slow and self-obstructed. This book describes the present state of Christian scholarship in a sequential, comprehensive collection of essays which address the roots, vision, and mission of evangelical colleges in America—and the scholarship which one might expect to accompany them. Most of the essays were first presented as papers at a conference sponsored by the Institute for the Study of American Evangelicals at the Billy Graham Center, Wheaton, Illinois, May 1985. The 21 contributors are mostly published academicians; at least two, Nieves and Van Leeuwen, are ASA members. Unlike some collections of essays, these deliver one broad, sweeping message.

Readers who are "committed to understanding the relationship of science to the Christian faith" (ASA brochure) will value this book. While the essays deal with Christian colleges, they also address the ebb and flow of Christian thinking in ways which will have import for others. Readers who prefer a succinct, direct explanation may find the book pedantic or verbose. And some unchallenged assumptions are worth pondering—for example, that scholarship is essential and influential upon the academic world.

With apologies, the essays provide a cursory review of the major trends and shifts in the university as an institution. Christian in its European origins, the university has periodically wrestled with secular curriculum, sometimes embracing it, sometimes separating from it. In America, Christian colleges were built upon a Puritan grounding until the American Revolution. Then they entered an Enlightenment-influenced era and flourished with the spiritual revivals of the first half of the 1800's. After the Civil War, a serious shift began: Christian rationalism was subdued with tides of idealism, utilitarianism, and professionalism. For the accelerating twentieth century, "The crying need of the day was for intellectual resources that could analyze scientific, industrial, and social phenomena in relationship to worldviews" (pp. 105–106), which was the Christian college's weakest area. Brereton credits Bible schools (institutes and colleges) with preserving evangelical thinking and influence into the twentieth century. When conservative Protestantism resurged after WW II, so did today's evangelical liberal arts colleges with increased emphasis upon "academics."

The crux of evangelical scholarship is well addressed by Hatch. Christian scholars face special challenges: balancing piety with reason, operating with biblical autonomy rather than with intellectual fashion, and avoiding the intellectual smugness which can damn us all. Most importantly, "Christian scholars will never speak with authority in the various disciplines of the liberal arts until their faith becomes as profoundly intellectual as the disciplines to which they are called" (p. 164). Perhaps a worthy conclusion to the whole book is: "Our danger has not been too much thinking, but not enough" (p. 169).

Another high point in the book is Van Leeuwen's essay. She had the rare privilege of an academic fellowship with other Christians to cultivate a biblical view of a given discipline. She was confronted with the insurmountable plurality of Christian scholarship. Even those faith-discipline integrationists who have made it to the high road are not necessarily on the same road: they will have to tolerate each others' incomplete points of view. The despair of serious disparity among Christian scholars can be overcome with considerable Christian and academic humility.

Every essay is eligible as someone's favorite. Wolterstorff proffers a provocative model for every teacher to teach with a vision of justice. Martin argues that Christian colleges should be a countervailing force to the status quo of secular status. Inspired by Billy Sunday, Frank offers a unique plea for integrity beyond scholarship. Nieves elucidates the common claim that Christianity is a white man's religion by examining minority student and faculty representation in Christian colleges. Marsden closes with an unpretentious proposal for recovering evangelical, advanced scholarship.

Some essays will seem weak links. They are not "even," reflecting variation in orientation and purpose as well as style. Additionally, the essays are not perfectly continuous, which leaves a few cognitive gaps. Readers may wish to read at selective speeds—skimming, perusing, and reading as preferred.

Nonetheless, this collection of essays reads with interconnectedness. In fact, many internal references to one another's essays or other writings illustrate cohesion and unity. A wide audience—Christians at both Christian and secular institutions, Christians who wonder whatever happened to Christian thinking, and nonevengelicals who wonder how evangelicals view their state of scholarship—should find this book informative if not stimulating reading.

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**PUTTING THE SOUL BACK IN PSYCHOLOGY** by John White. Downers Grove, IL: InterVarsity Press, 1987. 93 pages. Paperback; $4.95.

John White, a psychiatrist who has published widely on issues of psychology and faith (e.g., *Parents in Pain, Healing the Wounded*), has provided readers with a written edition of the Pascal Lectures he presented at Waterloo University. In addition to the lectures, chapters 1 and 4 in this short book, White has organized and expanded the discussion sessions

associated with his presentations and incorporated them as chapters 2 and 3.

As the title indicates, the objective of the book is to make a case for the necessity of religious content in psychological theory and practice. The author offers an indictment of psychology for avoiding religion, and critiques the humanistic religiosity that is often adopted by psychologists when the inevitability of religion becomes apparent. The opening chapter identifies the false assumptions White perceives as underlying humanistic psychology; i.e., its optimism, its overly generous sense of human nobility, and its naturalistic determinism. As a counterpoint, White sets forth his own assumptions concerning human beings.

White effectively demonstrates the nonreligious nature of much contemporary psychology. He also shows how Christians have borrowed too uncritically from "secular" psychology. They have "baptized it, personalized it, put a few verses of the New Testament over it and sort of reinterpreted it in biblical language, without changing its substance" (p. 67). This criticism is perhaps the most valuable aspect of the book, as Christians have too frequently assimilated various teachings and practices of the human potential movement in a search for "God-the-Superpsychologist" or "God-who-can-make-us-slim-and-beautiful" (p. 92).

While the book is clearly written and easy to read, it suffers from a lack of references to the extensive literature on the interface of psychology and theology. There are a total of 24 very brief citations, but few of them come from psychology. Consequently, the reader must accept or reject the case for religion in psychology based on the anecdotes, case studies, and faith statements of the author. Since biography and story now have a place of respect in psychology, the book's major value may be to stimulate others to work at the interface task. As such it may be a springboard for other Christian psychologists who wish to tackle the more difficult issues of building psychological theories based on Christian control beliefs (a challenge very cogently set forth by Nicholas Wolterstorff in *Reason Within the Bounds of Religion*).

ASA members, lay persons in the church and undergraduate students may benefit from the book if it is understood as one individual's personal pilgrimage as a psychiatrist. The reader interested in more extensive, well-documented treatments of these issues will need to go to the work of such writers as Mary Stewart Van Leeuwen, Gary Collins, David Myers, or John Carter.

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**THE VERY PRIVATE MATTER OF ANOREXIA NERVOSA** by Shanon Christian. Grand Rapids, MI: Zondervan, 1986. 153 pages. Paperback; $6.95.

Shanon Christian, wife of singer Chris Christian, gives a personal account of her struggle with anorexia in this book. She includes her interactions with Pat Boone's daughter, Cherry Boone O'Neill, who also has suffered with the horror of this problem and who also is closely linked to the music industry. Cherry wrote a somewhat similar account a few years ago titled *Starving for Attention*.

Two themes are included that are of clinical significance—the need to control the self taken to the extreme of overcontrol through compulsive dieting and drastic weight loss, and secondly the desire to be a little girl with the attendant fear of becoming a woman.

I must admit to being torn in two directions by the book. The publishers clearly had an eye for sales to the fans of Chris Christian; yet one wonders if better accounts of the problem would be provided by non-superstars. But even if such accounts were written, they probably wouldn't sell because of lack of name recognition.

