PERSPECTIVES on Science and Christian Faith

JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

In this issue . . .

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

VOLUME 43, N[illegible]3

SEPTEMBER 1991

Perspectives on Science and Christian Faith

MEMBER epa EVANGELICAL PRESS ASSOCIATION

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

Putting Things Into Perspective

This issue reflects the diversity of topics that fall within the purview of *Perspectives*. First, John Polkinghorne's "Cross-Traffic" examines what he dubs "theology's gifts to science" and "science's gifts to theology." He sees theology as providing answers to meta-questions, those which arise from but cannot be answered by science, such as intelligibility and the fine-tuning of nature necessary to support life. The gifts of science provide insights into the past and the future and an understanding of the interplay between chance and necessity.

Economist Bruce Gunn then takes us off the beaten path in suggesting a new economic model designed to handle America and other advanced nations in the post-industrial "information age." He offers a comprehensive "competruistic" (true competition) package bounded by the moral absolutes of Judeo-Christian ethics to compete with contemporary capitalistic and socialistic models characterized by situation ethics. Today, science is quickly translated into technologies which end up in the market pipeline. Readers closer to that end of the science-technology spectrum will find food for thought in Gunn's ideas. Physicist David Snoke takes dead aim on the "two worlds" notion in his "Toward a Unified View of Science and Theology." To those who would compartmentalize science and scripture, he asks "can we ever put our faith in such a safe place that no datum of experience could ever overturn it?" Instead, he offers a basis for a relationship which includes faith, beauty, and a willingness for each discipline to learn from the other. Finally, Fred Van Dyke offers a Christian ecological strategy capable of meeting the ecological challenge of the 1990's. Fred argues that a new willingness on the part of the scientific community to receive religious input must be met with an appropriate Christian response. He suggests a framework for such a response which is historically informed and theologically based on a right understanding of "Creator and Creation" and the role of mankind as steward.

In our first Communication, missiologist Al Hammond offers the insights of his discipline on the impediment that the strategies of the creation-science movement may place on the witness of the gospel. John Wiester then provides a critique of the 1990 "Science Framework for California Schools." He points out that the "Science Framework" does not follow its own "rules of science" when dealing with evolution. Richard Bube closes this section by asking us to consider the implications of calls to develop a "scientific theology" or to "reformulate" religious faith on the basis of scientific description.

The pages of almost any issue of *Perspectives* reflect a deep concern with the effect of the creation-science movement on both the scientific community and the Christian layperson. Unfortunately, the message is beamed for the most part to the already converted. Those who share these concerns also need to write for denominational and other general religious publications and use more effectively that hallowed medium for dissent, the "Letters to the Editor" section. We need to move out of our ivory towers to develop a rhetoric on origins and the natural sciences capable of attracting the lay public and the large number of students in Christian academies. I suspect that this kind of communication comes best from those who have an affirming identity with those to whom they wish to address, rather than through debate and confrontation. The *Through the Eyes of Faith* textbook series has made a significant mark on Christian higher education; now who is willing to work at the K - 12 level and what publisher is willing to support such a venture?

—J. W. Haas, Jr.

Cross-Traffic Between Science and Theology

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There is intellectual traffic between science and theology, but it is asymetrical in kind. Theology provides for science the answers to metaquestions which arise from science's insights but go beyond its power to answer. Examples are given by the rational intelligibility of the physical world and by the anthropic principle. Science provides for theology an account of the structure and history of the physical world which imposes conditions of consonance on the latter's discourse. Examples are given by the beginning and end of cosmic history and the role of chance and necessity in evolutionary process.

Although science and theology each have their own distinct domains as intellectual disciplines, there is also some interaction between them. I wish to discuss this cross-traffic across their frontier.

I write from within the Western Christian tradition. That tradition's approach to the physical world has been characterized by a commitment to reality, a search for rationality, and an acknowledgement of contingency. It has been argued,[1] with some plausibility in my view, that such an ideological setting was the necessary matrix for the development of modern science, thus making it intelligible why science first arose in Europe rather than, say, China.

Theologically, the reality of the physical world and the value set upon investigating it, derive from the doctrine that it is God's creation. That world's rational structure, apprehended by science, is taken to be an expression of the mind of its Creator. I shall return to that issue later. Theologically, the contingency of the world is a reflection of God's freedom to create whatever he wills. For science it implies the necessity of experiment and observation: we have to look and see how things actually are. A similar necessity is placed upon theology, with the implication, *inter alia*, that it must listen to what science has to say. The theologian cannot discourse on the doctrine of creation without condescending to pay attention to what is actually found written in the Book of Nature. In both disciplines, as their histories show, we must be prepared for surprises. Our power of rational prevision is strictly limited.

What then is the mutual relationship of science and theology? Each has its own decent degree of autonomy. We have every reason to believe that scientifically posable questions will prove to be scientifically answerable. In that sense, science requires no assistance from theology. To suppose the contrary would be to fall into the error of the God of the Gaps. Equally, theology is concerned with its own phenomena (in essence, the experience of the presence of God) and the understanding of them. Science, because of its self-defining limitation to a restricted class of generalisable, largely impersonal, occurrences (a restriction itself the very enabler of science's success) is in no position to endorse or deny the claims of religion. To suppose the contrary would be to fall into the error of

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scientism. Yet the two disciplines are not completely separable. There is an inescapable degree of interaction between their world-views, but one which is not symmetrical in form across the boundary. The asymmetry arises from the nature of theology. To be concerned with questions of God is to be concerned with the totality of all that is real. Necessarily, theology must take account of the deliverances of all the varieties of human inquiry, whether they be those of science into the physical world, or aesthetics into beauty, or ethics into goodness, or its own "particular" domain of revelatory encounter with the divine. I have written elsewhere of theology that "If it is to lay claim to its medieval title of the Queen of the Sciences that will not be because it is in a position to prescribe the answers to questions discussed by other disciplines. Rather it will be because it must avail itself of their answers in the conduct of its own inquiry, thereby setting them within the most profound context available. Theology's regal status lies in its commitment to seek the deepest possible level of understanding."[2]

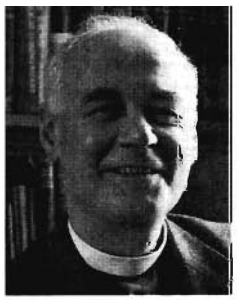
What theology can do for science is to provide answers to those meta-questions which arise from science but which are not themselves scientific in character. The role of theology as providing the ultimate quenching of the thirst for an understanding through and through is one which has been particularly stressed in the tradition stemming from Thomas Aquinas. A twentieth century Thomist thinker, Bernard Lonergan, wrote of God as "the unrestricted act of understanding, the eternal rapture glimpsed in every Archimedean cry of Eureka."[3]

What science can do for theology is to tell it what the physical world is actually like. In so doing it imposes conditions of consonance which the broader considerations of theology must respect. The doctrine of creation has to respond to the fact that the history of the universe is one of simplicity evolving into complexity over billions of years, rather than the springing-into-being of a ready-made world a few thousand years ago. That will surely encourage thought of a Creator who is patient and subtle in his operation. The need for consonance with the findings of science can be a healthy corrective for theology, whose persistent temptation is to indulge in ungrounded speculation.

I want to illustrate these general observations by giving two examples of meta-questions (theology's gifts to science) and three examples of the constraining demands of consonance (science's gifts to theology), taken largely from the experience of contemporary physics.

Intelligibility

One of the most striking features of the physical world is its rational transparency to us. We have come to take it for granted that we can understand the universe, but it is surely a highly significant fact about it that this is the case. Einstein once said that the only incomprehensible thing about the universe is that it is comprehensible. He was referring to what Eugene Wigner, in a memorable phrase, called "the unreasonable effectiveness of mathematics."[4] Time and again we have found that the physical theories which fit the facts are characterized in their formulation by the unmistakable quality of mathematical beauty. It is an actual *technique* in fundamental physics to seek theories endowed with mathematical economy and elegance in the (historically justified) expectation that they will be the ones which describe the way the world actually is. There is a marvelous congruence between the workings of our minds (the mathematical reason within) and the workings of the physical world (the scientific reason without). Of course, up to a point the need to survive in the evolutionary struggle provides an explanation of why this is so. If our thoughts did not match in some degree the world around us we should all have perished. But that can only apply to the relation of everyday experience (the world



John Polkinghorne has spent most of his adult life working as a theoretical physicist concerned with elementary particle physics. He became Professor of Mathematical Physics at Cambridge University, England, and a Fellow of the Royal Society. In 1979 he resigned his professorship in order to train for the Anglican ministry and was ordained a priest in 1981. After a few years in parish work, he returned to Cambridge, where he is now President of Queens' College. Polkinghorne has written several books on science and theology.

of rocks and trees) to everyday thinking (counting and Euclidean geometry). Wigner was not talking about anything as banal as that. He had in mind such things as the counterintuitive quantum world, whose strangeness is made sense of in terms of highly abstract mathematical entities. It is hard to believe that the ability to conceive of quantum field theory is just a spin-off from evolutionary competition.

The meta-question of the unreasonable effectiveness of mathematics insists on being answered ...

Science does not explain the mathematical intelligibility of the physical world, for it is part of science's founding faith that this is so. Of course, we can always decline to put the question, shrug our shoulders and say "That's the way it is, and good luck for you mathematical chaps." It goes against the grain for a scientist to be so intellectually supine. The meta-question of the unreasonable effectiveness of mathematics insists on being answered. A coherent and elegant explanation would lie in the theological claim that the reason within and the reason without are linked together by their common origin in the Rationality of the Creator. The physical universe seems shot through with signs of mind. That is indeed so, says the theist, for it is God's Mind that lies behind its rational beauty. I do not offer this as a knockdown argument for theism — there are no such arguments, either for or against — but as a satisfying insight which finds a consistent place in a theistic view of the world.

The Anthropic Principle

I shall not once again rehearse the many considerations that have led people to the conclusion that the physical world which is fruitful in evolving complexity out of simplicity, to the degree that an almost homogeneous ball of energy becomes, after fifteen billion years, a home for self-conscious human beings, is not in scientific terms "any old world," but rather one which is very special in the finely-tuned balance of its law and circumstance.[5] Notice that we are referring here, not to particular occurrences within cosmic history, but to those natural laws which are the necessary ground of all such occurence.

These laws contain certain parameters specifying the intrinsic strengths of the forces of nature. The laws take particular forms — in our universe they are quantum mechanical and, more specifically, they appear to correspond to spontaneously broken gauge theories. There are also certain givens about our universe itself (its size, for instance) which play an important part in determining its history. The Anthropic Principle suggests that quite small variations in any of these fundamental specifications of our world would have rendered it anthropically sterile. They would have condemned it to a boringly unproductive history.

If we accept this view, then a meta-question arises of why things are this way. That seems to me to be the interesting form of inquiry, stronger in intent than the "Weak Anthropic Principle" (which simply observes that our presence in the universe necessarily imposes certain constraints of consistency which require its circumstances to be compatible with that fact), and not as scientifically pretentious as the "Strong Anthropic Principle" (which purports to claim that the universe must be such that observers arise within it).[6] Instead one has what one might call the "Moderate Anthropic Principle," which notes the contingent fruitfulness of the universe as being a fact of interest calling for an explanation. Of course, if things were not that way we would not be here to worry about them, but it does not seem enough to say we're here because we're here and leave it at that. Instead there is the hint of an amazing anti-Copernican revolution.

... A coherent and elegant explanation would lie in the theological claim that the reason within and the reason without are linked together by their common origin in the Rationality of the Creator.

We don't live at the centre of the universe, but it does look as though the very fabric of the cosmos has been given a character which is required if the emergence of beings like us is to be a possibility. There seems to be the chance of a revised and revived argument from design — not appealing to Paley's Cosmic Craftsman working within physical process (which process science explains in a way not requiring intervention by such a God of the Gaps) — but appealing to a Cosmic Planner who

has endowed his world with a potentiality implanted within the delicate balance of the laws of nature themselves (which laws science cannot explain since it assumes them as the basis for its explanation of the process). In short, the claim would be that the universe is indeed not "any old world" but the carefully calculated construct of its Creator. The Strong Anthropic Principle is then seen to be an intuition of teleological truth, but of a theological rather than scientific character.

In short, the claim would be that the universe is indeed not "any old world" but the carefully calculated construct of its Creator.

It is necessary to consider a number of arguments advanced in rebuttal of such a claim:

(i). Perhaps there is in fact only one possible world; that it is an illusion that things could have been different. Perhaps the strengths of the fundamental forces have to be just what they are for reasons of consistency. (A more sophisticated version would say that there are different cosmic domains of symmetry breaking in which the force ratios take different values, but if there are enough such domains then one of them will be within anthropic limits, and that's where we live because we couldn't turn up anywhere else.) Such claims of a rational inevitability in the way things are have recently had some fluctuating degree of popularity among physicists. They spring from the difficulties encountered in fully reconciling quantum theory and general relativity, with the consequent speculation that there might essentially be only one way in which to do so. But even if that proves to be the case, we have already built in powerful tacit specifications of the worlds that we are prepared to talk about. They have to be quantum-mechanical, contain Einsteinian gravity, and so on. I see no reason why among possible worlds there should not be a Newtonian world, made up of billiard ball atoms and with gravitational action-at-a-distance, or a world without gravity altogether and consisting of just electrons and photons. For sure, they would not be anthropically fruitful worlds, but that's what we are discussing. I don't think the uniqueness argument stands up. Even if it did, it would surely be rather remarkable that the only possible universe was a fruitful one.

(ii). At the other extreme, perhaps there are lots and lots of different universes, each with its own law and circumstance and existing independently of each other. In that case, it would be no more surprising that *one* of them fulfilled the anthropic condition than it would be to find an almost spherical pebble if one had sorted over a million specimens in the first place. Once again it would be that particular universe that we live in because we couldn't turn up anywhere else. This "portfolio of universes" approach has been quite popular in one way or another. It can be tricked out in various scientific-sounding ways (by *illegitimate* invocation of many-worlds quantum theory,[7] or by speculations about vacuum fluctuations of ur-stuff, for instance) but it seems to me not to be a scientific proposal at all (for scientifically we only have adequate motivation to speak of this particular universe of our actual physical experience). Rather it is a metaphysical guess. Its interest lies in the fact that by making such guesses people indicate clearly that they feel there is really something calling for an explanation. To my mind a metaphysical speculation of equal coherence and greater economy is that there is just one universe, anthropically finely-tuned because it is the creation of a Creator who wills it to be capable of fruitful process. Again, I present that as a proferred insight, not a knockdown argument.

... There is just one universe, anthropically finely-tuned because it is the creation of a Creator who wills it to be capable of fruitful process.

(iii). The most interesting counter-argument is that the Anthropic Principle is the fruit of limited imagination, for its questions of balance centre around the conditions necessary to ensure the eventual development of carbon-based life. Perhaps intelligence and self-consciousness could have totally different embodiments, not based on carbon chemistry — a thinking plasma maybe. Perhaps all universes (or a great many) are capable of producing their own idiosyncratic forms of "life"?

Perhaps .... But those who speak this way are drawing a very large intellectual blank cheque on an unknown account. The only form of intelligent and self-conscious life that we know about is carbon-based. When one considers the physical complexity of the human brain (far and away the most intricately interconnected physical system we have

ever encountered), it is difficult not to believe that this degree of structure is necessary as the physical substrate sustaining self-consciousness, and it is very hard to believe that there are many radically different ways of realizing naturally such a necessary complexity. Our knowledge of how brain and mind relate is so pitifully rudimentary that no one can be dogmatic about what is possible, but I regard it as wholly reasonable not to entertain seriously this ground for rebutting the claim of anthropic significance.

I do not doubt that some anthropic "coincidences" which now seem special may be found to result from other, deeper, linkages.