All in all, the book is interesting reading (particularly for Chris Christian fans). Counselors might even use it as a supplement for counseling anorexics, although the characteristics of this single case may differ to some extent from others suffering from the disorder.

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

**GOOD NEWS FOR THE CHEMICALLY DEPENDENT** by Jeffrey VanVonderen. Nashville: Thomas Nelson Publishers, 1985. 180 pages. Paperback; $6.95.

VanVonderen is a recovered alcoholic who is now the director of a licensed chemical dependency treatment center in Minnesota. He offers here a practical, helpful book on the subject of chemical dependency.

While this book could have been greatly strengthened by more use of professional literature on the subject, VanVonderen's book is an interesting overview of the ideas and concepts that have helped him in his work. The focus is upon alcoholism, but it is useful for other forms of chemical dependence as well. Dependency is seen as a disease, rather than as merely a behavior or conversely as just sin. Thus, the needs of the dependent person are central to the counselor's concern.

Topics of the chapters include a description of the process by which people become chemically dependent, the influence of dependency upon family members, and the shame involved in dependency. About half of the book concentrates upon the solutions found useful in treating chemical dependency.

A highlight of the book are the many helpful diagrams included. These help to explain and outline the content quite well. While this book certainly needs to be supplemented

with more systematically researched findings, it will serve as a helpful collection of ideas that emphasize a distinctively Christian perspective.

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**THE LIBERATION OF LIFE** by Charles Birch and John B. Cobb. New York: Cambridge University Press, 1981. 353 pages. Paperback; $17.95.

This book, written by an experienced biologist and a distinguished process theologian, is about almost everything. Usually a book that is about everything suffers either from being superficial or incorrect about its individual topics or from becoming disjointed into individually correct items. Birch and Cobb, however, have identified underlying themes which allow even brief treatments of topics to not be shallow or disconnected.

The underlying theme is that living beings need to be liberated from being thought of as "objects to be manipulated rather than subjects that experience" (p. 1). Many or most of our world political problems arise from the treatment of people as objects, and our understanding of biology is restricted if we understand organisms as mere objects. Birch and Cobb call their approach "the ecological model" because it does not extract living beings from their environments. They apply this concept to many situations: in the "struggle for human freedom . . . against political oppressors; in the struggle for the rights of non-human life against its exploiters . . . in the struggle for economic justice and . . . ecological sustainability . . . " (p. 296).

This is not actually a Christian book. The authors state that they are presenting values that they understand to be Christian (p. 8), and they sprinkle the book with biblical allusions. Some of the allusions, however, (such as connecting "All flesh is grass" with photosynthesis, and "Many are called but few are chosen" with natural selection) are out of context. The authors admit they are not presenting biblical Christianity: "The reflections on life in [these] chapters lead to a new view of how things really are . . . a new religion . . . " (p. 176).

However, their new religion is not completely unchristian either. They say that God is Life, and they describe Life (as distinguished from "life") as a universal urging toward integration and experience. These urgings are most highly developed in living beings, in humans, and especially in religious humans. Life overcomes entropy, God overcomes evil: these are the same thing. At first this sounds like mystic pantheism. Birch and Cobb, however, believe in a Personal Deity rather than an Impersonal Force. They insist that the life-giving principle must itself be alive. God must therefore, like the biblical God, actively participate in the history of the earth and man, "even becoming human" (p. 200).

Their approach is not primarily a religious one, however. They have attempted to formulate a new religion yet remain completely within a materialistic, evolutionary framework. I am not satisfied with their attempt to synthesize evolution with their new religion. They are, I believe, ambivalent.

The universal urging toward greater richness of experience is seen, the authors believe, both in evolution and in the activities of individuals. This purposiveness comes from God. Therefore God is not a Designer, but One who urges life onward. Not only is life purposive, they claim, but it cannot be understood in mechanistic terms because the mechanistic model does not allow the behavior of organisms to be understood in an ecological context. Even the behavior of DNA molecules depends on their environmental conditions, including the activity of other DNA molecules. "Molecular biology is ecology at the molecular level" (p. 21). If I have understood them correctly, the authors maintain that machines do not respond to the environment. I suspect that the authors have misrepresented the mechanistic views of scientists such as Monod. ASA readers, looking for an answer to materialism, may find help but no clear solution in this book.

Despite their rejection of mechanistic thinking, the authors are not suggesting that evolution is influenced by anything outside the network of physical causation. Even the mind of man is the product only of the brain, they believe. Here is their ambivalence: if life is purposive, and this purposiveness is the action of God, how can it be nothing but the product of physical forces? Can they have both religion and a thoroughgoing naturalism?

If evolution is purposive, Birch and Cobb claim, it should give rise to altruism, "an all-embracing love for everybody and everything . . . an impulse to do some good in the world . . . " (p. 107). They present compassion, forgiveness, and pity as the supreme manifestations of Life. They ar ignoring the fact that natural selection cannot produce such behavior. When evolutionary biologists write about altruism, they refer to behavior which helps another individual but which also indirectly benefits the altruistic individual. No evolutionary biologist has explained how natural selection can lead to a desire to love and serve all mankind selflessly. The authors wish to defend lofty humanitarian ideals of the God of Love, but they also want to stay within the cause-and-effect framework of natural selection. Similarly, they want to stay within this framework yet also believe that humans have true free moral agency, that our choices are caused neither by genes nor by environment. In this way, humans differ from animals. Animal behavior is governed, they say, by pleasure. (Therefore, though the authors do not state this, all animals are truly "party animals.") Humans, however, can choose to limit pleasures through internally-imposed self-discipline. But the authors can't have it both ways! Which is it: materialism or free moral agency? They deny having to make the choice.

I admire the way the authors bravely worked from their basic principles to the political consequences. For instance, they reject capitalism because it concentrates money and power in the hands of the few, and they reject the depersonalization found in socialism and communism. Their political discussions are among the best parts of the book. Each of the subjects the authors touch upon—pollution, agricultural

problems, economic disparities, *etc.*—are well documented and are very worthwhile reading, even apart from the authors' main argument. The shortcomings of the book are disappointing mainly because they stand in contrast with so much of it that is of very fine quality.

*Reviewed by Stanley Rice, Department of Biology, The King's College, Briarcliff Manor, NY 10510.*

**THE PAGAN TEMPTATION** by Thomas Molnar. Grand Rapids, MI: Eerdmans, 1987. 201 pages, author index. Paperback; $11.95.

The evangelical press has been flooded by works decrying modern Christianity because of perceived deficiencies and corruption. Popular exposés range from denunciations of liberalism, such as Howard Lindsell's *The Battle for the Bible*, to accusations that Christianity has been penetrated by alien ideas, such as David Hunt's *The Seduction of Christianity*, to exposures of cults, such as Walter Martin's *The Kingdom of the Cults*. Here is a different kind of book, one providing a theological and philosophical framework for a unified understanding of all the doctrines threatening the very existence of Christianity today.