Having said all that, I do not doubt that some anthropic "coincidences" which now seem special may be found to result from other, deeper, linkages. So-called inflationary cosmology — the primeval boiling of space — has already provided one possible example of how this might happen, in relation to the anthropic requirement that cosmic expansion and gravitational attraction must be very evenly balanced in a fruitful universe, which must neither become too dilute nor suffer too prompt collapse. However, I think it is reasonable to expect that there will still be some things distinctly and minutely particular about a world capable of producing men and women. I therefore conclude that there is indeed a meta-question arising from Anthropic Principle considerations to which theism provides a persuasive (but not logically coercive) answer.

Let us now consider some constraints of consonance which science might seem to lay upon theological thought:

Origins

Perhaps no subject has given rise to more confusion in the inter-relationship of science and theology than the question of how things began. It has often erroneously been supposed that the Christian doctrine of creation is principally concerned with initiation, with the primary instant. To think that is to confuse Christianity with deism. The doctrine of creation is concerned, not just with what God did, but with what he is doing; its subject is ontological origin, not temporal beginning. Its central assertion is that the physical world, at every instant of its existence, is held in being by the will of God. Two consequences follow. The first is that if physical cosmology delivers us a dateable moment when the universe as we know it sprang forth from the Big Bang, that is scientifically very interesting but theologically neutral. There never was a theological stake in preferring Big Bang cosmology to steady state cosmology. Secondly, and conversely, if physical cosmology were to abolish a dateable beginning for the world, no great theological upheaval would follow. Stephen Hawking has proposed a highly speculative, but just conceivably correct, quantum cosmology in which the universe is a kind of fuzzy spacetime egg with no sharp beginning. He says "If the universe is really completely self-contained, having no boundary or edge, it would have neither beginning nor end; it would simply be. What place then for a creator?"[8] It is theologically naive to give any other answer than "every place" — as the ordainer and sustainer of the spacetime egg. God is not a God of the Edges, with a vested interest in boundaries. In fact there is a contemporary current of thought in theology, particularly associated with Jürgen Moltmann,[9] which stresses the gift of a genuine "otherness" made by a loving Creator to his creation, and which would find very consonant physical realisation in a universe "really completely self-contained." If there are problems for Christian theology in cosmological thought they lie, not in questions of origins, but in the question of The End.

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The End

Cosmologists not only peer into the past but they can also attempt to descry the future. On the grandest scale, cosmic history is a tug of war between two opposing principles: the explosion of the Big Bang, throwing matter apart, and the pull of gravity, drawing matter together. They are very evenly balanced and we do not know which will win. Accordingly, we have to consider two alternative scenarios for the universe's future. If expansion wins, the galaxies will continue to fly apart for ever. Within themselves gravity will certainly win and they will condense into gigantic black holes, eventually decaying into low-grade radiation. That way lies cosmic death.

The alternative scenario presents no more cheerful a prospect. If gravity wins, the present expansion will one day be halted and reversed. What began with the Big Bang will end with the Big Crunch, as the universe falls back into a singular cosmic melting pot. That way lies collapse.

If there is a true and lasting hope — and it is a deep human intuition that there is such a hope — then it can only rest in the eternal mercy and faithfulness of God himself.

On the face of it, the ultimate prospects are bleak. What does that imply for theology's claim that there is a purpose at work in the world? Christian orthodoxy has never subscribed to an evolutionary optimism which expects a total fulfillment of divine will to be brought about within the flux of present physical process. If there is a true and lasting hope — and it is a deep human intuition that there is such a hope — then it can only rest in the eternal mercy and faithfulness of God himself. Christians believe that for themselves (our bodies will decay on a time scale of tens of years) in their assertion of a destiny beyond death, and they can believe it as well for the whole universe (whose decay will be on a time scale of tens of billions of years). We need to embrace a cosmic hope as well as a personal hope, for it would be far too anthropocentric simply to regard this vast universe as being of concern to God only as the backdrop for a human drama which has just started after an overture lasting fifteen billion years.[10] It is, of course, beyond our feeble powers of imagination to conceive what that act of cosmic redemption will be like, but if there is a true hope it lies in God and not in physics.

Some of those unable to embrace a hope arising from casting oneself on divine faithfulness have engaged in ingenious speculation about whether there might nevertheless be some form of adequate fulfillment attainable within physical process. As cosmic circumstances change radically within the universe's evolving history, the embodiment of intelligence would have to adapt itself to what is going on. Carbon-based life would have to give way to successors which it had itself produced by conscious design. There might eventually indeed be "thinking plasmas," engineered by their predecessors in the great chain of intelligent being. In this way, even within the chronologically finite history of a collapsing universe, there could be such rapidly accelerating processing of information that a kind of infinite "psychological" history would be able to unfold. This kind of "physical eschatology" has been pursued particularly by Freeman Dyson[11] and Frank Tipler.[12] Tipler exhibits great speculative ingenuity, even to the point of supposing that as embodied intelligence approached its ultimate phase (which he calls Omega and equates with a kind of physical realization of God) it could recover traces of our past lives and reconstitute isomorphic models of ourselves in a final act of "resurrection." Yet it seems to me that it is an etiolated and abstractly generalized hope that his fast-racing cosmic computers would fulfill. In contrast the Christian hope is that nothing of individual and particular good is ever lost in the Lord and that a future awaits us of unending exploration of the riches of divine reality.

Chance and Necessity

As we survey the cosmic process which has carried the world from initial simplicity to present differentiated complexity, at every stage the realization of anthropic fruitfulness has depended upon an interplay of two opposing tendencies, which we can conveniently summarize in slogan form as "chance" and "necessity." By chance is meant just happenstance, the way things come together in an essentially uncorrelated sequence of occurrences: a fluctuation produces a little more primeval matter here than there; a genetic mutation produces a new characteristic of animal life. Through such novel offerings of chance there came about the condensation of the galaxies and the origin of new species. Yet, for those things to happen also required the operation of lawful necessity to preserve and sift the novelty provided: gravity enhancing the matter fluctuation; evolutionary biology operating within a stable, and so effectively selective, environment.

Some have felt that the role assigned to chance subverts religious claims of a Purpose at work.

Some have felt that the role assigned to chance subverts religious claims of a Purpose at work. After all, what will eventually happen is not forseeable at the beginning. The universe is given something

of the air of a game of cosmic roulette. With characteristic Gallic rhetoric, Jacques Monod spoke of "pure chance, absolutely free but blind, at the base of the stupendous edifice of evolution." [13] For him the role of chance turned cosmic history into a tale told by an idiot, full of sound and fury, signifying nothing.

The gift of the God of love to his creation will surely be freedom. He will prove to be no Cosmic Tyrant, holding all in tight control.

At times one feels that Monod lost sight of the indispensable, complementary, role of necessity, with its implication of finely-tuned anthropic law. If one attempts a more even-handed evaluation of the interplay of chance and necessity, then an alternative metaphysical interpretation becomes possible which is, in my view, fully consonant with Christian theology.[14]

The Christian God is both loving and faithful. The gift of the God of love to his creation will surely be freedom. He will prove to be no Cosmic Tyrant, holding all in tight control. Yet freedom by itself can only too readily degenerate into licence and chaos. The gift of the God of faithfulness will surely be reliability. He will prove to be no Cosmic Lord of Misrule. Yet reliability by itself can only too readily degenerate into an iron rigidity. We may expect the creation of the God who is both loving and faithful to display characteristics of both openness and regularity, such as are in fact reflected in the physical interplay of chance and necessity in the process of the world.

A doctrine of creation of this open yet regular kind can indeed be found in much contemporary Christian theology, not only in the writings of Moltmann,[15] but also in the work of the English theologian W. H. Vanstone. He is motivated, not by acquaintance with the scientific story, but by meditation on the necessary precariousness and value of any act of creation by love.

This leads him to write "If the creation is the work of love, then its shape cannot be predetermined by the Creator, nor its triumph foreknown: it is the realization of vision, but of vision which is discovered only through its own realization."[16] Such an account is perfectly consonant with the scientific insight of the realization of anthropic fruitfulness through the shuffling explorations of happenstance.

This understanding can afford us some help with what is for theology the most painful of its difficulties. I refer, of course, to the problem of evil. Some modest help with the question of moral evil (the chosen cruelties of humankind) is given by the so-called free-will defence. It asserts that a world of freely choosing beings is better than a world of perfectly programmed automata, however destructive some of the choices may be. Our instinctive recoil from coercive measures such as the castration of persistent sex offenders, shows us that we accord some force to this insight. However it leaves untouched the problem of physical evil (disease and disaster). I believe this needs what I have called the "free-process defence,"[17] appealing to the divine gift of freedom to *all* of the creation, not just to human kind alone.

God wills neither the act of a murderer nor the incidence of cancer, but he allows both to happen in a world to which he has granted the freedom to be itself.

Austin Farrer once asked himself what was God's will in the Lisbon earthquake. His answer — hard but true — was that the elements of the Earth's crust should act in accordance with their nature. God wills neither the act of a murderer nor the incidence of cancer, but he allows both to happen in a world to which he has granted the freedom to be itself.

There is a cross-traffic over the frontier between science and theology, and I believe that it is helpful and fruitful for both sides. ✣

NOTES

[1]Hooykaas (1972); Jaki (1978); Russell (1985).
[2]Polkinghorne (1988), p. 1.
[3]Lonergan (1958), p. 684.
[4]E.P. Wigner, Comm. in Pure and Appl. Math., 13 (1960), pp. 1-14.
[5]Barrow and Tipler (1986); Leslie (1989).
[6]Barrow and Tipler (1986), pp. 16-23.
[7]The "many worlds" of this interpretation properly refer to different outcomes of quantum measurement, not to differing basic law and circumstance.
[8]Hawking (1988), pp. 140-1.
[9]Moltmann (1981); (1985).
[10]One reason for believing in the empty tomb is that its picture of the risen Lord's glorified body being the transmutation of his dead body, speaks to us of a destiny for matter as well as humanity.
[11]Dyson (1979), ch. 21; (1988), ch. 6.
[12]Barrow and Tipler (1986), ch. 10; F. J. Tipler in Russell *et al.* (1988), pp. 313-31.
[13]Monod (1972), p. 110.
[14]Polkinghorne (1988), ch. 4.
[15]ref. 9.
[16]Vanstone (1977), p. 63.
[17]Polkinghorne (1989), pp. 66-7.

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Competruism and the Age of Discontinuity

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The transition from the industrial era to the information age has produced discontinuous change in the market economies of free societies. The paradigm shift has changed the criterion of success from a focus on the "growth of assets" in the industrial era to an emphasis on the "productivity of assets" in the information age. Free societies must consider discarding capitalism and socialism, which are industrial era doctrines dedicated to perpetual material gain, in favor of a conservation ideology, e.g., competruism, which is emerging in contemporary times.

There is increasing evidence to indicate that America and the other advanced nations in the world are in rapid transition from an industrial era to an information age.[1] This means that capital will be replaced by knowledge as the strategic element of advanced societies.[2] The subsequent shift in mass information relationships brought about by this technological revolution is changing the criterion of success in society from a focus on the "growth of assets" to the "productivity of assets."[3] This transition indicates that a paradigm shift has taken place which has produced discontinuous change.[4] These unparalleled conditions require entirely new ways of thinking to substantially raise standards of living and quality of life in post industrial societies.

The serious problems facing America and other free societies, e.g., enormous public/private debt, collapsing productivity, continuous conflict between haves/have nots, declining morality, environmental disaster, etc., cannot be solved by an overhaul of their respective economies, greater commitment, more social rhetoric or simply working harder. What will be needed are new principles, strategies, tactics and most of all, a new ideology that is compatible with the technological milieu of the information age. The perplexities confronting post industrial societies cannot be properly defined or solved in terms of machine age principles, strategies and ideologies that were developed to promote material growth in a bygone era.[5] Clearly, free people should consider adopting a new ideology called competruism, which embraces theories, concepts and techniques that promote "productive efficiency" in the management of its socio-economic system.[6]

Therefore, the purpose of this paper is to define the competruistic ideology and describe how its society will operate in the technological milieu of the information age. The paper begins with a discussion of true competition, which is the springboard for a definitive description of the competruistic ideology. Then the transition from the growth economies of capitalism and socialism to the steady state economy, under this new conservation doctrine, is scrutinized. Next, the nerve center of the competruistic society is explored from the perspective of its public and private sector organizations. The paper proceeds with an examination of the attributes of the strategic management system which is the decision making authority structure used to control the operation of the socio-economic system under competruism. This section is followed by the practical implementation of the strategic management mechanism in the form of three macro programs which are: the National Economic Planning Corporation, the commerce "value added" court, and the consumption tax system. The Judeo-Christian framework, in which the competruistic society operates, is examined in the last section of the paper.

Conservation Ideology for the Third Wave

Competruism (coined from the words true competition) was born in the realization that advanced societies must graduate from a destructive "survival of the fittest" type of rivalry to a constructive "survival of the species" form of competition.[7] This transition from "free" to "true" competition will be essential for advanced societies if they are to achieve a zenith of productivity in a technological milieu.

Free competition encompasses the activities of combatants who use scramble and/or interference strategies in rivalry.[8] Capitalistic societies usually employ public policy to prohibit interference strategies because of their predatory nature. The scramble strategy provides for rivals to capitalize on their efficiencies in some productive endeavor to force less effective combatants out of the competition. The economy must absorb the cost of destroyed assets when combatants are eliminated through scramble rivalry. It can be anticipated that this socially wasteful form of rivalry, which is analogous to biological competition, will pervade the political economies of free nations until the emergence of empiricism in the information age. Hence, free competition is simply an extension of the biological process of "natural selection" into society and functions according to the dictates of situation ethics.[9]

True competition is a cost effective form of rivalry which provides a harmonizing force in the mature economies of advanced societies. The reason this new type of rivalry must become the all pervasive law of competitive interactions in post industrial societies is to raise their survival chances in the finite environment. This auto-competition will permit resource conservation to be achieved through the operation of cost minimizing technologies in the steady state economies of advanced nations. True competition will be achieved in the information age by using empirical performance data to permit social entities (people, organizations, economies) to compete against their own records within operational delimitations. When social entities compete against their own performance standards it represents the "truest" form of rivalry. The reason is because this nonsocial type of rivalry eliminates the differential advantages of combatants that cannot be compensated for by the rules of competition. Therefore, true competition is being made possible by the empirical progress of decision scientists and is governed by the moral absolutes of Judeo/Christian ethics. After the cornerstone concept of competruism has been elucidated, the tripartite operation of this ideology can be examined.

Thesis and Antithesis to Synthesis

The competruistic ideology is evolving from the mixed economies of the free world. Its progenitors are capitalism and socialism which are epitomized by socially sanctioned competitive and cooperative behavior patterns, respectively. The hybrid nature of this ideology can best be described through Hegel's dialectic, whereby one fact (thesis/-capitalism) works against another fact (anti thesis/socialism) to produce a wholly new fact (synthesis/competruism). Accordingly, competruism synthesizes the free market competition of democratic capitalism and the allocative cooperation of practical socialism into a coordinated whole that operates within the framework of Judeo-Christian ethics.[10]

Perpetuating the survival of society by orchestrating the private decisions of capitalism and the public decisions of socialism, within the delimitations of Judeo-Christian morality, does appear to be the next major stage in ideological development.[11] This proposition is given credence by the fact that most of the programs relevant to competruism have already been proposed and/or implemented in the

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West. Thus, the competruistic ideology has been developed by selecting those proposed and actual programs that are compatible with free societies, e.g., the steady state economy, managed market system, national economic planning, commerce court, consumption tax system, etc. Once the tripartite format of competruism has been explored, the focus can shift to the high output orientation of this ideology.

Survival Through Productive Efficiency

The mission of the competruistic ideology is to provide for the material, intellectual and spiritual needs of the denizens in its socio-economic system. The *goal* of competruism is to advance the survival chances of society and each of its denizens, to optimal limits, and then facilitate other free publics to achieve these ends. First, this ideology enhances the survival chances of society by employing national economic planning to orchestrate true competition and facilitate its public to adapt to rapid environmental change.[12] Second, the longevity of denizens is augmented under competruism through programs designed to facilitate each of these individuals to reach optimal standards of living and quality of life and then save surplus income for future contingencies. Third, competruism provides for a society to help raise the standards of living and quality of life of world citizens by adding value (total cost minus total benefits) to the global economy through foreign investments, international trade, diplomacy, cultural exchanges, charitable programs, police actions, etc. Therefore, the common denominator of all socio-economic processes in the competruistic nation is their contribution to survival.

The* mission *of the competruistic ideology is to provide for the material, intellectual and spiritual needs of the denizens in its socio-economic system.

Productive efficiency provides the *means* for achieving the survival goal of society and longevity of life for its denizens under competruism. There is cogent evidence which indicates that the productivity of a society's exchange processes, as measured by its standards of living (per capita GNP) and quality of life indices, is positively correlated with its denizens' longevity and well being.[13] Each individual will be provided with an equal opportunity to compete for socio-economic success in order to facilitate them to maximize their contribution to the competruistic nation.

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When "productive efficiency" becomes the criterion of success in advanced societies, beset by rapid technological change, their economies must operate as *macro mechanisms for the maintenance of minimum costs.* This presupposition is reflected in the concept of "Human Scale" which means that for every animal, object, organization or system, there is an optimal limit beyond which it should not grow.[14] When the economies of advanced societies grow too large, excessive costs accrue to these publics which negate the benefits of increases in their GNP. That is, diseconomies of scale produce excessive costs which reduce societies' collective standards of living and quality of life. When these costs are allowed to exceed prudent limits they can undermine the survival chances of societies. These ideas may be easier to comprehend by seeing negentropy being advanced by decisions that optimize the ratio between costs and benefits in the economies of these publics.

There is mounting research which indicates advanced nations, like America, have entered into the transitional period when public policy must be used to phase in the steady state economy.[15] For example, there is cogent evidence concerning the finite status of natural resources which indicates that advanced nations must convert their consumption doctrines to conservation ideologies to provide for a sustainable future.[16] Also, factual information shows there has been a transformation in post industrial nations from manufacturing to service based economies which promote the intensive use of assets.[17] This latter transition to the technological milieu of the information age has created conditions where companies now receive a higher return from investments in human capital than in physical assets.[18] These changes simply mean that the most productive economy, which provides the highest standards of living for society, must operate

as a conduit of wealth instead of a reservoir of wealth.

The Steady State Economy

When the competruistic society uses public policy, e.g., tax laws, to place a cap on the accumulation of physical capital at optimal levels, it converts its growth economy into a steady state economy (SSE). The SSE has four distinct characteristics. These are: (1) a constant population of human bodies; (2) a constant population or stock of artifacts (physical capital); (3) levels of these two populations which are high enough to provide society with optimal standards of living and quality of life; and (4) a rate of throughput of resources, by which the two stocks are maintained, reduced to the lowest possible level.[19]

When the competruistic society uses public policy, e.g., tax laws, to place a cap on the accumulation of physical capital at optimal levels, it converts its growth economy into a steady state economy.

Population stability in the steady state economy is achieved through the process of demographic transition. The tax program can be used to place a cap on the wasteful consumption of physical assets, shifting revenues into adequate levels of savings and expenditures for services in the SSE. Optimal levels for the above two stocks can be gauged through the use of a homeostatic survival coefficient for the SSE as a whole. The thermostatic mechanism for the SSE, which uses this optimal capital productivity standard, will be discussed in the section on the National Economic Planning Corporation. The rapid development of high technology, e.g., inventions that challenge the laws of thermodynamics, will enable the post industrial economy to operate as a conserver market system.[20] This conservation process requires that the systems science methodology and computer based technology be employed in this SSE to pursue "productive efficiency" in the management of its resources. The realization of this criterion of success provides the means by which the SSE will deliver optimal living standards and life quality to society.

Public and private organizations must be combined into an effective format to serve as the nerve center for the SSE. A goal orientation should be incorporated into this cybernetic mechanism to facilitate the SSE to achieve a zenith of productivity. This macro communication and control system for the SSE will provide for centralized strategic decisions and decentralized operational decisions. The above format is designed to assist the competruistic society to achieve a competitive advantage in the technological milieu of the third wave.

The Nerve Center of the Market System

The nerve center of the market system in the competruistic society has a public sector, held accountable by political votes, and a private sector that is accountable to dollar votes. The democratic government that operates in the public sector protects individual liberty based on the belief that human nature is flawed and therefore prone to abuse power. The primary means of protecting people from the misuse of power is to limit the power of the state so that government is prevented from functioning as the ultimate authority. For example, authority in the public sector of America is held in check through an edifice of democratic institutions that includes representative government, the separation of powers, federalism and a limitation on the power of the state through a Bill of Rights. Government under competruism must be limited to the tasks of providing direction, order, protection and justice.[21]

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Also, the attributes of the management system, which is the primary decision making authority structure in the competruistic society, will be explored in this section. This computer based-communication and control system is unique to the third wave. The discussion of the properties of the management system will serve as a prelude to introducing the macro programs that operate in the SSE according to the tenets of this truth-centered authority structure.

Democratic Government

America's democratic, republican form of government under constitutional law represents the best

form of government devised to date for the competruistic society. It will be assumed under this form of government in the competruistic society that the Creator has endowed mankind with certain inalienable rights, e.g., life including property, liberty and the pursuit of truth. Happiness has been deleted because it produces widely divergent behavior depending on one's personal perception of what it takes to satisfy this end. This substitution reinforces the precept that competruism was not developed to provide a utopia on Earth. Rather, this ideology has been designed to establish a social system which will facilitate people to reach their full productive potential through personal growth.

It is assumed under the democratic form of government in the competruistic society that the Creator has endowed mankind with certain inalienable rights, e.g., life including property, liberty and the pursuit of truth.

However, America's Constitution will have to be amended under competruism if its public is to achieve a zenith of productivity.[22] Amendments, e.g., a balanced budget, holding all organizations accountable for socially responsible actions (value added) and transferring budget appropriations by legislators in the public sector to juries of experts in a new commerce division of the court system, must be carefully contemplated. This new commerce section in the judicial system will hold public employees responsible for being stewards of society's resources. This stewardship will prescribe that the only justifiable redistribution of wealth by the public sector will be where empirical evidence substantiates that society will receive an adequate return on its investment in a sanctioned project. This public redistribution of wealth will work on a similar principle to "portfolio analysis" for corporations so that social entities can receive the cash flow they need to reach their full productive potential.[23] The altruistic redistribution of wealth in the competruistic society will fall under the domain of charities, religious institutions and philanthropic organizations.

A strong cooperative link between the public and private sectors of the competruistic society will be established through a national economic planning program that is governed by a management system.[24] The use of representative government to guide the public sector and a strategic management system to direct the private sector will provide a sound format for implementing accountability (political votes versus dollar votes) throughout the competruistic society. This format should make it clear that there is a significant difference beween capitalism/socialism and competruism. The former doctrines use a political system to govern their growth economies and the latter ideology employs a management system to control its steady state economy. The attributes of the management system will be discussed in the next section because this truth-centered authority structure is emerging in the information age and is not widely understood.

Management Systems

The management system will dominate the operation of organizations, which operate at the macro and micro levels of the economy, in the information age. This cybernetic construct will facilitate these organizations to adapt to rapid, accelerating change. The management system can be defined as a decision-making authority structure that operates on the assumption that truth is sovereign over the operation of the organization.[25] The truth-centered authority structure functions as a computer based-communication and control mechanism which provides the long range potential of automating the management of the organization. This end will be accomplished by employing measurement and exception procedures in management systems to monitor and control the activities of the organization, its units, programs and personnel.[26] The paradigm for this authority structure recognizes that all people suffer from human frailty. Therefore, personnel must be held accountable as stewards over the resources they manage.

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The pervasive nature of accountability in the management system creates a learning organization with a high collective IQ for decision making and problem solving.[27] This focus on learning reduces

the firm to a living classroom where personnel are united in the pursuit of truth. The realization that truth is the route to "productive efficiency" in the organization requires that the environment for learning be protected. This can be accomplished through adherence to the mandate that personnel not be punished for honest errors but clobbered for dishonest mistakes. The prevailing view on blunders stresses that the "first time around is ignorance, but the second time around is stupidity."

The management system encompasses checks and balances that are designed to minimize the adverse effects of human frailty on the productivity of the organization.

A further requirement in the management system stipulates that all personnel are responsible for promoting the success of their organization and each of its employees in achieving their vocational goals. This mandate is advanced on the belief that "success" is the best motivator. Consequently, workers must serve as coaches, mentors and teachers in their area of expertise to assist other employees in their organization to overcome their problems and failures.

A systems methodology is employed in the high output operation of the computer-based communication and control mechanism. This systems approach to administration is comprised of participative management, management by obectives, management by exception, general systems theory, information systems and modules (statistical, mathematical, procedural).[28] Administration is characterized by the following properties when the above systems methodology is utilized in an organization. These features are: democratic/consensus authority, positive reinforcement, astute intuitive and analytical reasoning, leadership by example, networking, high achievement goals, personal growth, egalitarian relationships (Theory Z), collaboration, systems mastery, team projects, verbal and mathematical skills, cooperation, extended family commitment, absolute moral standards, group supervisory methods, holistic thinking, self direction, performance/referent power bases, supportive relationships, high fidelity information, continuous training, group learning, standards of excellence, redeployment of personnel and objective approaches to decision making.[29] The management system encompasses checks and balances that are designed to minimize the adverse effects of human frailty on the productivity of the organization. These check and balance procedures permit subordinates to challenge administrative malpractice in an organization which undermines the value it adds to the economy.

A vital part of the management system is its feedback mechanism which operates on the principle of a thermostat in facilitating the organization to follow the goal path of its mission while adapting to change. The cybernetic mechanism in this truth-centered communication and control system incorporates high output tenets, e.g., *profit optimization, value added* and *true competition* and third wave principles, e.g., synergism, symbiosis, redundancy, equifinality and holism in its operation.[30] The management system provides for an increasing number of structured decisions and tasks to be automated through computer technology. The autonomic functions of the management system will improve the ability of the organization to raise its productivity in an environment beset with chronic change.

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In retrospect, the public sector will ideally be limited to those government officials and their staffs, who can be held strictly accountable for their performance by free elections. Government bureaucrats, and their agencies, who cannot be held accountable by poliical votes will be moved under the discipline of the market system through the privatization process.[31] Public policy can be implemented to encourage organizations to adopt the management system, as their formal authority structure, and employee ownership programs.[32] These employee stock option programs will make economic democracy the sequel to political democracy in the competruistic society. This arrangement will provide for the market system to be composed of public and private corporations. The public corporations will be allocated the revenue for their budgets by government treasuries that use the profits from these organizations to fund their future operating

requirements. The private corporation in the market system will function according to standard operating procedures. In this way capital productivity can be uniformly assessed in public and private corporations through a comparison of cost with performance.

The primary mission of the NEPC will be to operate the economy on an autonomic basis for the purpose of facilitating all denizens in the competruistic society to achieve optimal standards of living and quality of life.

The above cooperative relationship between the public and private sector will work best when a strategic management system, in the form of a National Economic Planning Corporation (NEPC), is used to orchestrate the operation of the SSE. The need for the NEPC is based on the realization that if a SSE is to achieve "productive efficiency" it must be managed for results.

National Economic Planning Corporation

The national economic planning program in the competruistic society begins with the public sector setting macro goals for: employment levels, price stability, balanced economic development, transportation, energy, agriculture, raw materials, housing, education, public services, etc. A national economic planning program can be used to orchestrate the operation of public and private organizations in the market system to achieve these goals. This goal orientation for the strategic management of the SSE provides the competruistic society with: (l) an overall sense of direction; (2) well defined national goals and objectives; (3) integrated strategic plans for achieving these ends; and (4) the ability to consider "what if" consequences to the market system from actions, e.g., an oil embargo, nuclear catastrophe, debt repudiation by third world nations, limited police actions, etc.

A macro management system for the private sector, which is designed to give the competruistic society a competitive advantage in the global community, can be set up by the federal government. The government can grant a private sector agency titled the "National Economic Planning Corporation (NEPC)" a charter to carry out the strategic management of the SSE. The charter will delegate *authority* to the NEPC to govern the SSE, the *responsibility* to use these resources in the best interests of society and *accountability* for the quality of performance it achieves in managing this market system. Procedures must be written into the charter for using job-related criteria to replace the planning agency's senior management team with another administrative group, in the event their performance is inadequate. The primary mission of the NEPC will be to operate the economy on an autonomic basis for the purpose of facilitating all denizens in the competruistic society to achieve optimal standards of living and quality of life. The NEPC can begin its task by franchising planning bureaus to systematize all productive organizations in the economy by function, size and region. The U.S. Government's Standard Industrial Classification Code for business provides a good example of a format which can be used to systematize productive organizations that elect to be registered under the NEPC. It is important that no organization be required to join this macro agency. The NEPC must use the quality of its information services, which it provides its member organizations for a reasonable fee, to contractually bind them into the macro planning network. Thus, the NEPC, serving as the steward for the resources in the private sector, can pursue its planning program by working in close cooperation with the public sector.

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The center of gravity for the planning process, carried out by the NEPC, is a homeostatic survival coefficient which takes the form of an optimal profit goal for the economy as a whole.[33] This homeostatic survival coefficient, which utilizes a Dupont rate of return format, will provide the foundation for plans, strategies, tactics, resource allocations, priorities and other managerial actions executed by the NEPC. Initially this coefficient, representing the capital productivity goal for the whole economy, will have to be estimated. After the NEPC has been operating for a time, it will be possible to use its data base to perfect a regression equation, similar

SEARCH

Scientists Who Serve God

Physicist, Engineer, Biblical Scholar

For over forty years Aldert van der Ziel has been a professor of electrical engineering at the University of Minnesota. For the past twenty years, after each twelve months in Minneapolis, he has spent three months at the U. of Florida in Gainesville as a professor. The author of fifteen books on such topics as solid state electronics, electronic noise, and semiconductors, he has also published two books on the relation of the Bible to modern science.

From The Netherlands: Education, Occupation, Emigration

Aldert was born in 1910 in Zandeweer in the northern province of Groningen in The Netherlands. He studied at Groningen, the country's second oldest university, founded in 1614. For work on spectroscopy under Prof. F. A. Zernike, Aldert received a Ph.D. in physics in 1934. For the next thirteen years he did research for N. V. Philips, a huge Dutch industrial concern with many divisions. He worked on vacuum tubes and other electronic devices at the *Natuurkundig laboratorium* at Philips's *Gloeilampen fabrieken* in Eindhoven (now a major manufacturer of television tubes).

Aldert van der Ziel, right, at age 20, with a fellow physics student at the U. of Groningen, 1930.

Nazi occupation of The Netherlands lasted from 1940 to 1945. Eindhoven, in the south, was liberated by the Allies in 1944, but the war went on for eight more months through a bitterly cold Dutch winter. Many people starved; some barely survived by eating tulip bulbs. Postwar life was also grim, but in 1947 Aldert took his family to Canada. He had been invited to teach at the University of British Columbia in Vancouver.

To the United States: A Distinguished Research Career

In 1950 the van der Ziels emigrated once more, this time to Minnesota. During his tenure there, Aldert has published hundreds of scientific papers and advised many Ph.D. students on their way to important posts in industries and universities around the world.