Thomas Molnar, presently Visiting Professor of Philosophy at Yale University, is an internationally recognized Catholic philosopher with a long list of books dealing with the intellectual, spiritual, and political aspects of the Western world. In *The Pagan Temptation* he draws on this rich background to contrast the transcendent, personal God: a linear purposive view of history; a moral view of good and evil; the creative interaction between spiritual and material of Christianity to the imminent, impersonal deity; cyclical, purposeless non-history; and the rigid separation between spiritual ("good") and the material ("evil") creation of paganism. Molnar carefully considers the contribution of Oriental thought to Western philosophy and theology from the time of Plato to the present day. The rise of Christianity created a desacralization of the pagan world with devastating effect on its intellectual and cultural milieu. In turn, the breakdown of Christianity's creative tension between reason and faith resulted in the loss of belief in the supernatural, which allowed the revival of paganism to begin in earnest and began the gradual desacralization of Christianity. As a consequence, two movements have gained strength in the Western world: neopaganism, emphasizing reason; and new occult, emphasizing the spiritual.

While this book was obviously written for those who are quite familiar with philosophy, those with some background in Western thought can understand and profit greatly from it. However, their task would have been easier if a chronology of philosophers and attendant intellectual history had been appended. Similarly, a subject index would have greatly facilitated flipping back and forth to tie the various elements of the discussion together. The author index, while obviously useful, is most helpful to those who are reading about old friends and enemies.

By their very nature, analyses such as this are messy, but this one could have been made clearer. For instance, "myth" is a term with as many meanings as there are scholars who use it, yet Molnar never does get around to defining myth and how, of if, he applies it to Christianity—even though the concept is crucial to his argument.

In his discussion of Greek thought, Molnar emphasized that he was dealing the philosophical thought of the "elite" and not that of the mass culture. While this is a valid approach, the book would have been much more valuable if he had devoted a chapter to discussing how the rise of neopaganism and new occult among the intellectuals in the past few hundred years has affected the mass culture of today. I would be very surprised if a multitude of people holding views coincidental to these neopagan and new occult views realize the philosophical structure explicated by Molnar in this book. We need a sequel to this book, elaborating and elucidating points of the first book and, more importantly, laying down a plan of action for recovery.

These criticisms, however, should not be allowed to detract from the very significant contribution this book can make to our reflections. The essential natures of paganism and Christianity are delineated and contrasted quite well. We now have a theoretical basis for understanding many, or all, of the cults and aberrations today. The systematic and theoretical consistency of pagan thought from antiquity to the present day is made clear, and the history and extent of its infiltration and virtual conquest of segments of Christianity are carefully traced.

Molnar's historical analysis of the tendency of Christianity to drift into either a cold rationalism or a reasonless faith can easily be applied to contemporary Christianity. His warning that the loss of symbol and belief in the supernatural leads to the triumph of the rationalism of neopaganism or to a reactive adoption of the new occult can also be tested in today's Christian scene. This is a book that needs to be read and pondered deeply by those in intellectual leadership of the Body of Christ.

*Reviewed by Eugene O. Bowser, Technical Services Librarian, The University of Northern Colorado, Greeley, CO 80639.*

**PHILOSOPHY AND MIRACLE: The Contemporary Debate** by David and Randall Basinger. Lewiston: The Edwin Mellen Press, 1986. 124 pages, index. Hardcover.

*Philosophy and Miracle* is the second volume of the Problems in Contemporary Philosophy series. The preface acknowledges that the book is the result of fifteen years of dialogue, which also produced two doctoral dissertations and one master's thesis. The book still retains the flavor of this origin. At times the discussion is brilliant and insightful, while at other times it becomes obtuse and argumentative. The language used makes the book readable by lay people, even if they miss some of the logical subtleties which give the book its depth.

The book is divided into five chapters: What is a Miracle?; Can History Rule Out the Miraculous?; Can Science Identify the Miraculous?; Can We Know That an Event Has Been Caused by God?; and, Should Theists Expect Miraculous Divine Intervention? Each chapter contains an excellent conclusion, along with notes and a selected bibliography.

The book begins with an attempt to rigorously define a miracle. The common usage of miracle as meaning some pleasant, though unexpected, event was developed into "a permanently inexplicable event directly caused by God." A second category was allowed for coincidental events, coordinated by God, to produce a normally unexpected result. Unfortunately, the attempt to define "permanently inexplicable" degenerated into a subtle argument concerning the definition of "natural laws." It was never explained why all of God's actions must be eternally incomprehensible to His children.

The authors provide a very balanced discussion of the conflicting viewpoints of natural versus supernatural when interpreting human events. The discussion itself becomes an example of the difficulties resulting from the attempts of science (which by definition deals only with the natural) to understand and explain God (who supersedes the natural). The necessarily ambiguous handling of this problem is eventually clarified with an insightful conclusion.

"Can we know that an event has been caused by God?" is, in this reviewer's mind, the crucial question controlling our understanding of miracles. The major disappointment of this book was the inability of the authors to present any self-consistent method for determining the presence or absence of the Hand of God in any observed event. This unanswered question is the major fault of this book.

The last chapter helps balance out the shortcomings of the book. Many important questions are asked and discussed, including good versus evil, God's omnipotence, natural order versus miraculous disorder, and human free will. There are no easy answers to these questions, but their significance has a great impact on the philosophy of miracles. More effort should have been devoted to developing these topics.

Overall, this book was disappointing. Too much time was spent arguing about trivial definitions, while thought provoking questions were only mentioned in passing. A little more miracle, and a little less philosophy, would be an improvement.

*Reviewed by Thomas N. Teichrieb, Orange, CA 92667.*

**COSMIC UNDERSTANDING** by Milton K. Munitz. Princeton, NJ: Princeton University Press, 1987. 282 pages, index. Hardcover; $25.00.

A veteran of the cosmic wars, Professor Munitz argues that, in order for human consciousness and the nature of the universe to be related appropriately, we may not construe the objective reality of the cosmos in the same sense that we may consider any or all of its parts; a point which, I believe, is a very important one for scientific culture. We need, claims our renowned author, to breathe the transcendent air of the boundless existence of the world if we are going to be able to give meaning to it. This means we must take seriously both the Anthropic Principle laid bare by modern cosmologists as well as the teleologic dimension of that whole which we in the universe form. The cosmic horizons must be explicated while appreciating as deeply as we can the implicate orders by which the phenomenal levels of reality may be explained. With all of this, I believe, the Christian theologian must be in agreement.

But there are dangers here, and we cannot ignore them. The Kantianism in Munitz's concept of "transcendent air" reveals our author as naive when it comes to Christian dogma, which claims to hear in these open realms the very Word of God. I think this allows for a very superficial presentation of the way we understand that God has related Himself to the creation. Does not the work of Karl Barth grasp more dynamically the problems of the subject/object relation inherent to our contemplations than Anaximander? Have we really not been able to penetrate more profoundly the curiously familiar concepts of Greek science? Are we not able to free ourselves from the static relations and abstract formalizations which mark the way that dead-end philosophy attempted to related human thought to physical and eternal realities? Must we continue out into the vast horizons of the cosmos with only the silence as our companion?

I believe Professor Munitz needs to take far more seriously the concept of the contingent rationality of created reality implied by the doctrine of Creation *ex nihilo* if he is to help us transcend appropriately the necessity/chance dualism at the heart of his thought. However, Christian theologians and scientists can certainly benefit from his sensitivity to the significance of the subject/object relation in their efforts to understand the world where we have been given our being.