Besides two honorary doctorates (Université Paul Sabatier in France, 1975; Eindhoven University of Technology, The Netherlands, 1981), Aldert's many honors include election to the prestigious National Academy of Engineering in the U.S. From his own professional societies, he received the Western Electric Award of A.S.E.E in 1967, the Vincent Bendix Award of A.S.E.E. in 1975, and the I.E.E.E. Education Medal in 1980. Ω

On January 20, 1991, while this issue of SEARCH was in preparation, Aldert van der Ziel died. After retirement at age seventy, even after the onset of a progressive illness, he continued to advise students and write papers. His wife Jantina ("Tine") and former colleague Carolyne Van Vliet of the Centre de Recherches Mathématiques, U. of Montreal, Quebec, helped complete this issue. According to Tine, her husband participated in a research colloquium just ten days before he died.

Prof. van der Ziel will be missed "as a friend and as an example" by many, wrote Prof. Van Vliet, but "his works are still with us." In the Dutch Bible so familiar to Aldert, *Ned. Bybel genootschap,* that phrase in Revelation 14:13 reads:

Want hun werken volgen hen na.

Scientific Investigation

A Quiet Student of Noise

At the universities of Minnesota and Florida, Aldert van der Ziel supervised the doctoral research of over eighty students. Many were attracted to his laboratory by his international reputation on the subject of "noise" in electronic tubes and conductors. His interest in that field began when he was a young industrial scientist in The Netherlands.

"What Did You Say? I Can't Hear You for the Noise!"

Everyone is familiar with noise as unwanted *sound.* A musical instrument produces a tone of a particular frequency, plus overtones harmonically related to that frequency. Random sound (including some modern "music"!) is full of overtones that are not harmonically related. "Static" breaking in on a radio broadcast during an electrical storm is random sound.

The term *noise* also applies to signals other than sound waves, such as flickers of light that might be confused with blips on a radar screen. In general, noise refers to spontaneous fluctuations interfering with any kind of signal reception or amplification. Research on noise in electronic devices has improved many methods of communication and detection of electronic signals, visible light, and infrared radiation.

Noise is especially troublesome when signals are very weak, as from an interplanetary spacecraft. Voyager 2, launched in 1977, approached the planet Uranus in 1986. Two of its instruments detected bursts of radio signals, evidence that Uranus has a magnetic field, but scientists first had to rule out electronic noise. In 1989, on its way out of our solar system, Voyager 2 detected radio emissions from Neptune also. Interference with radio signals sent back from the Pioneer Venus Orbiter circling that planet since 1978 has shown that Venus has an ionosphere.

Higher Mathematics; Down-to-Earth Applications

Aldert van der Ziel approached scientific problems with a full range of methods, from intuitive "model making" to sophisticated calculations. He claimed that his "betting rate" was better than average, and his initial approximations were often borne out later by careful mathematical and experimental work. At other times he began with a very exact study, using expertly the standard theory of differential equations he had learned at Groningen. Of one of his pioneering contributions to our understanding of semiconductors, a theoretical physicist wrote:

"Van der Ziel's theory of noise in junction devices, reported in *Proceedings of the Institute of Radio Engineers,* v. 43, pp. 1639-46 (1955), and v. 46, pp. 1019-38 (1958), was based on a transmission-line analog for the pertinent partial differential equations (with stochastic noise functions added in the sense of Langevin sources). It solved the controversy concerning Petritz's earlier theory and provided the basis for all noise spectra in bipolar junction devices. All this was done without Green functions or operator algebra as we would use nowadays."

The writer added that afterward Aldert looked for a simple corpuscular model that would give the same results. Although he did not shy away from lengthy calculations, Aldert basically believed that nature was "simple" and should be described by concise, basic equations and results. He frequently quoted the director of the industrial lab where he had worked: "If you cannot state your results in plain language, you have not understood them yourself."

In the 1980s, Professor van der Ziel made fundamental contributions to Peter Handel's quantum 1/f noise theory, which explains a certain type of noise on the basis of a "fine structure constant" related to the coupling of accelerated moving charges with the electromagnetic field. Aldert confirmed Handel's formula for a large number of modern devices as well as for older measurements on vacuum tubes.

What sounds like theoretical gobbledy-gook to outsiders can have surprisingly immediate applications. Predictions from Aldert van der Ziel's work on 1/f noise improved the infrared detectors of military "snooperscopes," enabling U.S. forces to operate at night in the 1991 Gulf War with Iraq. Ω

IS GOD A MATHEMATICIAN?

"There is nothing mysterious about the use of mathematics in science. It comes about everywhere where quantitative determinations are made and quantitative predictions aimed at. For that reason I must take exception to the view of the famous British astronomer and theoretical physicist [Sir James] Jeans who maintained that this had important philosophical and theological implications. According to Jeans the use of mathematics in modern science indicated that 'the Architect of the Universe is a great mathematician.' In my opinion modern theoretical physics merely shows that physicists have become good mathematicians. I do not want to sound impious, but I suspect that this 'mathematician-architect of the Universe,' deduced from modern physics, is nothing but a projection of an idealized mathematical physicist against the sky and has nothing to do with the God about Whom the Christian message speaks. Christians should not try to make apologetical capital out of this role of mathematics."

—from Aldert van der Ziel, *The Natural Sciences and the Christian Message,* Minneapolis: T. S. Denison & Co., Inc., 1960, copyright by Lutheran Studies, Inc., p. 29.

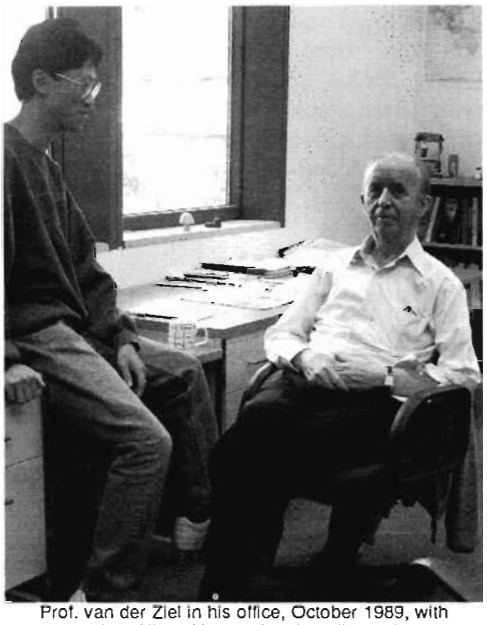
Theological Reflection

Filtering Out What Doesn't Belong

Scientists and engineers study noise partly to figure out how to get rid of it. Noise is "unwanted information," clogging communication channels and degrading the quality of information handled by computers. Noise can sometimes be eliminated by inserting "narrow band pass" devices that let a desired band of frequencies pass but filter out unwanted ones.

Science as a Filtering Process

Aldert van der Ziel accepted the idea of science as "the pursuit of truth" but considered it a loaded definition because it suggests that only science is true. He felt that some scientists, perhaps to boost their own egos, define science too narrowly, excluding many fields of inquiry other than their own. He objected to the phrase *scientific method* when used to imply that only one method exists or that any investigation not fitting within its narrow framework is unscientific. In the Dutch language and tradition, the word *science* can be used for scholarship in general. Hence Aldert once wrote that Christian theology—the systematic investigation of the sources, content, and interpretation of the gospel message—should be classified as a science.



Prof. van der Ziel in his office, October 1989, with student Alister Young. Are they discussing physics or theology?

Whatever one's definition, science acts like a filter. The physical sciences, for example, exclude from their consideration nonphysical forces that cannot be measured. Since all scientists work to eliminate hypotheses that do not stand up to experimental test, science could be defined as "the pursuit of error." Its purpose is to weed out false ideas so we can see more clearly how the physical world really works.

Theology As a Filtering Process

Even when science is defined narrowly, theological investigations resemble at least the theoretical aspects of scientific work. Theologians, though more at ease than scientists with the word *truth,* also proceed by eliminating error. Theological work aims to filter out ideas that do not jibe with sound knowledge of God's Word or God's world.

Following Karl Barth, Aldert van der Ziel took a dim view of "natural theology," looking exclusively to the Bible for divine revelation. Following Gerhard von Rad, Aldert distinguished between the biblical message and what might be called the "biblical framework" in which that message is conveyed.

Every communications channel has its own kind of "noise." In communicating with humanity, God had to take a certain risk that we might be distracted by what is extraneous to the real message. To Professor van der Ziel the message was clear: we are not "making the moral grade" but Jesus Christ has done something about that. Recognizing sin as the root of human troubles could make us despair when we look at the world, Aldert believed, but God tells us that we are *forgiven* sinners. That knowledge, Aldert wrote, "does not drive us into despair but revives in us the hope and makes it possible for us to work quietly toward the solution of problems that face us." Ω

> Long ago God spoke to our ancestors in many and various ways by the prophets, but in these last days he has spoken to us by a Son, whom he appointed heir of all things, through whom he also created the world. — Hebrews 1:1-2

IS THE BIBLE SCIENTIFIC?

"Concerned Christians in the past have had, and many at present still have, considerable difficulty in accepting scientific discoveries and theories concerning the world and its origin. They have feared, and many still fear, that they would have to forfeit the integrity of Scripture if they would do so. This problem had its origin in the manner in which the Biblical message, in particular the message of Genesis, was tied to 17th-century science. To overcome this difficulty, one should allow the Bible to *speak for itself,* without making premature connections with science and without introducing preconceived notions derived from science. It will then be seen that most of these problems disappear.

"For others the problem seems at first sight to be of a quite different nature. They hold the first chapters of Genesis to be an ancient *explanation and view* of the world around us, that was once useful and valid but that has now been superseded by a scientific explanation and world view. The error made here is that it is not sufficiently understood that Genesis gives in the first place a *religious, theological* message. It does not try to *explain,* but it *teaches* and *preaches* God as creator. To find that out, one must listen carefully to what Genesis tries to convey."

—from Aldert van der Ziel, *Genesis and Scientific Inquiry,* Minneapolis: T. S. Denison & Co., Inc, 1965, pp. 11-12.

The fact that scientists try to be "objective" and remain as unbiased as possible in their work does not of itself keep them from holding religious convictions. (Ironically, belief in science as the only source of knowledge is held by some with an almost religious fervor.) Aldert van der Ziel's personal religious beliefs and his range of other interests helped make him a delightful husband and father as well as a friend to many, many students.

Eindhoven, 1947, the day before Aldert and Tine left for Canada. Son Jan Peter, in front of Aldert, is now a physicist at Bell Labs. Daughter Cornelia, in foreground, is a physician. Joanna, born in Vancouver, is also a physician.

One scientist recalls being met at the airport on visits to Minneapolis: during the ride, Aldert would talk animatedly of the lastest experimental findings and theoretical models of noise in whatever was under study at the time, "from vacuum tubes to submicron HEMTs." An hour later, in his home or at the Campus Club, Aldert would be talking about theologian Rudolph Bultmann, Gerhard von Rad, or cosmology and Einstein's general relativity (the necessity of which Aldert felt was still open to debate).

High Standards, but Humane Treatment

Prof. van der Ziel trained some outstanding scientists and engineers but he was also a "father" to some less gifted students. On one occasion one of his students gave a rather weak defense of his doctoral dissertation. It is rumored that afterward the professor said to the committee, "Look, we need some students like this one, to maintain the normal average." After some discussion the committee voted to pass the student, who now does respectable scholarly work at a school not quite in the top rank.

Eindhoven, 1981, when Aldert returned to receive an honorary doctorate.

In one sense Aldert's work was his life, but the human aspects were never far from his soul. Former students remember the long hours they put in to get the experimental results he wanted to see, but also his compassion toward their human needs. They remember his lab, but also being in his *home*. His wife Tine was an essential part of his own support system, typing and retyping his manuscripts and making that home what it should be.

Not a Hierarchy, but a Fellowship of Scientists

A yearly picnic in the van der Ziel yard brought together all the lab workers and their families, spreading blankets on the grass for their children. With Americans, Chinese, Taiwanese, Japanese, Koreans, Greeks, Iranians, Indians, and various other nationalities (including Dutch), it was like a little United Nations: a community with a common bond, at peace.

Aldert never saw the gradation from pure science to applied science to engineering to technology as any kind of hierarchy. He noted that those who see it that way generally put themselves at the top. He felt that the borderline between science and engineering was becoming less distinct, and he liked it that way.

Aldert van der Ziel was a long-time Fellow of the American Scientific Affiliation (ASA), a fellowship of Christians in science and technology. For many ASA members he was an inspiration, as though both his life and his work were saying,

Beproeft alle dingen; behoudt het goede.
("Test everything; hold fast to what is good,"
1 Thessalonians 2:21.) Ω

Thoughtful Worship

A Well-Rounded Life

SEARCH

This issue of SEARCH (No. 14) was prepared by Walter R. Hearn of Berkeley, California. Design by Nancy C. Hanger; layout by ASA managing editor Rebecca Petersen. Opinions expressed in SEARCH are those of individuals and may not be representative of the entire ASA membership. Scripture quotations are from the New Revised Standard Version (1989) unless otherwise noted.

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to the PIMS model, for setting the par value for this homeostatic goal.[34] The decision rule will be to set an optimal rate of return coefficient for the SSE which minimizes cost of operation while maximizing the value added to the global economy.

The operation of these electronic control mechanisms trigger monetary and fiscal actions by the NEPC that speed up or slow down the economy.

The strategic management of the SSE in the competruistic society focuses on the use of computer based control models. These cybernetic control systems should be designed to monitor the performance of the SSE within thresholds that are delineated by moral, legal and operational performance standards.[35] The operation of these electronic control mechanisms trigger monetary and fiscal actions by the NEPC that speed up or slow down the economy. The complex decisions to accelerate or brake the economy are executed whenever the actual moves of the homeostatic survival coefficient breaks through predetermined thresholds for the planned equilibrium standards. The NEPC's control system is unlike Keynes' "Compensatory Model" which utilizes government borrowing as a means of stimulating the economy. Managing the operation of the SSE within reasonable tolerances around the homeostatic survival coefficient will require the NEPC to establish an annuity program. This program serves as a national savings account for all citizens in the competruistic society. The national annuity account will help to remedy the problems, in some post industrial nations, with low levels of per capita savings. Inadequate savings undermines these advanced nations' ability to fund the rapid technological progress necessary for their long run survival and prosperity. Details of this national annuity account will be explained in the section on the consumption tax. The thermostatic mechanism in the NEPC's control system provides the gauge for regulating the flow of money into the private sector. This control system is designed to keep the operation of the SSE within an optimal range. The NEPC would have the authority to raise or lower interest rates on funds in the national annuity account that were lent to business enterprises by banks. Also, this strategic management agency could adjust the variable tax rates on money taken out of the national annuity accounts by citizens for expenditures. These combined actions by this macro agency would provide the basis for controlling the speed and volume of capital turnover in the economy. When the NEPC lowers the variable tax rate on money taken out of the annuity account, it will encourage expenditures on services because of the fixed tax rate on property in the competruistic society. Of course, raising these variable rates would discourage citizens from taking money out of the annuity account for routine expenditures.

The banks, which will control these national annuity accounts, will play the central role in lending these funds to borrowers according to strictly commercial criteria. Although the prime rate will be set by the NEPC, the interest charged to the borrower would be calculated to cover the banks' overhead, risk and profit. The efficiency of this macro control system will be greatly enhanced as progress is made in reducing monetary float through the implementation of electronic funds transfer throughout the SSE.

The NEPC would have the authority to raise or lower interest rates on funds in the national annuity account that were lent to business enterprises by banks.

The coordinating medium in the strategic management of the SSE will be a management by objectives process for setting capital productivity targets for all the organizations that operate under the NEPC. This macro planning agency will establish goal congruency throughout the SSE by negotiating specific return on investment or asset targets, with its member firms, that synthesize back into the homeostatic survival coefficient. Of course, these companies will have the autonomy to develop the best objectives, strategies and tactics for achieving these optimal profit goals within moral, legal and operational constraints. This management by objectives format accommodates innovation through the use of empirically based forecasting that identifies the long term profit potential of new companies with promising technologies, e.g., semiconductors, bio-engineering, lasers, medical instruments, energy generation, etc. This focus on profit potential will direct resources, away from mammoth dying industries, into futuristic enterprises that can add high levels of value to the SSE in raising standards of living and quality of life in society.

Optimal profit goals for these organizations can be approximated through the use of judgmental methods, e.g., company records, annual reports of companies, financial reports (Fortune's 500) and trade association materials (Robert Morris Associates) and empirical procedures, e.g., the Rand Risk Premium Method, the Capital Asset Pricing Technique and the PIMS model.[36] Final capital productivity coefficients must be agreed upon by the chief executive officers of the firms and the appropriate NEPC planning bureau in order for these enterprises to participate fully in the national planning scheme.

Corrective actions would be initiated when an organization's actual performance, depicted by these diverse variables, breaks through predetermined thresholds delineated by moral, legal and functional performance standards.

Once the NEPC planning bureaus and their member firms have agreed to specific return on asset targets, this macroagency can use its super computers to monitor the operations of these organizations. That is, a management by exception report format can be used to plot these organizations' actual capital productivity around their negotiated profit goals. Other variables that would likely be monitored by this control channel format include: cash flow, inventory levels, receivables, market share, capacity utilization, investment/sales, working capital, value added, current liabilities, R & D, expense/sales, etc. Corrective actions would be initiated when an organization's actual performance, depicted by these diverse variables, breaks through predetermined thresholds delineated by moral, legal and functional performance standards. The appropriate NEPC planning bureau and the dysfunctioning firm would take coordinated steps to bring the variables, which affect capital productivity, back within reasonable tolerances. Examples of corrective actions that could be taken by the macro agency, if enough firms shared the same problems are: recommended adjustments in public policy, creation of tax credits, direct grants, industry subsidies, changes in trade policies, negotiations for strategic minerals, funding of basic technological research, initiation of training programs, etc. It should be understood that this management by exception format is designed to control the capital productivity of organizations around target levels for these profit goals. This homeostatic control mechanism facilitates productive organizations to achieve, maintain and enhance their survivability over time. The strategic management of the market system does not control the exchange (buying/selling) processes between social entities (people/organizations). This control format can also be used to monitor aggregates of these organizations, e.g., companies grouped into one, two, three and four digit S/C categories. Thus, every major socioeconomic force that affects the capital productivity of the market system and subsequently the survivability of the competruistic society, can be monitored and coordinated by the NEPC's computer based-management system.[37]

Subsequent to developing a format for the strategic management of the SSE is the need to introduce a new division to the court system. This judicial process will facilitate resources to be allocated efficiently in the public and private sectors of the competruistic society.

Commerce Division in the Court System

The main social strategy that provides for optimizing productivity in society concerns the addition of a commerce division to the traditional civil and criminal court system. The need for this new court division is based on the realization that achieving "productive efficiency" in an advanced nation necessitates that its citizens and organizations be held accountable for adding value to its economy. The above "criterion of success" should encourage these social entities to undertake productive activities to provide the best possible ratio between costs and benefits in the post industrial country.

The need for this new court division is based on the realization that "productive efficiency" in an advanced nation necessitates that its citizens be held accountable for adding value to its economy.

Currently, there is no institution in progressive countries, like America, which serves as an effective countervailing force to inept and/or unethical bureaucratic decisions that undermine the productivity of the economy. The condition has lead people

to feel powerless and hopelessly cut off from participation in making socio-economic decisions that affect their standards of living and quality of life. The inability to effectively challenge self-serving bureaucratic decisions violates the guiding principle of participatory democracy. This tenet emphasizes that people must be a part of the process of arriving at decisions which have a major impact on their lives. Hence, a new institution can be introduced into advanced nations which gives citizens an effective way of curtailing the noxious activities of social entities that have an adverse effect on their lives. This new court division will serve as an effective deterrent to people and organizations that are attempting to promote their own selfish ends to the detriment of society.

The inability to effectively challenge self-serving bureaucratic decisions violates the guiding principle of participatory democracy.

The new judicial division, entitled the Commerce Court, will be responsible for all litigation which involves a tractable exchange of value between people and/or organizations. The court will take appropriate steps to protect the interest of society when the actions of people and/or organizations are clearly having an adverse effect on the "productive efficiency" of the economy. That is, social entities will have a means of legal recourse in stopping the actions of people and/or organizations that are promoting waste, inefficiency, mismanagement and fraud in society. It will be necessary to empirically prove these adverse actions are having a detrimental effect on the potential value (total costs minus total benefits) that a productive endeavor could add to the economy.

The constitution of the competruistic society can be drafted to guarantee social entities, who are damaged by the actions of others, the right to correct the situation through the commerce court. This judicial division will operate similar to the private court system in America where the litigants pay for its services and are legally bound by its decisions.[38] The focus on "value added" in this judicial process reflects the fact that the competruistic society is a single body shared by all of its inhabitants. It follows that their potential standards of living and quality of life will be adversely affected by the degree to which this socio-economic order dysfunctions. For example, one of the most notable changes the commerce court will bring about is the transfer of public budgetary decisions from elected officials to its jurisdiction. The services of the commerce court would be used after the elected government officials and the NEPC complete the process of prioritizing the goals and objectives the nation and states are to achieve. This court division will determine the most efficient means for accomplishing these predetermined targets. The judicial process in the commerce division, which employs juries of experts, will authorize the budgets, strategies and tactics for accomplishing the ends sanctioned by the government and the NEPC.[39]

In retrospect, the commerce court will provide an expedient means for correcting the detrimental actions of people or organizations that undermine the value that could be added to the SSE. This will be accomplished when no social entity is allowed to be above conformity to the law and sound ethical standards that concern actions that have a harmful effect on others in society. The commerce court makes it possible for the "little guy" to function as a full and equal partner in the management of the competruistic society. This judicial process will allow a citizen to right the wrongs that heretofore he/she could do nothing about legally.

The commerce court will provide an expedient means for correcting the detrimental actions of people and organizations that undermine the potential value that could be added to the SSE.

Consumption Tax Program

In addition to the commerce court, it will be necessary to introduce a consumption tax program into the competruistic society to provide sufficient savings to fund technological progress in its SSE.

A consumption tax is used in the competruistic society to place a cap on material gain at a level where further increases are deemed counter productive.[40] A description of the harmful effects from excessive material gain can begin with Arnold Toynbee's observation, from his tome *Stages of Civilization*, that national cultures go through five distinct stages. These stages are: (1) birth, (2) rapid

growth and expansion, (3) conservation of gains, (4) moral decay, and (5) disintegration. Perhaps the factor most responsible for moral decay is affluence which appears to be the soft underbelly of society. Contemporary culture is plagued by the passion to possess. The good life is found in accumulation expressed by the idea that "more is better." The lust for affluence, which undermines responsibility and character in society, has become psychotic. Affluence causes growing apathy which finally results in a state of chaos and anarchy which can lead to a police state and eventually slavery. Clearly there are two ways to get enough: One is to continue to accumulate more and more and the other is to desire less. The tax scheme in the competruistic society provides disincentives for material accumulation at the point where increases are deemed to represent conspicuous consumption.

Contemporary culture is plagued by the passion to possess. The good life is found in accumulation expressed by the idea that "more is better."

Advanced societies will need a savings base of at least twenty percent of GNP to promote the scientific and technological achievement necessary to sustain high standards of living in the Information age.[41] Hence, fixed and variable rate schedules will be used in this consumption tax program to establish an optimal balance between consumption and savings in order to fund technological progress in the economy. Individuals will pay a flat tax rate on their property, e.g., a home.[42] Personal income will be taxed at a flat rate up to an optimal point. The personal income tax schedule will become increasingly progressive after the optimal point is reached. This schedule, with a flat tax over the optimal income range followed by progressive rates, is based on the premise that there is a point in consumption beyond which expenditures do not contribute to physical well-being. Expenditures which exceed the optimal range will not extend longevity of life in society as a whole and, therefore, can be considered to be conspicuous consumption. These purchases are made for the purpose of acquiring goods and services that symbolize prestige, status and affluence. It is assumed in this tax scheme that scale economists will be able to devise empirical methods for determining levels of consumption which permit individuals to optimize their standards of living and quality of life. For example, scale economists may begin by using tax schedules that provide for an ideal relationship between national consumption and savings. The need for this arrangement is based on the fact that the key to maintaining a country's productivity lies in constant and prudent investment of national savings. The optimal relationship between consumption and savings in the competruistic society could be perfected in the tax schedules as data dictates over time. People will be given the option of deferring taxes on surplus income, beyond the optimum range on the tax schedule, by saving it in a nationally sanctioned annuity program.[43]

Only when the sheltered capital is drawn out of the annuity program for expenditures, will it be taxed at a predetermined rate. If people decide to spend their income, beyond the point of optimality on the tax schedule, they will voluntarily pay graduated taxes. These progressive rates will raise the tax on consumption significantly, as a result of income producers electing not to shelter their surplus capital in the national annuity program. This appraisement system tightens the lid on consumption further by not providing exclusive concessions for any individuals or special interest groups other than religious organizations. Firms will also pay a flat tax on property. Ideally, the rate on income property, e.g., buildings and land, will be set at a level which will encourage the most productive use of these assets. A flat tax will be levied on corporate income to an optimum point, after which profits would become excessive for a particular type of enterprise.

Clearly there are two ways to get enough: One is to continue to accumulate more and more and the other is to desire less.

Empirical methods already exist, e.g., the PIMS model, which can be used to determine the "par value" or optimum return on investment for hundreds of different types of businesses. Progressive tax rates will be used to encourage companies to shelter capital, beyond the optimal profit range, in the annuity program. This surplus income would be taxed at a predetermined rate, only when it is taken out of the annuity program for expenditures.

The NEPC, working in conjunction with the federal government, would use empirically based models to set variable tax rates for capital taken

out of the annuity programs for domestic and commercial expenditures. This variable tax rate will be used to regulate the metabolism of the economy which would have to be in sync with the intensity of goal achievement being undertaken by the nation. The NEPC would raise or lower the tax rates on money taken out of the annuity account whenever the actual homeostatic survival coefficient moves above or below predetermined thresholds for this planned equilibrium standard.

Progressive tax rates will be used to encourage companies to shelter capital, beyond the optimal profit range, in the annuity program.

The NEPC's computer control system provides the gauge for regulating the flow of money from the national annuity account into the private sector. This cybernetic mechanism is designed to keep the operation of the SSE within an optimal range which will eliminate the wide cyclical swings commonly associated with capitalistic economies. These conditions will provide for the actual capital productivity coefficient to be a "standard of living" index and value added by the SSE to serve as an indicator of "quality of life."[44]

Framework of Judeo-Christian Ethics

The competruistic society must be bounded by Judeo-Christian ethics in order for this public to achieve a zenith of productivity in advancing its survivance to optimal limits.

The competruistic nation operates in a framework of Judeo-Christian morality which clearly distinguishes this conserver society from contemporary capitalistic and socialist publics that are characterized by situation ethics.[45] The moral absolutes and values of Judeo-Christian ethics will have the greatest impact of any program described in this treatise, on quality of life in the competruistic society.[46] However, the operation of the steady state economy, managed market system, privatization, employee entrepreneurship, commerce court division and consumption tax program will make significant contributions to this end.

The reason Judeo-Christian ethics is the most important program contributing to the quality of life in the competruistic society, concerns the fact that every socio-economic action is a moral act. This is because these socio-economic actions impact the lives of people. Hence, it is wrong to ignore the fact that all socio-economic decisions have their root in moral standards.[47] Quality of life can be undermined in a nation when people resolve socio-economic problems in a value free milieu that permits them to ground their decisions in the amoral or immoral dimensions of situation ethics.[48]

There are several paramount reasons for operating the competruistic society within the delimitations of Judeo-Christian ethics. First, the culture of character, that emanates from Judeo-Christian ethics, will protect the competruistic society by insulating it from the secular values of the world. Second, the moral absolutes of Judeo-Christian ethics will provide for the survival of the competruistic public by establishing a sound foundation for it to operate on while withstanding the vagaries of chronic change. These observations indicate that free enterprise, operating under the high output demands of the information age, cannot prosper in a competruistic society that has allowed greed and hedonism to replace its Judeo-Christian framework with situation ethics.[49]

The reason Judeo-Christian ethics is the most important program contributing to the quality of life in the competruistic society, concerns the fact that every socio-economic action is a moral act.

Therefore, when the competruistic society is encapsulated by Judeo-Christian ethics it provides a resilient framework for organizing the steady state economy into a powerful engine of exchange. The bonds of trust, that hold a free society together, will be strengthened as the integrity of the exchange processes in this public increases. This condition will facilitate the public to withstand the stresses and strains produced by the geometric increase in transactions between people in the information age. Thus, the strength of the competruistic society is in the integrity of its people and that attribute will be produced by their moral character.[50] The character of the people who comprise the competruistic society will determine whether this public regresses, to function as a reservoir of accumulated capital, or stays true to its mission. The competruistic society

is designed to operate as a conduit of wealth in maximizing the value it adds to the global economy.

Summary

Competruism has been born in the transition from the industrial era to the information age. This term is coined from the words "true competition" which refers to rivalry between a social entity and its own empirical performance record over time. Auto competition is "true" in the sense that it eliminates the differential advantages of rivals, e.g., people, organizations, economies, etc., that cannot be compensated for by the rules of engagement. This cost effective form of rivalry is distinguished from "free competition" which represents an expensive, destructive way of achieving progress in society.

The combination of the competruistic ideology and the steady state economy produces a unique format of cost reduction programs.

True competition is the cornerstone concept of the competruistic ideology. This philosophical system synthesizes the free market competition of democratic capitalism and the allocative cooperation of practical socialism into a coordinated whole that operates within the delimitations of Judeo-Christian ethics. The goal of competruism is to advance the survival chances of society and each of its denizens to optimal limits and then facilitate other free publics to achieve the same ends. Productivity provides the means for achieving the survival goal of society and longevity of life for its denizens under competruism.

The competruistic ideology is compatible with a democratic republic under constitutional law and the steady state economy. This type of economy is characterized by constant stocks of human bodies and physical capital, optimal standards of living and quality of life and the achievement of productive efficiency through cost minimization technologies. The combination of the competruistic ideology and the steady state economy produces a unique format of cost reduction programs. These three cost containment programs, which operate under the competruistic ideology, include the strategic management of the SSE, the "value added" commerce court division, and the consumption tax system. It is posited that the competruistic society will be capable of achieving a zenith of productivity when Judeo-Christian morality provides the culture for problem solving and the foundation for decision making in this public. Thus, the competruistic society will advance its survival chances by functioning as an efficient engine of exchange in the technological milieu of the information age. ✣

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We must enlarge our effort at understanding. In the nineteenth century, the Greek scholars were somewhat narrower than the best of the Greeks, the Christian scholars were somewhat narrower than the best of the early Popes, and the men of science were somewhat narrower than the founders of the study of mathematics and of physical science. The nineteenth century in the aggregate knew immeasurably more than the Greeks, and the Popes, and the founders of science, all put together. But the moderns had lost the sense of vast alternatives, magnificent or hateful, lurking in the background, and awaiting to overwhelm our safe little traditions. If civilization is to survive, the expansion of understanding is a prime necessity.

Alfred North Whitehead, *Modes of Thought*

Toward a Unified View of Science and Theology

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Current Christian thinking on the philosophy of science and theology largely embraces a "two-worlds" view of science and theology, that scientific claims and theological/biblical claims cannot contradict each other because they address two completely different aspects of reality. I dispute this view, and argue that faith in God and the propositions of the Bible are of the same nature as faith in the order of the universe and the results of scientific experiments. Although keeping certain propositions in the religious sphere may protect them from attack, ultimately this kind of separation cuts Christians off from meaningful dialogue with the world. In keeping with this view of the unity of knowledge, I propose several areas in which theology and modern science intersect in their studies.