*Reviewed by John McKenna, Fuller Theological Seminary, Pasadena, CA 91101.*

**IS THE NEW TESTAMENT HISTORY?** by Paul Barnett. Ann Arbor, MI: Servant Publications, 1986. 173 pages. Paperback.

Is the New Testament history? "This book is written from the conviction that there is a sound historical basis to the New Testament," explains Barnett. His opinion is supported by an array of evidence presented in 14 chapters. Barnett presents his material in answer to such questions as: "Did Jesus really exist?", "What did Jesus' contemporaries say about him?", and "Did Jesus really perform miracles?"

The foreword, written by New Testament scholar F.F. Bruce, characterizes Barnett as a well-qualified historian who

knows how to deal with evidence. Indeed, Barnett is a lecturer in New Testament history at Macquarie University in Sydney, Australia, where he is Master of Robert Menzies College.

Barnett shows that, even without the New Testament, there is substantial evidence to indicate that Jesus was a historical character who lived in the first century. He also argues that the transmission of information found in the gospels is trustworthy, including the miracles of Jesus. Barnett favors a date of 7 or 6 B.C. for the birth of Jesus. He thinks the 7 B.C. date is confirmed by the appearance of the star of Bethlehem resulting from the conjoining of Mars, Jupiter, and Saturn. While there are a few problems with Luke's accounts found in his gospel and Acts, Barnett thinks there is an abundance of evidence to indicate that Luke was an accurate historian.

This book is concise, readable, stimulating and reassuring. It demonstrates that the Christian faith is based on history rather than myth. Seekers will find it informative, and Christians will find it edifying. Members of the scientific community will find it a model of good writing and careful research.

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

**THE BIBLE WITHOUT THEOLOGY** by Robert A. Oden, Jr. San Francisco: Harper & Row, 1987. 193 pages, index. Hardcover; $18.95.

This five-chapter book by a professor of Religion (Chairman of the Department) at Dartmouth College is one of a series from New Voices in Biblical Studies. It consists of five independent essays. Its only unity is found in the critical stance of the author to the traditional view of the Bible (by which he means only the Hebrew Old Testament) as the Word of God. He proposes a clear set of alternatives—"a thoroughly comparative and anthropological approach"—more in keeping with analytical methods employed elsewhere in the modern university. He speaks of the scientific method, which he fails to define. He deplores "the coldly rational fashion of the natural scientist." He does not appreciate the difference between the applicability of the scientific method to physical phenomena and to social phenomena. He fails to define literary criticism, history, and religion.

The first two essays are critical and historical summaries of broad areas within biblical study. "Historical understanding and understanding the Religion of Israel" is the first chapter. It deals primarily with "The German Tradition of Historical Understanding" (Von Humboldt, Von Rampe, and Droysen). In the light of comparative religions, the author sees no uniqueness for Judaism. He regards "historical criticism [as] the approved method of Biblical interpretation." He finds no need for a Creator in viewing His creation.

The second essay (about one-third of the book) discusses in detail "Interpreting Biblical Myths," which he finds in both the Old and New Testaments but particularly in the primeval history (Genesis 1–11). The author reviews various attempts made to define a myth (Grimm, Gunnpel, Bultmann, Fraser, Malinowski, Cliade, and Fontenrose). He concludes that there is apparently general agreement that a myth is a traditional story with characters other than human (e.g., a god). He claims that myths are primitive science; they seek to explain. He discusses, for instance, the intellectualist theory of Tylor, the myth-ritual view of Smith, "mythopolic" thought, social contest theory, psychological unconscious theory, or Levi-Strauss' structural analysis. Despite evident flaws in all these, the author himself prefers the last, which he applies to several so-called myths in Genesis.

"Grace or Status? Jehovah's Clothing of the First Humans" (Genesis 3:21) is the first controversial study discussed. Traditionally this act is regarded as evidence of God's graciousness; in covering their shame, the Creator becomes Preserver. The author, however, prefers to look upon the clothing as a status symbol, comparing the act to similar uses by neighbors in the stories of Gilgamesh and Adopa.

"The Patriarchal Narratives as Myth: The Case of Jacob" (Genesis 25:10–35;20) is concerned about the kinship and lineage used to define Israel (e.g., why not Abraham or Isaac? Why all the sons of Jacob?). Why insist that the very lack of an explanation is itself an explanation? The author devotes considerable attention to the avuncular relationship and the cross-cousin marriage in the Jacob story as being paramount to God's selection of Israel.

The last essay deals with "Religious Identity and the Sacred Prostitution Accusation" (Israel's blaming its neighbors while maintaining its own innocence). There is little evidence for this effect (cf., a similar occurrence in the case of cannibalism). The author reviews sacred prostitution according to classical and patristic writers. He finds no evidence of this in Mesopotamia, and concludes that Israel's vaunted morality in this regard was largely self-assumed.

An "Epilogue: The Persistence of Theology in Biblical Study" is essentially an argument that the Hebrew Bible should be treated like other so-called sacred writings; it has no religiously distinctive virtues. In a "Thoroughly comparative and anthropological approach"—it is an alternative to the theological tradition.

It is noteworthy that the author carefully conceals his own personal religious viewpoint, if he even professes one. A reader might suspect agnosticism stemming from his Harvard doctoral training in Near Eastern studies.

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

**THE NEW TESTAMENT WORLD IN PICTURES** by William H. Stephens. Nashville: Broadman Press, 1987. 420 pages. Hardcover.

For ten years, the author of this book served as editor of *Biblical Illustrator*, a Bible background and archaeology magazine. While he was editor, Stephens was granted a three-month study leave during which he visited archaeological sites and museums throughout the Mediterranean region and Europe. With his wife, he took notes and photographs which have now been transformed into this magnificent volume.

Stephens has divided the contents into nine major areas: emperors, the military, the people, the city, business, professions and trades, religion, leisure time, and home and hearth. Each area is profusely illustrated with pictures which, with the exception of a few in the religion section, are in black and white. Each area is introduced by a few words of instruction. Each photo is identified along with the location of the site or artifact upon which the photo is based. Thus, this would be a handy guide to have along on a foreign trip. The traveler would, for example, be aware that a portrait bust of Gaius Julius Caesar could be viewed in the Staatliche Museum in Berlin.

The photos included in this book were selected for their importance to New Testament backgrounds. A large percentage of them are based on materials from the first century. Most of them come from the Greco-Roman world, which was the world of Jesus and the early church. Scripture and subject indices aid in locating specific items.

The goal of the author was to produce a book which would stimulate interest in New Testament backgrounds. According to Stephens, the interest to date has not resulted in a field of study known as New Testament archaeology. The information in this field is a gathering of information from other disciplines. Biblical archaeology has hitherto focused on the Old Testament. Stephens thinks attention needs to be directed at the wealth of information waiting to be discovered at such unexplored New Testament sites as Colossae, Derbe, Troas, Antioch of Pisidia, and Patmos. He recommends that some seminary or university take on the task of New Testament archaeology by identifying sites, scheduling excavations, negotiating permissions, and raising funds.