Is the philosophy of science of Christians healthy these days? Do we have a cogent system for pursuing distinctly Christian science? I feel that modern Christian philosophy of science could use some fresh thinking.

In this essay I present a brief overview of my approach toward the philosophy of science and theology. In doing so, I challenge the viewpoints of many others. I do not refer to the specific works of other writers, however, because I wish to generalize a great diversity of thought under the single category of the "two worlds" view. In response I argue for a "unified" view, that all knowledge is essentially the same. As I show, this viewpoint can have profound implications for science and theology.

The "Two Worlds" View

Having interacted with a number of Christians at the university level over the past few years, including members of the American Scientific Affiliation, I would say that one view of the relationship of science and theology pervades the thinking of most Christian scientists today. This view, which I call the "two worlds" view, says, in essence, that science and our thinking about science lie in one world and that the Bible and theology lie in another world, completely distinct from the first. The two worlds do not contradict each other because they cannot; no overlap exists for one world to have implications in the other. I have heard the terms "orthogonal," "complementary," and "different levels of description" used to describe this non-intersection of worlds. The Bible has authority in "matters of faith," not at all in matters of science, because faith and science have nothing to say about each other.

This mindset of "two worlds" comes, I believe, from an essentially defensive posture. Having survived a long tradition of attack on Christianity in the name of science, many Christians make the underlying assumption that if the two worlds did overlap, then science would surely contradict Christian faith. Even if science does not presently appear to contradict our faith, the possibility always exists that it will. Richard Bube perhaps puts it best when he says that if we tie our theology to our science, then when science changes (as it always does) then

our theology must change. To go further, if our belief rests on some point of science, then if that scientific fact becomes disproven, our faith will crash! Not wanting to lose their faith nor to reject the truth yielded by science and experience, many have found a refuge by living in two worlds at different times of the day, not unlike the schizophrenic. With Christian faith having no implications at all for what to look for in science itself, the only implications of Christianity for the scientist boil down to the needs to live an ethical personal life and to have a Bible study during the week. Christianity never challenges the actual science of the scientist.

Some have even gone so far as to define evangelism in terms of affirming as much as possible of non-Christian science, in fact, all of non-Christian science because Christianity has nothing distinctive to say about science, in order to demonstrate the degree of enlightenment of modern Christians. This in turn presumably provides opportunities for inviting non-Christians to Bible studies. The degree to which some people have gone to affirm atheistic science sometimes amazes me. I recently read in the ASA Newsletter of a man who claimed that Christians could even accommodate Hawking's theory of an eternal universe, in contradiction to the historical doctrine that only God is eternal, Who existed "in the beginning."

In saying this, I do not mean to question the faithfulness or sincerity of individuals who hold to a two-world view. For most individuals I know, this view serves as the best philosophy of science they have found. I feel, however, that such a view necessarily stunts inquisitiveness, removes a basis for offense against worldly philosophies on the basis of reason, and leads to sacrifice of biblical truth.

Can We Make Faith Unassailable?

Can we ever really divorce science and Christian faith? Can we really come to an unchanging theology that knows only the Bible and not the latest scientific data? To put it another way, can we ever put our faith in such a safe place so that no datum of experience could ever overturn it? I think not.

Suppose that next year scientists came up with the bones of Jesus, proven beyond a shadow of a doubt to belong to him. Would that affect your faith? I hope that it would destroy it. Or can you already imagine hastily redefining your definition of the Resurrection? Suppose that scientists proved beyond doubt that propagandists wrote the Bible in the 18th century and at the same time generated all the historical records of it existing before then. Only a fool would continue to cling to faith in such a document. In fact, I know several acquaintances in religious cults like the Mormons who do continue to believe in the dogmas of their religion in spite of overwhelming historical and scientific evidence to the contrary, precisely because they have foolishly made their faith untestable, a world completely different from the world of experience, history, and science. I claim that our faith does depend on the well-established scientific "facts" that no one can find Jesus' bones and that the Bible comes from the times it says it does, as well as a host of other such facts. These facts may seem so well established that questioning them seems absurd. Nevertheless, they belong to the physical, observable world and therefore at least in principle have implications for science.

Some may at this point feel uncomfortable with my position. If I make faith subservient to experience, do I not leave open the possibility of the believer blowing with every wind of new scientific theory? Or do I put Christianity in the position of opposing science whenever it contradicts the Bible (which I claim can happen), therefore endorsing anti-intellectualism? How do I define faith, if not as an unassailable presupposition?

I think that the basic question comes down to,

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"What should we do when a result of science appears to contradict a belief we hold as part of our faith?" Let me take again the hypothetical case of a report of proof of the discovery of Jesus' bones. I can imagine three possible responses to such a report.

I think that the basic question comes down to, "What should we do when a result of science appears to contradict a belief we hold as part of our faith?"

First, a believer may say, "I reject that report because it comes from scientists." I call this the position of "fundamentalism"/anti-intellectualism — the scientist as villain. A second believer may say, "I can handle that. The essense of the Bible's teaching in the Resurrection does not center on the fact that Jesus really rose bodily." I call this the "eager-to-please" position — the scientist as god. Both of these positions maintain a dichotomy between the truth of the Bible and the truth of science. In the first case, the truth of science belongs to the unimportant world, while in the second case, the literal sense of the Bible belongs to the unimportant world. Both reject any tension.

I have, of course, caricatured both positions above. In the first category belongs not only the anti-intellectual, but also many quite intelligent schemes of presuppositionalism. These also reject data out of hand such as bones purported to belong to Jesus, not because the scientist is an evil person, but because the data comes from the natural world, which is the world of science. Any attempt to bring these in conflict with the presuppositions of religion is seen as evil. In the same way, quite intelligent liberal thinkers, for reasons other than pleasing the world, feel that Bible scholars overstep their bounds if they insist on a scientific implication, such as the location of an ancient city or the time period of the Flood, based on scriptural exegesis.

Let me return to my hypothetical case of the report of Jesus' bones. A third believer, the Seeker after Truth, may say, "That really goes against the Bible, and I don't believe it. But you seem to have built a compelling case, so I want to examine this further. I expect that your science has errors, in which case I can advance science by discovering them. If your claim truly is airtight, however, then my faith has no basis, and I cannot take that possibility lightly."

Can a believer live with that kind of attitude? I think so, although perhaps not with the degree of comfort he or she would like. Let me give an example from science of living with tension. Suppose a scientist comes across some data which seem to violate a cherished principle such as the conservation of energy. How should the scientist react? Option 1: ignore the data. Option 2: give up on physics as we know it. Option 3: investigate thoroughly. Breakthroughs can occur when this happens. Has the scientist lost faith in physics in this case? Not really, although the slight possibility of the failure of a cherished principle does drive the investigation. I note that the first two options are not merely hypothetical. Many professional scientists ignore data when they contradict well-established theories, often simply because questioning these theories would require too much work. Option two is all too often the case among students. Most students hate physics not because it is too difficult, but because it contradicts too many cherished "common sense" principles. Each group makes an easy resolution of any tension.

Some may object that comparing faith in God to faith in a scientific principle such as conservation of energy does disservice to faith in God.

Some may object that comparing faith in God to faith in a scientific principle such as conservation of energy does disservice to faith in God. I agree that faith in God involves a much more far-reaching faith than belief of a single scientific principle. I see the difference between the two as essentially quantitative, however, rather than qualitative, with faith in God as *deeper* and *wider*. In fact, faith in a single scientific principle does not properly compare to faith in God, but compares to faith in a single principle about God, for instance an attribute of God. I have changed my mind regarding the attributes of God over the years; for instance, at one time I did not know or believe in the wrath of God, but now I do. Did I believe in the same God then? I do not believe that changing my understanding of an essential attribute of God involved lack of faith in God. That deepest faith in a personal God compares to an equally deep faith in the area of science, that is, my faith in an orderly God.

A Unified View

Let me expand my view a little further. Experimental results, archeological digs, historical documents, my inner feelings, and the words of scripture all function as "sense experience" data. Historically, the Church has talked of "general revelation," that is, experience at least in principle available to us all, and "special revelation," that is, experience available to only a few, which involves direct communication from God. Scripture contains a general-revelation record of the claims of others to special revelation. The two kinds of revelation, or sense experience, both occur in this physical world. With both, we must trust second-hand information ("authorities") to some degree.

To the seeker after truth, real contradictions can never occur in the "data" provided by God, only in the frameworks we construct.

Science and theology both function as the "theoretical frameworks" into which we organize all of our sense-data memories and make predictions of what new sense data to expect. On an almost daily basis, we encounter sense data which do not fit readily into our mental framework. The apparent contradiction creates tension, a state of some level of confusion. To resolve the tension, one must ultimately adjust one's theoretical framework in a self-consistent way to incorporate the new data. We cannot always do this easily, and so at any given time we each carry a certain number of apparent contradictions with us. The seeker after truth has at least a goal of eliminating the contradictions, as opposed to the mystic who revels in contradictions. To the seeker after truth, real contradictions can never occur in the "data" provided by God, only in the frameworks we construct.

To put it another way, we each make "presuppositions" or assumptions about the world. These presuppositions build on each other in layers — many presuppositions involve deeper, underlying presuppositions. In the ordinary course of life, we can overturn upper-level presuppositions without much stress in order to resolve new experiences (e.g. meeting a person from Indiana who hates basketball overturns the simple presupposition that all people from Indiana love basketball). More abiding contradictions may force a more painful re-examination of lower-level presuppositions (e.g. maybe not all people like me). A buildup of deep contradictions within a system of thought may force a "Kuhnian revolution," that is, a complete change in world view due to the overturning of a fundamental presupposition. This can only come about if a viable alternative world view exists.

Some Christians seek to put all Christian doctrine at the level of fundamental presuppositions. In doing so, they can keep their doctrine safe from questioning for a long time, but they risk having their whole world view overturned when contradictions to certain doctrines arise. The child of a fundamentalist may leave the flock altogether.

As a reaction to the above type of Christian, other Christians try to deduce a "minimal set" of Christian belief to hold on to at the deepest level, such as the "Four Spiritual Laws," a few creedal statements, or simply the need to always keep the name "Christian." They then sacrifice every other Christian truth claim which conflicts with the world.

In each case, and in many less extreme cases, Christians seek a simple cutoff for beliefs to defend at all costs. For me, the most responsible course requires a recognition of the different levels of importance that various doctrines may have. An initial conclusion based on a little experience may require only one counterexample to overturn it. A more deeply held belief, such as a belief about the wrath of God or the conservation of energy, may require a long period of exposure to completely inexplicable data (biblical or natural). Deepest beliefs like belief in the personhood of God, by which we interpret the world, do not belong to a completely different world. I do not divide the world into so-called "control beliefs" which are unassailable and all other beliefs which can be sacrificed. This kind of division allows us to sacrifice too easily biblical truths which we have not made "control beliefs," and it allows us to add too easily to our body of control beliefs doctrines which we find hard to defend.[1]

My position allows for changing of theology and science. Nevertheless it insists that we do not quickly drop beliefs simply because they lack popularity in the world (or the church) at the time.

My position allows for changing of theology and science. Nevertheless it insists that we do not quickly drop beliefs simply because they lack popularity in the world (or the church) at the time. In my example above of the report of finding Jesus' bones, I stated that proof of their existence should destroy our faith. A simple claim of their discovery, however, should do no such thing because the Bible and the Church among other things are strong proofs to the contrary.

What is Faith?

At this point I must address the basic issue of the definition of faith. Very few philosophers deny that people do indeed acquire all forms of knowledge starting at a very early age via a process like that which I have outlined above, creating and overturning assumptions at various levels over time. A person gains religious knowledge in the same way, hearing the Bible or other religious propositions and making decisions about whether they make sense and the trustworthiness of their sources such as parents and teachers. The problem arises, however, that we do not want to allow the overturning of our faith in a casual way. For this reason some have proposed that at some point after we have come to know certain truths, we take another step, by an act of the will, to make these beliefs unassailable. This step is equated with faith.

Is faith an act of the will by which we remove a proposition of truth from the world of experience and place it at the level of presuppositional dogma?

What is faith? Is faith an act of the will by which we remove a proposition of truth from the world of experience and place it at the level of presuppositional dogma? I find that the Bible consistently uses passive terms for faith — those with faith "having been persuaded," or "being convinced," or "believing what they have heard." Faith is not a work of the will which has merit in the eyes of God. Rather, faith is a necessary prerequisite work which God must do to us before he can save us, by which he convinces our minds of certain basic truths via our sense experience, such as hearing sermons or looking at nature.

Faith in God compares well to what we think of as faith in a person. Suppose I have a friend, a true friend in whom I put all my trust. He has said he would not leave town without me. A person then comes to me and tells me that he has seen my friend driving out of town. How do I respond if I have faith in my friend? I don't want to believe he has let me down. Suppose I say, "By force of willpower I have presupposed that my friend can never leave town without me." To force all data into that framework without possibility of letdown, I have two choices: I can ignore all new information so that I can never hear that my friend has left, or I can "redefine" what I mean by "leaving town" so that no matter where he goes, he is still "in town."

Faith is not a work of the will which has merit in the eyes of God. Rather, faith is a necessary prerequisite work which God must do to us before he can save us...

Both of these responses indicate a lack of what we would commonly call faith in someone. One may say, "Why do you need to use willpower to believe that your friend will not leave? Don't you know him?" Both the consequent options, ignoring new information (anti-intellectualism) or redefining the terms of the promise (liberalism), betray a fear that he may indeed leave town!

If I have faith in my friend, I respond first by expressing doubt about the news that he has gone. If I receive even more information indicating that he has left, I may start to do some checking, always with the belief that the truth will vindicate my friend. My faith has real consequences for the world I live in, which makes me vulnerable to a true failure by my friend. But I don't believe that will happen!

A related issue is the question of "sureness." What can we be "sure" about? Can we be perfectly certain about anything? Ever since Kant and Hume, philosophers have taken it for granted that nothing is perfectly certain except for mathematical deductions. Many a sophomore student has lost all sense of purpose and direction after exposure to such philosophy. In response, many Christians take the position that believers acquire perfect certainty by the means of faith as an act of the will. Do Christians need 100% certainty by Hume's definition?

The destruction of all certainty by eliminating "perfect" certainty is essentially a trick, a deception by wordplay. If we do not have 100% certainty are we necessarily "uncertain"? Certainly not! There is room for knowing things as certain without requiring a mathematical standard of perfection. No person has "perfect" certainty that jumping off the Empire State Building will lead to death. Few philosophy professors would try it, however! In fact, the idea of 100% certainty is absurd. Consider the statement, "I am perfectly sure." Who am I? The boundary of my skin does not end perfectly; as an electron microscope can show, it fades away. Instead of causing insecurity about my existence, however, this should only show the absurdity of splitting hairs indefinitely.

Rather than talking of perfect certainty, we can talk of being "sure enough" — sure enough to act, sure enough to keep trusting in a friend indefinitely. God expects us to use our will power to act on that which we do believe, not to create beliefs.

To reiterate, moving propositions into a separate world of 100% certainty only does injury to the real-world certainty they do have. It implies that we fear that if we took our religious propositions out of the protected world and let them compete on their own merits in the world of experience, then they would fail.

The Intersection of Theology and Science

How can theology intersect with science today? This involves our whole notion of how scientists do science. No one can deny that the image of the dispassionate scientist simply collecting data, with no prejudice or goals, does not correspond to reality. In a big universe with a lot of data, the philosophy of the scientist defines the interesting places to look, the problems to select.

God expects us to use our will power to act on that which we do believe, not to create beliefs.

I apply here this kind of approach to several examples of the intersection between science and special revelation. First, what do we make of the Institute for Creation Research, or "scientific creationists"? Many scientists operating from a "two worlds" view condemn them for the cardinal sin allowing the Bible to say anything about science, for allowing an overlap of the worlds. The secular world hates them for the same reason — if they kept the Bible to Bible studies, the world would love them, because then the world could ignore the Bible as "religion," not truth about the world we live in. To me, however, the scientific creationists have the right idea when they refuse to throw out the biblical data on the basis of current science, allowing instead the unpopular possibility that cherished scientific theories may fail on the basis of research motivated by biblical presuppositions. To a large degree, they have succeeded in their mission, forcing nearly all of the modern scientific world to respond to their critiques of evolutionary theory and indirectly assisting a great number of scientists to admit that the random, spontaneous evolution of mankind from subatomic particles is extremely unlikely, even if it did happen. The *Anthropic Cosmological Principle*,[2] which has impacted much of the physics community, shows how seriously some scientists take theism as a valid input to scientific theory.

We must allow the possibility of adjusting our biblical interpretation based on historical/scientific data.

Where have creationists gone wrong, then? In my opinion, they have erred in the first place by sticking to a too inflexible theology and mode of biblical interpretation. Blurring the distinction between the biblical "data," i.e., the actual statements of the Bible, and the theological frameworks of people's minds, they leave little room for overturning "upper level" assumptions about what the Bible teaches. The flow goes entirely one way — science may change based on biblical data, (properly, I believe,) but biblical interpretation may never change based on scientific data. We must allow the possibility of adjusting our biblical interpretation based on historical/scientific data. This already occurs on the basis of study of ancient languages, even among fundamentalists.

I also feel, as do many Christian scientists, that creationists have also erred in setting themselves in a position of antagonism toward nearly all modern science, like a secret society infiltrating and attempting to overthrow the "establishment." Their science, some of it good, has too much consisted of attacks on modern science rather than a proposal for a new

consistent framework, in other words, a proposal for the kind of data they expect to see based on biblical assumptions.

In positive terms, what interactions do I see between biblical faith and science? I can think of several examples from my own field of physics. I have mentioned one, that is the issue of the eternity of the universe. Atheism requires an eternal universe of some sort. The observations indicating a Big Bang, however, imply a universe with a beginning. For no other reason, modern cosmologists such as Hawking have promoted the "inflationary" model of the universe which allows for Big Bangs seeded by previous universes in an eternal super-universe. Can we apply Occam's razor in cosmology? In which can we more easily believe, a universe with a beginning and a God who communicates or a finely-tuned theory of epicycles in an eternal universe that by clever masking obscures all record of its eternity? Do we expect that a simple theory of an eternal universe may appear? Experiments looking at the cosmic microwave background may overturn the inflationary theory this year, and astronomers already talk of a complete collapse of the theory in their field. Do we have any alternatives?

In which can we more easily believe, a universe with a beginning and a God who communicates or a finely-tuned theory of epicycles in an eternal universe that by clever masking obscures all record of its eternity?

To turn this around toward implications for theology, can we resurrect the argument for the existence of God from the design of nature, in particular the design of conscious humans? The two-worlds view has led to a kind of half-heartedness toward such arguments for the existence of God because they do not prove anything with 100% certainty — because an atheistic loophole always exists many apologists end up by saying, "But ultimately, you must decide to believe!" To what degree does the present age of the universe constrain atheistic theories of design?

Quantum mechanics is also presently in a state of philosophical upheaval. No serious philosopher of physics is satisfied with the present understanding of quantum mechanics. Can Christians enter in? Does belief in an external Observer-God affect one's interpretation of quantum mechanics? Can we say categorically on biblical grounds that no random event ever occurs?

Can we resurrect the argument for the existence of God from the design of nature, in particular the design of conscious humans?

On a more general level, what makes a theory "beautiful"? Ever since the Greeks, people have seen beauty in symmetry. In ancient times, thinkers saw the best symmetry in the sphere, and philosophers of nature considered a law beautiful and satisfactory if it put everything into circles. When the theory of epicycles for the planets failed, "Galilean invariance" became the standard for beauty. In other words, scientists consider a theory beautiful if it involves no center point in space, no special chosen reference point. Maxwell's and Einstein's equations especially seem beautiful for this reason. The desire for symmetric laws of nature still drives physics. With all of the subatomic particles discovered, however, physicists presently need complex theories with up to seventeen dimensions in order to make everything "symmetric." Can Christians apply a different standard of beauty? The Anthropic Cosmological Principle suggested a different standard, namely, that physicists should consider as beautiful theories which allow the existence of cognizant thought.

Conclusion

In conclusion, I quote two of my favorite philosophers of science, Augustine of Hippo and Roger Bacon. Neither of these saw a high wall of separation between science and the Bible, but rather they encouraged science as improving the understanding of scripture. According to Augustine,

> "That man would indeed do the Scriptures a kind service who should collect the characteristics of times and places, of stones and the rest of inanimate things, of plants and animals."[3]

Roger Bacon, for whom I have increasingly gained admiration as a progenitor of the scientific method, wrote,

> "But the whole purpose of philosophy is to evolve the natures and properties of things, wherefore the power of all philosophy is contained in the sacred writings; and this is especially clear, since the Scriptures far more certainly, better, and more truly comprehend the creatures than philosophical labor would know how to define them."[4]

Although given little credit in later writings because his attacks on other philosophers led the Church to ban his works, Bacon trained a great number of young scientists in the scientific method. His writings influenced Francis Bacon three centuries later to leave a life of pleasure and pursue the high calling of science. Roger Bacon encouraged the study of astronomy to better set the calendar to fix the dates of scripture, the study of ancient languages and cultures to better understand the original texts, and the study of nature to better understand the literal sense of scripture. He encouraged the study of magic in the form of magnetism, herbs, and optics to disarm evil magicians and their false wonders. At the same time, sounding like a Reformer, he swept away the writings of human philosophers and theologians, even men like Aristotle and Aquinas, as the mere frameworks of men.

Roger Bacon faced a similar problem in his day: Christian philosophers felt that the study of history and languages, astronomy and experimental science added nothing to theology and could only distract from it. Bacon's bold assertion that scripture belonged to the same world as science and would be supported by it, despite the vast unknowns of science facing him, led to the scientific revolution. Dare we do the same? ✣

NOTES

[1]I have argued that no contradictions can occur in the "data" provided by God, only in our human scientific theories and theology. A friend has raised the objection that such a belief is itself a presupposition made by choice. I concur with Sproul, Gerstner, and Lindsley, however, in their work, *Classical Apologetics* (Zondervan, Grand Rapids, 1984), as well as with the famous atheist Ayn Rand and others, that the law of noncontradiction is inherent in all thinking. To argue against the law of noncontradiction is to use the law of noncontradiction. While it is possible to formulate a contradiction in our thinking, a direct contradiction, i.e. "A is true and A is false," cannot refer to reality because it is simply meaningless.

A long series of philosophers have also doubted whether we can properly speak of "external" reality separate from our mental frameworks because we perceive external data exclusively through the filter of our mental frameworks. I concur with Mortimer Adler, e.g. in *Ten Philosophical Mistakes*, (Macmillan, New York, 1985) that the existence of an external reality is self evident.

It is certainly possible to hold the view that the Christian scriptures contain contradictions. It is, however, impossible to hold that God the Author of Truth could speak a contradiction. Therefore to believe that the Bible is God's Word is to believe that it contains no real contradictions with itself or with the external reality created by him, even if certain passages seem to us to have such contradictions.

I note that Sproul, Gerstner, and Lindsley in *Classical Apologetics*, cited above, have made a substantial contribution toward the reconstruction of natural theology and the unity of science and faith. In particular they treat the issue of miracles which I neglect here. I depart from Sproul et al., however, in claiming that the personal God of the Bible can only be known through the less-than-mathematically-exact evidences of our experience, not through 100% certain propositional logic as they would like to affirm.

[2]J.D. Barrow and F.J. Tipler, *The Anthropic Cosmological Principle*, Oxford University Press, 1988.

[3]As quoted by Roger Bacon, *Opus Majus II.* iii, trans. R.B. Burke, University of Pennsylvania Press, Philadelphia, 1928.

[4]Roger Bacon, ibid, II. viii.

Take note, theologians, that in your desire to make matters of faith out of propositions relating to the fixity of sun and earth you run the risk of eventually having to condemn as heretics those who would declare the earth to stand still and the sun to change position — eventually, I say, at such a time as it might be physically or logically proved that the earth moves and the sun stands still.

Galileo Galilei, *Dialogue Concerning the Two Chief World Systems—Ptolemaic & Copernican*, 1632.

Ecology and the Christian Mind: Christians and the Environment in a New Decade

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Today the scientific community is appealing to the religious community to join them in preserving and cherishing the earth against ecologic catastrophe. The Christian community must identify and define key issues and assumptions inherent in such appeals in order to respond appropriately and to articulate a genuinely Christian environmental ethic. Ecologic concern is understood in Christian life from the perspective of knowing God as Creator and the universe as His creation. Within this perspective we understand God's characteristics of being pre-existent and transcendent, and can thus understand the physical universe as real and good, rather than illusory and evil. Biblical revelation teaches humans to celebrate creation by assuming God's activity in it, not by attempting to prove God's existence from creation's activity. Our response to appeals for joint commitment should be gracious and, whenever possible, cooperative, but must make clear that: l) Christian faith offers insight into real truth and is not merely a means to control human behavior, 2) abuse of creation is wrong because it expresses willful rebellion against God, and 3) creation is to be valued because of God's value of it, not because it is itself sacred or worthy of worship.

Environmental concerns began receiving serious national and international attention in the early 1960's, especially after the publication of Rachel Carson's *Silent Spring*.[1] Involvement of and response by the Christian community to the ecologic crisis has changed progressively since then. Initially unresponsive, Christian response was sparked and focused by the 1967 publication of Lynn White, Jr.'s essay, "The Historical Roots of Our Ecologic Crisis."[2] White, a historian, identified the Judeo-Christian tradition as the primary cause of western culture's exploitive and abusive attitude toward nature. His thesis was repeated, often with increased fury and additional negative implications, by many scientists and science writers during the next ten years.[3]

Christian response during this period and the years that followed was directed mainly toward refuting White's charges[4,5] and toward developing a systematic biblical view of environmental concerns within Christian perspective.[6,7,8,9] Such response has ultimately had a two-fold effect. First, environmental problems have been established as a legitimate concern and priority of the Christian community. Second, the scientific community has largely ceased placing the entire blame for ecologic problems on the biblical world view, and has adopted a less hostile, at times even cooperative, posture toward the Church and the Christian tradition in relation to environmental problems. The purpose of this article is to consider appropriate

Christian thinking and response toward both our environment and the environmental movement as the Christian community enters a new decade, and a changing atmosphere, of ecologic concern.

An Appeal

Carl Sagan, the noted astronomer and spokesman of science, published a letter in the July 1990 issue of the *American Journal of Physics*.[10] In it he called for a joint commitment by "science and religion" to preserve and cherish the earth. After briefly reviewing some of the major environmental problems, Sagan wrote, "We are close to committing — many would argue we are already committing — what in religious language is sometimes called Crimes against Creation."[11]

Sagan goes on to say that our environmental problems require "radical changes not only in public policy, but also in individual behavior. The historical record makes clear that religious teaching, example, and leadership are powerfully able to influence personal conduct and commitment."[12] Speaking for the scientific community he concludes that, as scientists, "We understand that what is regarded as sacred is more likely to be treated with care and respect. Our planetary home should be so regarded."[13]

This letter was not the first such appeal by Sagan. The Global Forum of Spiritual and Parliamentary Leaders On Human Survival, held in Moscow in January 1990, attracted more than 1,000 religious, political, and scientific leaders from 83 nations, including United Nations Secretary General Javier Perez de Cuellar, Nobel Peace Prize winner Elie Wiesel, and Mikhail Gorbachev.[14] A joint religious-scientific initiative emerging from that meeting was a commitment for "preserving and cherishing the earth." The initiative was led by Carl Sagan. Other statements included the "Moscow Declaration," which called for a new "planetary perspective" to include "a spiritual and ethical basis for human activities on earth." And the Forum's "Plan of Action" included many measures to raise public consciousness, while taking concrete steps to reverse environmental destruction through "fundamental change in the attitudes and practices that have pushed our world to a perilous brink."[15]

The implications of such appeals merit careful consideration by the Christian community. Within them are contained the key issues that force us to understand what makes an environmental ethic genuinely Christian, and to perceive what lies ahead for the Church in the coming Environmental Age.

Taking Our Bearings: Where We Have Been

"When first investigated," noted scientist Rene Dubos, "the cave floor of the Choukoutien cave, which had been occupied by *Homo erectus* 500,000 years ago, was littered with the charred bones of horses, sheep, pigs, buffalo, and deer. More recent prehistoric sites contain food residues which had been casually abandoned by the occupants over many generations, along with artifacts of stone, bone, ivory, or pottery. Such accumulations of products and objects are an essential source of documentation for the archaeologist.... But from another point of view...[they]...can be regarded as the garbage of primitive humankind. They are the equivalents of beer cans, plastic junk, radios, bedsteads, and automobile carcasses that litter modern highways and settlements."[16]

In light of such data, it is not surprising that Dubos perceived that fatal flaw in the thinking of his countryman, French philosopher Jean Jacques Rousseau, in assessing human nature and its relation to the environment. "...Rousseau," wrote Dubos, "believed that human nature was intrinsically good until it was sullied by civilization. The fashionable view at present is that human nature was bad from

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the very beginning and civilization has only given wider ranges of expression to its fundamental bestiality."[17]

This "fashionable view" does not, like historian Lynn White, Jr., assign the causes of our environmental crisis to a particular world view, like Christianity, or to the civilization most influenced by it, medieval Europe.[18] Rather, Dubos and others understand that there is something fundamentally wrong with human nature itself. It is "bestial," to use Dubos' phrase, though, as a wildlife ecologist, I think that term unfair to beasts. Nevertheless this fundamental depravity within human nature expresses itself in, among other things, a destructiveness toward the physical world. It is, at heart, an expression of the selfishness of humankind.

Humans find selfishness more natural (and more profitable) than cooperation, with environmental destruction the logical result.

"Immediately upon the fall," wrote Jonathan Edwards, "the mind of man shrank from its primitive greatness and expandedness, to an exceeding smallness and contractedness.... Before, his soul was under the government of the noble principle of divine love, whereby it was enlarged to the comprehensiveness of all his fellow creatures and their welfare.... [But]...Sin, like some powerful astringent, contracted his soul to the very small dimensions of selfishness, and God was forsaken, and man retired within himself, and became totally governed by narrow and selfish principles and feelings."[19]

It is amazing that an eighteenth-century theologian like Edwards should be able to describe so precisely and powerfully what environmental philosophers like Garrett Hardin can only puzzle over as a bizarre quirk of human societies. Namely, that humans find selfishness more natural (and more profitable) than cooperation, with environmental destruction the logical result.[20] While such behavior is not unique to American culture, it has always been very much at home in it. In colonial America, William Penn provided a positive example of good stewardship by prescribing that, on his lands, one acre of forest was to be left standing for every five that were cleared.[21] But George Washington expressed his embarrassment over more typical American farmers in a letter to Arthur Young. Washington wrote that the goal of such farmers was "not to make the most they can from the land, which is ... cheap, but the most of the labour, which is dear; the consequence of which has been, much ground has been scratched over and none cultivated or improved as it ought to have been...."[22] In these perceptions of the father of our country, the words of Genesis are flung stinging back upon us. "Then the Lord God took the man and put him into the garden of Eden to cultivate it and keep it," (Genesis 2:15).