This book will be a delight to a lot of people. It is a compendium of interesting information which will be welcomed by pastors, scholars, teachers and students of New Testament backgrounds. The spade of the archaeologist continues to uncover sites and artifacts which illuminate the New Testament. While none of the information in this book is new, it is distilled in one volume in a format which makes it readily accessible. The text does not overwhelm the photos. This makes an ideal volume for those who desire to see the New Testament world in pictures rather than just read about in words.

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

**MEGATRUTH: The Church in the Age of Information** by David McKenna. San Bernardino, CA: Here's Life Publishers, 1986. 210 pages. Hardcover; $12.95.

John Naisbitt has written the best-seller of the 1980's, a book titled *Megatrends*, which traces the major trends of the last few years and projects similar trends for the near future. David McKenna, Christian educator and Asbury Seminary president, has now reflected upon those trends, reacted to some of Naisbitt's assumptions, applied aspects of the trends to church life, and added his own conclusions about the future of Christianity in his book, *Megatruth*.

This is a great book, a fact perhaps too easily overlooked because of its strong identification with Naisbitt's work. Clearly, *Megatrends* is the central organizing factor in McKenna's book, but the author is doing far more than just reacting and responding to the best-seller. A wide variety of topics are considered and integrated within a consistent Christian world view.

In one respect, the book is a surprise. The publisher is an arm of Campus Crusade and Bill Bright's ministry, who not long ago chastised Tony Campolo for some of his views. McKenna has much in common with Campolo at a number of points—though not those that got Campolo into trouble—and McKenna even criticizes some "heresy tests" (p. 28), perhaps as an allusion to the Campolo situation. Not only are some of McKenna's conclusions similar to those of Campolo, but one also gets the impression that McKenna is trying out some ideas on us; "testing the waters" as it may be, as Campolo did in his book, *A Reasonable Faith*—the book that got him into trouble with Bright.

While I would not buy every point McKenna makes, he contributes much to our understanding of where the Church is at a crossroads. McKenna reminds me of Francis Schaeffer in his ability to tie many trends and divergent areas of life together, although his topics and analysis are quite different (he takes Schaeffer to task at one point on page 59).

Focuses of the book are social, organizational, psychological, sociological, and philosophical. He is not afraid to borrow concepts from unlikely sources, such as the McDonalds restaurant model of organization as being appropriate for the church. His writing is scholarly enough to be used in college classes as a supplement (perhaps for a sociology class), but readable enough for use in a Sunday school class as well.

The strongest criticism I can make is the lack of an index. For example, I would like to look at all of his thoughts about education at one time, but this is a major task without an index. I also hope McKenna will consider doing a book in reaction to *The Closing of the American Mind*. His many years in Christian higher education would make him a natural for such a task, and his few comments on the subject in *Megatruth* indicate that he has much to share on the subject.

I now have four recent books on major trends and the church: *The Search for America's Faith* by George Gallup and David Poling, *Vital Signs* by George Barna and William

McKay, *Foresight* by Howard Snyder and Daniel Runyon, and now *Megatruth* by David McKenna. Each is a significant contribution, and the last is at least equal to the other three. It's a must reading for any thinking Christian.

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

## COMPUTERS AND THE BEAST OF REVELATION

by David Webber and Noah Hutchings. Shreveport: Huntington House, 1986. 151 pages. $6.95.

Webber and Hutchings' book is to my knowledge the only book devoted exclusively to computers in the context of biblical prophecies. Interestingly, the discussion of the computer role in the events to come is merely alluded to in the vast majority of these books. It may seem strange, since computers are the leading force in contemporary technology and some biblical prophecies may remain unexplained if computers are not taken into consideration. For this reason, this book should be more than welcome. The authors concentrate on one subject: the beast of Revelation. How is it possible for the Antichrist to exercise a power as espoused in the Bible? How can one man have control over nations; a control that exceeds the dreams of Napoleon and Stalin? The authors' thesis is: it is possible by using computerized technology. They don't say that the mere existence of electronic machines guarantees fulfillment of the prophecies. But they may repeat after Nils Nilsson that the computer can "greatly increase the forces of both good and evil."

Very often we read idyllic visions of tomorrow's world, when people are freed from mundane tasks and occupy themselves with art and science. Mankind is to have victory over illness, hunger, illiteracy and the like. Peace and freedom are to reign. Then it may cross man's mind that the supernatural is missing; thus, humans create God. "It may be," says Arthur C. Clarke, "that our role on this planet is not to worship God—but to create Him. And then our work will be done."

What an excellent tool in the hands of the Antichrist computers could be! Centralized data banks with high-speed machines give immediate access to all information. The machines' capacities grow on almost day-by-day basis. The authors mention, for instance, the famous Cray-2's speed of 1.2 billion operations per second, which is 40,000 times faster than that of a personal computer (p. 32).

Another change can be observed in banking and financial operations. In the past, gold was a universally understood exchange medium. After Marco Polo brought paper money from China, his sponsors burned it to demonstrate its worthlessness. It seems that soon this operation could be repeated. According to the authors, we are heading toward a cashless society, where gold will be replaced by electronic exchange. Thus, we hear about the Society for Worldwide Interbank Financial Telecommunications, Electronic Funds Transfer, Special Drawing Rights, and credit cards. The latter are getting more and more efficient, so that debit cards allow payments to take place instantly (p. 108). "By using three six-digital units—states *San Jose Mercury* in 1975—the entire world could be assigned a working number—an international mark that would do away with all currency and coin. Instead, credit notes could be exchanged through a world bank clearing center. No member could buy or sell without having a digital mark. One man could have at his fingertips the number of any man on earth" (pp. 128–9). But such a credit card can still be lost, stolen or forged. Thus, another idea is to make it a part of the human body, so that virtually nothing can happen to it. One way would be to plant under the skin a chip that would contain information necessary for performing some financial operations. And, in fact, some experiments have been conducted in Sweden, Japan and Dominique (p. 93).

The very interesting thing is that the foregoing couldn't have been seriously discussed even 30 years ago. No other human invention has progressed at such an impressive pace. Someone said that if an automobile business had developed like the computer business, a Rolls-Royce would now cost $2.75 and run 3 million miles on a gallon of gas.

What level of development can be reached by computers? Can we expect them to think, reason, act autonomously, create, have emotions? No one would ask such a question about a bike or refrigerator, but distinguished authorities discuss it when speaking about computers. Computers have no soul, but they are constructed to imitate some human functions, sometimes so perfectly that, for example, some users prefer being interviewed by a machine rather than by a doctor (p. 120). Machines can be programmed to talk (some Coke machines have a built-in chip with a voice thanking the customer), to recognize voices, or to serve as a sexual partner (pp. 124–5). The realization of the talking and moving image of the beast from Revelation 13 is within reach. It's going to be "an ultimate computer with infinite optical and memory capabilities" (pp. 66, 117).

These facts indicate, according to the authors, that fulfillment of all prophecies is only a step away from us. Computers are a leading technological factor in this fulfillment, and the authors meticulously document it. This documentation would be more trustworthy if the authors didn't confine themselves mainly to newspapers and popular magazines, but it is impressive nevertheless.

*Reviewed by Adam Drozdek, Professor of Computer Science, Duquesne University, Pittsburgh, PA 15282.*

## THE UNIVERSAL MACHINE: Confessions of a Technological Optimist

by Pamela McCorduck. New York: Harvest/Harcourt Brace Jovanovich, 1985. 305 pages, index. Paperback; $7.95.

Early in this book Pamela McCorduck describes the lasting impression made upon her by C.P. Snow during her senior

year at Berkeley. As a distinguished visitor in her English department, Snow embodied the idea that "science, and even technology, are respectable, and respectable people can talk seriously about them without falling from the grace of the Western Culture." She discovered that she enjoyed scientists (particularly those involved with computers) more than literary types, because they "are not only cheerful and hopeful about the future, but they love the present and are deeply engaged in it." This has continued to be a lifelong involvement evidenced by her marriage to Joseph Traub, Edwin Howard Armstrong Professor of Computer Science and Professor of Mathematics at Columbia University. The description on the book cover suggests that she has bridged the gap between C.P. Snow's *Two Cultures*, arguing for "the computer as the most civilizing and human machine invented."

The book is divided into four parts as follows: Part I, "Transition" (from written word to printed word to transmutation of text to the computer); Part 2, "The Machine of the Century" (a discussion of various kinds of computers, artificial intelligence and computer art); Part 3, "The Vernacular Computer" (applications of the computer from medicine to war and reconciliation to literacy and computing in the Third World); Part 4, "The New Humanities" (the future of computing and information science).

As the title implies, the author is a technological optimist. She believes the technological fix can provide hope, even for catastrophic human problems. I found the book interesting, well written and particularly informative in the areas of artificial intelligence and historical perspective of computer art. For example, I was not aware of fifth generation Japanese machines that could make the power of expert systems technology available to almost anyone.

This book should be of interest to all who are not well-versed in computer science. I did find very little in this book which could be considered an integration of a Christian perspective with computer science. The following quotation might be suggestive: "In the end, I think our salvation as a species lies in self-help; by introducing knowledge and its rational use not only at the microlevel but also at the macrolevel and learning to see the connection" (p. 104).

With the rapid changes in computer technology, some of the material in this book may be dated with its 1985 publication date. However, for anyone like myself who is not up on artificial intelligence and machines that can reason, this book will certainly be interesting reading. I enjoyed *The Universal Machine*, and I think you will too.

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

**THE CASE FOR ANIMAL EXPERIMENTATION: An Evolutionary and Ethical Perspective** by Michael Allen Fox. Berkeley: University of California Press, 1986. 262 pages, index. Hardcover.

Michael Fox is a professor of philosophy at Queens University in Kingston, Ontario, and his objective in writing this book was to defend the use of animals for human purposes, particularly in scientific research. Two concerns motivated his writing. One is the resurgence of antivivisectionists in "animal welfare" societies who present a distorted and one-sided view of animal welfare issues; focusing on animal suffering while ignoring intensive efforts to improve the welfare of animals. The second concern was his belief that "much of the attention and energy committed to improving the lot of animals would be put to better use ameliorating human need and suffering" (p. 4). He attempts to carry out his defense of experimental use of animals in the light of a careful review of evolutionary findings, a critical consideration of our ethical views as they pertain to animals, an examination of past and current research activity, and an examination of the possible alternatives to animal experimentation. Fox attempts to develop ethical criteria for animal use based on an evolutionary non-theistic perspective.

This book has a clearly focused argument, and the writing is easy to read and understand. Fox begins by analyzing some of the fallacies in our thinking about animals and points out how often irrational, emotional, and sentimental ideas influence our thinking about animal welfare. He goes on the argue for the uniqueness of *Homo sapiens* and suggests that although humans are not totally unique, we are still different from all other animals in significant respects, including brain development, mental abilities, tool use, language, and most importantly in our autonomy. He argues that humans are autonomous beings; that is, we are critically self-aware and have "the capacity to manipulate concepts in complex ways, use a sophisticated language, reflect, plan, deliberate, choose, and accept responsibility for acting" (p. 45).

Fox develops his ethical perspective in terms of a moral community "whose members are or consider themselves to be bound to observe certain rules of conduct in relation to one another because of their mutual likeness" (p. 49). He argues that since animals lie outside this moral community they have neither rights or obligations within it. He suggests that only beings capable of meeting obligations have rights. Since animals cannot meet or even understand obligations, they cannot have rights as we ascribe them to humans. Fox takes particular pains to develop an argument which assigns "rights" only to beings who are autonomous and capable of functioning as rational moral agents. He attempts to avoid assigning special status to *Homo sapiens* as a species and to assign "rights" based only on observable differences between some beings and others. His objective is to avoid the charge of being a "speciesist"; i.e., to give special preference to one's own species.

One of the dilemmas of such an approach (to claim no special status for *Homo sapiens*) is to explain why one might wish to assign rights to mentally defective humans and not to healthy animals of greater mental abilities. His arguments become particularly weak in this area, since if rights are assigned on the basis of certain characteristics of beings, it is difficult to justify why exceptions need to be made. Fox is clearly unhappy with the logical outcome of his argument; i.e., that mentally defective humans would not have rights

according to his criteria. He then feels obliged to go to some lengths to argue for their inclusion in the moral community based on their kinship, suggesting that charity, benevolence, and prudence require such an extension of the moral community. However, this implies special status for the species *Homo sapiens*, exactly the position which Fox wishes to avoid.

Clearly Christians will not agree with the basic premise behind this book, namely that ethics can be considered independently of God. Nor can those who accept the biblical claim that humans are created in the image of God for a relationship with God, and hence are categorically different from animals, share Fox's position that ethical criteria for animal use should be based solely on observed differences between humans and animals. Although Christians are unlikely to agree with some of the methods and premises which Fox employs in his arguments, we may well agree with his conclusion—that the use of animals in research is justifiable—having arrived at the same conclusion although beginning with different premises.

Notwithstanding its non-Christian perspective, this book will be of particular value to those who are interested in the animal welfare issue, and who are attempting to develop an ethical perspective on the use of animals in research. Many of the issues pertaining to animal use must also be addressed by Christians, and we can certainly profit from considering Fox's thoughtful analysis of these issues.

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**ANIMAL SACRIFICES: Religious Perspectives on the Use of Animals in Science** by Tom Regan (ed.). Philadelphia: Temple University Press, 1986. 270 pages. Hardcover.

This book is a collection of papers given at a conference on "Religious Perspectives on the Use of Animals in Science" in London, England in 1984. The conference was sponsored by the "International Association Against Painful Experiments on Animals." Each chapter is contributed by a different author who presents the perspective of a major world religion on the experimental use of animals. There are chapters on the Judaic, Christian, Muslim, Hindu, Jaina and Buddhist, and Confucian perspectives on animal use. Two additional initial chapters provide: (1) an introduction to ethical issues raised by the use of animals in science, and (2) a survey of the extent and nature of animal use in science. Given the conference sponsor and the title of the book (*Animal Sacrifices*), the individual contributions are surprisingly free of the obvious bias of the conference organizers. The only exception is the chapter on the use of animals in science, which tends to present the claims of the animal welfare movement that: (1) too many animals are being (2) used unnecessarily (3) in painful experiments (4) when alternatives are available. Some of these claims are questionable or just plain erroneous.

One of the difficulties in an undertaking such as this is that within each religion there is evidently a divergence of opinion on which uses of animals are acceptable. This is recognized by most of the chapter authors, some of whom do indicate that their view is not the only one held by members of that religion. The views held about animal use are often based on different religious perceptions about the nature of man. And since beliefs about man vary greatly, it is not surprising that there are great variations in opinions about the acceptable uses of animals.

The Christian religion is represented by two chapters. James Gaffney, a Catholic theologian, reports that the Roman Catholic moral tradition typically regards the use of animals as acceptable means to human ends. Hence, the use of animals in research is as legitimate as the research itself. A different point of view is contributed by Andrew Linzey, and Anglican priest, who suggests that based on the nature of creation and the value of animals in it, that there are clearly severe moral restrictions on the use of animals by humans. Linzey argues that animals cannot be treated as "things" and cannot be viewed as simply a means to human ends regardless of how laudable the ends may be. Hence, he is largely opposed to the use of animals in scientific experiments.

Although there is a great divergence of opinion among the religions included in the book, several common threads do emerge. None of the religions surveyed assign "rights" to animals in the sense that they do to humans. However, all agree that animals do have valid claims on humans, arising out of our responsibilities as humans, and we cannot morally do as we wish to animals. For example, cruelty to animals is proscribed in most religions; not just because of the consequences for the animal, but also because of the human consequences to the person doing the cruelty.

This book will have limited appeal. It is not easy reading. Not only do the perspectives vary, but the method of thinking, arguing, and presenting cases varies considerably from religion to religion. Consequently, each chapter requires an adjustment to a different way of thinking. However, to those interested in the perspectives of different religions on the use of animals in scientific research, this book provides a very useful summary of the points of view of the major world religions.

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# Letters

## The ASA and the Paluxy Mantracks

As I became involved in investigating the creationist mantrack claims along the Paluxy River in Texas ("The Rise and Fall of the Paluxy Mantracks," *Perspectives*, Sept. 1988), I also became curious as to why there was comparatively very little investigative reporting on these claims over the years by ASA members. It is true that a major investigator over the longest period of time, Glen Kuban, is now an ASA member, but his extensive, detailed history of the claims is still forthcoming. Other ASA members such as Gerhard Nickel and John DeVilbiss were peripherally investigative, but seemed reluctant to publish their strong but private criticisms of the mantrack claims. In fact, I was motivated to write the above-referenced article through a sense that the ASA readership needed to be kept informed about and abreast of the important and interesting issues involved with the mantrack claims and their eventual unraveling.

The article tries to point out that if there is any set of issues "tailor made" for the ASA, it is the group of Paluxy mantrack claims. The need for the ASA to be kept informed was expressed by reviewers of the article's draft, confirming my perception of ASA interest. Yet not even a short book review of John Morris' *Tracking Those Incredible Dinosaurs . . . & the People who Knew Them* (1980) appeared in ASA publications. *Teaching Science in a Climate of Controversy* did deal with the Paluxy mantracks, but, in my opinion, disproportionately too little compared to their importance. Such relative inactivity was incongruous to the open and direct handling of hard-hitting and controversial issues I saw as characteristic of the then *Journal* when I was an ASA member in the late 1960's and early 1970's in the Gulf-Southwest section. In fact, some of the better scientific rebuttals of anti-evolutionary zeal came from the *Journal*, wherein both "sides" of creation/evolution were equally represented.

One explanation for what I see as incongruity might be changes within the ASA about which I have known nothing. I was not a member for about a decade (roughly 1973–1983) and have recently become reassociated with the ASA as a Friend. Perhaps I have not resubscribed for long enough, but I think *Perspectives* appears to deal in less controversy than the old *Journal* I knew. If my perception of change is valid, is it the result of change in policy, leadership; both, or neither? If my perception is not valid, please forgive my probing; an inquiry hindered by my absence from the ASA.

Perhaps another explanation concerns the ASA's commendable tolerance for divergent views, but that this tolerance is now practiced by a conscious or unconscious avoidance of "stepping on anyone's toes." As laudable and useful as conciliatory, compromising, and/or guarded statements are in issues tapping emotional, political, and ideological levels among well-meaning Christian believers, they simply cannot be justified in the context of past mantrack claims. Regardless of the merits of a humble spirit compared to a haughty one, clear conclusions based upon unambiguous evidence obviously concerning the readership of the ASA need unambiguous airing in keeping with the ASA's high standards of scientific integrity.

How badly or correctly placed my possible explanations on this matter, I gratefully thank the present staff of *Perspectives* for making possible the updating of the ASA readership on the Paluxy mantrack claims through my article. I welcome inquiries, criticisms, and comments from readers about the article; I would be happy to furnish further details for those interested.

I would also welcome from the ASA readership any comments on my comparison of ASA publications past and present.

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## Economics, Ecology, and "Limits to Growth"

In his article "Planetary Economies and Ecologies" (June 1988), Fred G. Van Dyke defends the popular neo-malthusian fable by suggesting that it should provide the paradigm for a theological understanding of the environment. The limitations of this attempt became evident in his astonishing belief that we should take *The Limits to Growth* seriously in spite of its gross flaws—"accuracies and inaccuracies aside." I understood this tolerance of inaccuracy better when I saw that in footnote 32 he objected to my refutation, in an earlier issue of *Perspectives*, of another neo-malthusian effort. In doing this Dr. Van Dyke quoted from my letter; of the three short passages he used—twelve words in all—he got two wrong.

The letter to which he objects, though not long, deals with theological and public policy issues that are at the heart of some very real problems, both ecological and economic. It is the seriousness of these problems that have led to the recrudescence of the malthusianism that Dr. Van Dyke and many others find so persuasive. His article, full of the generalizations that permeate this literature, fails to deal with the issues I, as well as many others, raised. It's hard to have a good conversation when one side won't talk seriously about the source of the disagreement.

For readers of *Perspectives* who may wish to follow up on these and related issues from a Christian point of view, I can suggest a new book: Marvin Olasky, Herbert Schlossberg, Pierre Berthoud and Clark H. Pinnock, *Freedom, Justice, and Hope: Toward a Strategy*

*for the Poor and the Oppressed* (Crossway, 1988). It comes out of a consultation held in Switzerland last year by Food for the Hungary [*sic.*—ed.]. Among other things this book articulates a point of view that makes it clear why the malthusian outlook is never going to help either the poor or the environment.

The few quotes Dr. Van Dyke lifts from the work of Simon and Kahn and their colleagues do nothing to make the malthusian philosophy more credible. Although these critics are for the most part not Christians, I urge *Perspectives* readers to compare their work with the malthusian efforts, including those by believers, and see which comports better with a biblical understanding of the universe.

The question is not whether we despoil the environment on the one hand or join the malthusian hand-wringers on the other. That is the way Dr. Van Dyke and his friends would have us view the situation. The question is whether we can really accept that the world God created is good and sufficient to support us in abundance—all of us—or whether we shall have to turn ourselves over to governing authorities who will apportion to us the remaining resources as they see fit. (This is the survivalist mentality Dr. Van Dyke should have focused on rather than the trivial version he mentioned.) The latter vision is the one championed by *The Limits to Growth* and the works that followed in that tradition, and it is evidently the one that Dr. Van Dyke thinks Christians ought to support.

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## Fred Van Dyke Responds

Unlike Mr. Schlossberg, I believe that a serious discussion of environmental economics within a Christian perspective is quite possible. I welcome the opportunity to participate. In responding to Mr. Schlossberg's letter, I want to address, first, Mr. Schlossberg's criticisms of the article itself and, second, Mr. Schlossberg's own views of the environmental problem.

"Planetary Economies and Ecologies" is a review of recent literature in environmental economics and of Christian reaction to and understanding of it. Mr. Schlossberg's comments about the article's generalities notwithstanding, it is quite specific in: (1) citations of individual publications which have influenced this field over the last 30 years, (2) the specific conclusions reached in those publications (expressed, whenever possible, in the authors' own words), and (3) the specific outcomes and impacts of such literature on future directions in environmental economics. *The Limits to Growth* was cited because of its obvious importance to an understanding of this field and its literature. This single book produced more discussion, literary response, symposia, and criticism than any other book of that decade. The works of Simon and Kahn, among others, would probably never have been written had *Limits* not been published. The paragraph to which Mr. Schlossberg alludes in his criticism takes full account of the criticisms and refutations to which this book was subjected.

I find Mr. Schlossberg's objections to the inclusion of a book of this magnitude quite incredible. It is rather like a bald man wanting a mirror that only goes up to his eyebrows. Just as we cannot change the truth about our own appearance, we cannot change the truth about what constitutes important literature in a given field. To attempt such alterations tells us nothing about the literature, but only about the reviewer's lack of scholarship.

My article makes no recommendation of individuals or groups turning their resources over to government control, and I think that criticizing an article for something it never even said is both unfair and unprofessional.

The works of Julian Simon and of Simon and Herman Kahn are included for the same reasons that *Limits to Growth* was included: because their books form significant contributions to discussions of environmental economics. The major conclusions of Simon and Kahn are quoted in their own words to avoid misrepresentation of their views. Such quotes do not, as Mr Schlossberg rightly indicated, provide credibility for any alternative views. However, such quotes do, in my opinion, provide the reader with evidence for the incredibility of Simon and Kahn's views. Let me illustrate this incredibility with one of their conclusions; namely, there is not *prima facie* evidence to require any expensive species' safeguarding policy. Simon and Kahn's view of the whole question of endangered species is well summarized in the quote which appeared in my article.

> We do not neglect the die off of the passenger pigeon and other species that may be valuable to us. But we note that extinction of species—billions of them— . . . has been a biological fact of life throughout the ages, just as has been the development of new species, some of which may be more valuable to humans than extinguished species whose niches they fill. (Simon and Kahn, *The Resourceful Earth: A Response to Global 2000*, p. 23)

While we are on the subject of birds, it is worth noting that, in this century, human beings have exterminated an average of two bird species every three years, including the passenger pigeon. But, given Simon and Kahn's premises, their conclusion is true, because none of the species presently endangered are valuable enough to humans to make them worth preserving.

In his letter, Mr. Schlossberg tells us abut God's "good" world. Unfortunately, what Mr. Schlossberg does, in following the lead of Simon and Kahn, is make good synonymous with human utility, exactly the opposite of what the scripture intends. When the scripture speaks of the creation as "good," it never uses this adjective of the creation in general, but only of its particulars. The light is good, the land and water, the earth's vegetation, the moon, the sun and the stars, the fish of the seas, the great sea monsters, the birds, the cattle, the creeping things, the beasts of the earth, and finally, human beings. Additionally, the term "good" always refers back to God's pleasure in His creation, not humanity's utility of it. This concept is further exemplified in the latter chapters of Job. God demonstrates His wisdom and sovereignty to Job through Behemoth and Leviathan, the great river and sea monsters, respectively. God's obvious pride in their "goodness," their strength, power, and majesty, is amplified by God's knowledge that they are of no use to Job. No one can control them. Because only God can master them, Job, like all of us, is humbled before them. So God can say of Leviathan, "He is king over all the sons of pride."

When the scriptures tell us of a good world, by extolling the goodness of its particulars, their intent is to produce humility in the reader to recognize that he is not the measure of the universe. When Mr. Schlossberg talks about a good world, he means a world which can never run out of all the things we want to have because God simply won't permit it.

There is a town in Crawford County, Michigan, called Deward. It was named somewhat corruptly, after the 19th-century Michigan timber baron, David Ward. Ward established the town in the midst of his most extensive timber holdings, 90,000 acres of virgin forest, including 16,000 acres of 170-foot tall white pines that had never seen a woodsman's axe. Like God's pleasure in Leviathan, Ward was very proud of his timber, and believed that it would last for many decades. But less than 12 years after his lumber mill began operating in Deward, all marketable timber had been cut.

There was once a church at Deward, and perhaps believers there thought as Mr. Schlossberg thinks today. Regrettably, there is no one left at Deward to argue the point. In fact, there is nothing left at all, except the concrete cornerstones of Ward's mill. The rest was hauled away for scrap. No government policies caused this disaster. Deward is a story of free enterprise at its best.

To say that God will simply not permit resource depletion before the end is like arguing that God will not permit a believer to spend all the money in his bank account before the rapture. If the scriptures teach anything, it is that God is not pledged to keep a fallen world happy, or to save us from the consequences of our own stupidity and bad theology. Like politics, all environmental problems are ultimately local. Environmental consequences will be experienced by ordinary people in ordinary communities around the world, one life and one consequence at a time. If a sovereign God, by divine mercy and love, places into the hands of human beings finite resources which they can destroy, be it a personal bank account, a Montana elk herd, or a Michigan forest, He takes the risk that the worst can happen. And a theology that says it can never can, will be cold comfort when it does; just as it was cold comfort to the families of Deward who watched their dreams hauled away with their last load of logs.

When Mr. Schlossberg asks us to accept the fact that the world is sufficient to support us in abundance, it certainly sounds like he is encouraging us to faith, and that is a worthy exhortation. Unfortunately, faith concentrated in the wrong object is not virtue but vice. The faith offered by writers like Simon and Kahn is faith in human ingenuity and technology. Indeed, the ultimate resource is, to them, the human mind. Christians believe that God is the ultimate resource, and to replace Him with anything else is idolatry. The Bible calls us to a different kind of faith, no only for ourselves but all creation.

> For the anxious longing of creation waits eagerly for the revealing of the sons of God. For the creation was subjected to futility, not of its own will, but because of Him who subjected it in hope that the creation itself also will be set free from its slavery to corruption into the freedom of the glory of the children of God. (Romans 8:19–21)

That is what faith is, the sure and confident hope that Jesus Christ can redeem both us and His world. Anything else is nothing but a sub-Christian substitute. I reject the work of Simon and Kahn because it substitutes faith in a living God for faith in human cleverness, which is an act of idolatry, and because it changes God's creatures and resources from objects measured by their Creator's concern for them to objects measured by their ability to meet human need, which is an act of rebellion. If God told a sinless man that the way to rule and subdue was to cultivate and to keep, it seems to me it would behoove sinful rebels such as ourselves to do no less. At the end of my article, I warned that what Christians write on these matters must grow up, or the world will never find in it or us a reflection of the One we serve. I am glad that Mr. Schlossberg has given me the opportunity to repeat that warning here, and has provided a specific example of the kind of thinking that the Christian community must reject.

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