A Beginning: Right Thinking About Creator and Creation

Ethicist James Gustafson summarized two basic ways of looking at the application of theology to social issues. One is to begin with some pressing moral and social question. When we have a clear view of the question, then we can turn to the resources of theology and religious practice to establish the theological and religious "answer." The second is to begin with a more basic question. What do we know about God and his plans, and how do we know it? In Gustafson's own words, "What can we affirm ... about God's purposes for life in the world? What beliefs about God pertain to the moral issues we face in time and place ... of contemporary life?"[23] I think, with Gustafson, that the second approach is better. In fact, it is the use of the first approach that contributes to the weakness of much Christian writing about ecologic problems today.

Begin with a more basic question. What do we know about God and his plans, and how do we know it?

Theologian J. I. Packer addresses this point powerfully in the final paragraph of his classic book, *Knowing God*. He wrote, "From current Christian publications you might think that the most vital issue for any real or would-be Christian in the world today is church union, or social witness, or dialogue with other Christians and other faiths, or refuting this or that-ism, or developing a Christian philosophy and culture.... But our line of study makes the present day concentration on these things look like a gigantic conspiracy of misdirection."[24] Packer goes on to make clear that it is not that, at least it need not be. The issues are real and must be dealt with. But the true priority of every human being is to know God in Christ. From that perspective, and to avoid making this article part of that

"conspiracy of misdirection" we must summarize the issues of ecology and Christian thinking from a larger perspective.

God the Creator

God chooses to begin the revelation of himself to us as Creator (Genesis 1), and no idea in human history has had more impact that the first five words of Scripture, "In the beginning God created...."[25] It is an idea so radical it finds no parallel in ancient myth or modern philosophy. No culture was without its story of creation, but none could conceive of creation *ex nihilo*, from nothing. To an ancient people surrounded by pagan cultures God revealed his true nature, even as he reveals it today to a modern people steeped in twentieth century paganism.

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The dominant creation myth of the ancient Near East was the *Enuma Elish*, one of several Babylonian creation stories. In its polytheistic view of many gods in a chaotic universe, Marduk, the hero god, slays the monster goddess Tiamat and the servant monsters she has created. The earth is formed from Tiamat's dismembered body. Mankind is fashioned from the body of a god, Kingu, who is sacrificed for his part in helping Tiamat. There is no dignity for man in this creation. "Blood I will mass and cause bones to be," says Marduk. "I will establish a savage, 'man' shall be his name. He shall be charged with the service of the gods that they might be at ease."[26] But Marduk himself is no real creator, only a craftsman making a tool for his own use. The cosmos itself, in *Enuma Elish*, existed before the gods and they are but products of it.

Other pagan myths offer an equally pessimistic view of humanity's place and destiny in the universe. The best example of these is the Mesopotamian story, *Atrahasis*. This story begins with the gods already established in an organized society. The greater (management) gods have assigned the more numerous lesser (labor) gods the heavy work of digging canals on the earth. After 40 years of long and oppressive conditions, they unionize, form a picket line at the foreman's (the god Enlil's) house, and set their tools on fire. An emergency management council is called, and the craft god Ea has a plan. The birth goddess, Mami, is assigned to create humans, and they will take over the canal work. One of the gods is sacrificed to provide the capital. Mami shapes the mixture into fourteen humans (seven male and seven female), puts them in a place called "the house of destiny" for ten months, and, at the end of their gestation, they are born into the world.[27]

Several of the key elements in *Enuma Elish* are shared in Greek mythology and later incorporated into Greek philosophy. A plurality of gods is produced from an existing cosmos. Eventually there is civil war and one god, in this case, Zeus, emerges victorious, killing or banishing his enemies and rewarding his allies. This mythology makes no attempt to account for the human race: its existence is not even considered worth mentioning. And humans are no object of love for Zeus. Rather, in his anger at the titan Prometheus who gave them fire, Zeus directs his vengeance at both. For humans, he creates a fair maiden, Pandora, and makes her, in the words of the Greek writer, Hesiod, a "spine-chilling, untouchable booby trap,"[28] because she is given a gift of pain and sorrow for men from every Olympian god. These are contained in a jar (not a box, as the common expression would imply), along with hope, and Pandora, after being sent to earth, opens the lid. All manner of evil flies forth to afflict men randomly and then, according to Zeus's plan, she slaps the lid down before hope can escape, trapping it under the rim. And Zeus's malice against humans triumphs. "Full is the earth," wrote Hesiod, "full is the sea of evil. During the day, afflictions come to mortals; and at night they go to and fro wherever they will, inflicting evils.... Thus, there is no way to escape Zeus' plan."[29]

With unequaled dignity and beauty, the writer of Genesis reveals a wealth of knowledge about God in a single sentence.

The Radical Revelation

It was to a culture steeped in these ideas that a living God spoke, revealing the true nature of himself and what he had made, of the place of mankind,

of the nature of good and evil, and of human hope and destiny. "In the beginning, God created the heavens and the earth." With unequaled dignity and beauty, the writer of Genesis reveals a wealth of knowledge about God in a single sentence. First, *God is pre-existent.* He does not emanate from a pre-existent, eternal cosmos. He is the one eternal entity. Second, *God is transcendent,* as well as imminent. He is not the same as what he has made, and he does not add to or subtract from himself to make it. Third, *God is a creator,* and that means he is free. A craftsman god can work only according to a predetermined plan and purpose in constructing a tool for a particular use. A tool can only be one thing, not another. That is why the Greek view of a craftsman god never developed into a real science. For nature, as the work of a craftsman, is not free, but pre-determined.[30] Therefore, its reality can be understood by deductive reason alone, and there is no place for experiment or extensive observation.

God's creation, though reasonable, is unique. It could have been something other than what it is.

But Greek attempts at science ultimately failed because nature is not like Euclidean geometry, nor is God like Euclid. His creation, though reasonable, is unique. It could have been something other than what it is. But God gave form from void, a unique form out of a myriad of possibilities, to a heaven and an earth which had neither. Finally, the universe itself is a creation. As Francis Schaeffer said, "It is really there."[31] It is not an illusion. Its material substance is neither an imperfection, as Aristotle thought, a necessary evil, as Plato thought, nor an illusion, as Buddha thought. Rather, as soon as nature is understood to be a *creation,* we understand that its material substance is not some imperfection in its form, but the essence of it. That is why we can now begin to deal honestly with the things in creation as *creatures,* not as imperfect, evil, or unreal. And we can begin to see ourselves, not as souls trapped in physical bodies (which even some Christians mistakenly believe), but as creatures with a composite nature: body, soul, and spirit.

The consequences of these truths must not be allowed to escape us. The current perception in western Christendom that what is material is evil and what is non-material is spiritual is not a biblical view, but a Greek one. As long as it persists, it will prevent Christians from fully knowing God as Creator, and of experiencing the value and joy of his good creation. Indeed, it is our culture's present loss of this idea which has contributed to its increasing loss of optimism and of reality. With the disobedience of Adam and Eve, sin entered the world, and creation fell with them (Romans 8:19). But it is sin which is evil, not created matter. That is why Christ was not ashamed to take on a human body. And even in a body like ours, he was able to live a sinless life. That is why created things are still valued by God, still worthy of redemption (Romans 8:19-22), and still "good" in his eyes (Genesis 1:25).

Creation defines our place in the cosmos and our position before the living God, our Creator, just as it also defines our common bonds with other creatures and our special responsibilities to them. "Creator" and "creation" are words and concepts the Church must reclaim if it is to successfully lead people to know God and his world, as the really are, and not merely as we might (falsely) think them to be. To know God as Creator is to know that he is pre-existent and self-existent, that he is transcendent (not the same as what he has made) as well as imminent, and that he is free, creating for his own purposes, not ours.

It is only in knowing God as Creator, and the universe as his creation, that we can begin to contemplate the immensity of the person and work and purposes of God. And in the present age, when people are all too ready to imagine God as a sort of celestial bellhop assigned to their own room service, the knowledge of God as Creator is not a knowledge which any Christian can get along without. In fact, it is essential if one is to presume to know God at all.

Because our culture has lost its belief in God the Creator, it has lost, with that, its spontaneous joy in the works of creation.

The Celebration of Creation

Because our culture has lost its belief in God the Creator, it has lost, with that, its spontaneous joy in the works of creation. Despite their grandeur and beauty, it is difficult for people to find lasting joy in mere physical obects which they believe are simply the outcome of time plus the impersonal plus

chance. The Church, in its attempt to appear sophisticated and mimic society's "objectivity", also has robbed God's people of such joy. Such an approach to the works of creation is not, in fact, sophistication, but stupidity. The Bible teaches the believer to say with the psalmist, "Oh Lord, how many are Thy works! In wisdom Thou hast made them all!" (Psalm 104:24). It teaches us to find joy in the wonder of rock badgers and wild goats, in lions and storks, in moon and sun and stars (Psalm 104). The Bible even teaches the believer to find joy (with reverence) in the power and destruction of a thunderstorm (Psalm 29).

To know God as Creator we must celebrate his creation. This means that it is hypocrisy for a Christian to willfully live separated from God's creation and the joy of it.

The Bible does not do this because these things prove God's existence (as though the Creator depended on his creatures for this), but because they are simply his; his creatures and his works, and they exist for his pleasure. To understand this is to begin to understand the joy of the psalmist and say with him, "Let the glory of the Lord endure forever!" (Psalm 104:31). To know God as Creator we must celebrate his creation. This means that it is hypocrisy for a Christian to willfully live separated from God's creation and the joy of it. Just as knowing God as Creator is not some piece of theological lumber the Christian can very well get along without, so knowing the joy of God's creation (through deliberate contact, study, and concern) is an essential element to the joy of Christian life.

The Obedience of Ruling and Subduing

As the Christian cannot be indifferent to knowing God as Creator, or to the joy of celebrating his creation, he cannot be indifferent to the needs of creation, especially when these needs express themselves as the ecological crises of the modern world. Because ruling, in the kingdom of God, is to be expressed by service to those ruled and by the command to cultivate and keep (Genesis 2:15), management and preservation combine in the concept of stewardship. While the stewardship of creation is a professional calling to some Christians who serve as scientists and resource managers, it must be the avocation of every Christian. Involvement in the care of creation, both corporately and individually, both on issues of worldwide concern and of local significance, represents appropriate obedience for every Christian to the imperative of Genesis 1:28.

Intelligent involvement and action toward creation has not and will not be unique to the Christian community. Indeed, the Church has lagged far behind other groups in recognizing the rightness of caring for creation. What is unique to the Christian is the ability to act without internal conflict and intellectual contradiction. She does not need, on the one hand to claim (falsely) a complete identity with the earth and its creatures to have a reason to act. On the other hand, she does not need to claim (inconsistently) to be merely a plain citizen of nature and then assume that she should make life and death decisions about its welfare. Stewardship of creation is demanded by something greater than the survivalist mentality inherent in many modern environmental appeals. It is demanded by humanity's unique position in creation as the image of God. So we are exalted by this demand, to act, in a limited but very real sense, as God's servant and representative to other creatures in this present age. But we are also, in the same acts of stewardship, humbled, for we also are creatures, and we stand accountable before God for the outcomes of any actions we take.[32]

While the stewardship of creation is a professional calling to some Christians who serve as scientists and resource managers, it must be the avocation of every Christian.

If the Christian community embraces this role for itself toward creation, it also must understand what it must reject. Namely, we must reject the false, but popular, notion that protection is the same as preservation, as though God's creation was a static artifact to be corked in a glass bottle, rather than a living system produced by complex exchanges of matter and energy. The former view, which author Wendell Berry described as "nature under glass,"[33] at best denies and at worst despises the human presence. Alston Chase, author of *Playing God In Yellowstone: The Destruction of America's First National Park*, demonstrates that it is precisely this equation of protection with preservation which has

depopulated Yellowstone National Park of its native animals and ruined the historic vegetational communities which supported them.[34] This view also has deflected much emphasis in modern ecology from the genuine and active care of creation to the so-called "Deep Ecology."[35] The advocates of Deep Ecology espouse not a scientific but a religious position, a position characterized, not by its ecologic integrity, but by its rejection of all things modern and material.[36]

In answering the question, "What is humanity's place in nature?" Christians must appreciate the significance of God giving Adam the tasks of a gardener, not a museum collector.

This is part of the present crisis in environmental ethics.[37] The question, "What is humanity's place in nature?" cannot be satisfactorily answered by Deep Ecology or New Age Spirituality about the environment. The failure of the Church to address this question has created a vacuum which these movements exploit, but it still remains a question that only the Church has the answer to. In answering this question, Christians must appreciate the significance of God giving Adam the tasks of a gardener, not a museum collector. Protection from human presence and development does not, by itself, insure the continuance of any life form, community, or ecosystem on earth. The ethics of protectionism amount to nothing more than protecting nature from humans. God calls us to be an involved humanity, actively working for the good of other creatures with all the resources we possess. God calls us to be managers.

Teaching The Vision: Christian Ecological Education

In northern lower Michigan, near the town of Mancelona, there is a place called the AuSable Institute of Environmental Studies. Serving as a field campus for a consortium of Christian colleges throughout the United States and Canada, AuSable, in the words of its own official bulletin (1990) "offers programs and courses of study for college students, for Christians, and for the greater world community. Students at AuSable take college courses, gain field experience, and develop practical tools for environmental stewardship."[38] At the time of this writing, AuSable is, to my knowledge, the only institution of its kind. Since its inception in 1982, it has trained hundreds of students in the professional and practical application of Christian resource stewardship.

For Christian higher education, the question of the future is, "Will AuSable remain the only one of its kind?" In his classic science fiction trilogy, *Foundation and Empire*, Isaac Asimov tells of the decline of a decadent civilization which has ruled the galaxy for centuries. Foreseeing its collapse, and the centuries of chaos that will follow, one of the empire's most brilliant scientists secretly establishes two new communities, the Foundation Colonies, in different parts of the galaxy. Their ultimate purpose is to replace the decadent empire as a new, and better, source of order, peace, and enlightenment in the galaxy. Asimov's trilogy is the story of the struggle of these colonies. In the same way, environmental ethics established upon inadequate value systems must ultimately lead to irresolvable conflicts and crises.[39,40,41] This outcome is inevitable. What is still in doubt is whether the Christian educational community will recognize the coming collapse of such ethical systems and seize the opportunity to become the new foundation.

The present practice of sending the best and brightest students to complete their graduate education at state universities has done both Christian education and environmental stewardship much harm.

The beginning of this recognition will be the establishment of programs in graduate environmental education at Christian colleges and institutes. The present practice of sending the best and brightest students to complete their graduate education at state universities has done both Christian education and environmental stewardship much harm. While interchange and training within the entire scientific community is always valuable, indoctrination in a secular system of values is always harmful. Its outcome is a class of individuals which C. S. Lewis rightly called "men without chests."[42] The products of such training are often individuals who have been taught to believe in a dichotomy of two worlds, a world of facts without a trace of value,

and a world of values without one trace of truth or falsehood.[43]

Secular education does not always produce the kind of individuals Lewis describes. Many of the most dedicated Christians engaged today in science were trained professionally in state universities. The failure of secularism to convert all the men and women trained by it is due to two factors. Negatively, it fails to address many of the most important issues and questions of life, and even its own pupils see these inadequacies and look to other sources. Positively, God, by his grace, continues to raise up and keep for himself men and women whom he calls for his own purposes, even in the heart of a hostile environment. We ought to praise God that these things are true. We ought not to think that this excuses the failure of Christian higher education to address graduate training in science. Some people survive car crashes. That does not lead the Department of Transportation to encourage them.

The Christian educational community must make the commitment to professional, graduate-level training in resource sciences if it hopes to lay a new foundation of environmental ethics.

That God produces people for himself in a hostile environment supported by the state does not mean that he would fail to produce them in a godly environment supported by the Church. Here in Montana, volunteer wheat grows in vacant lots. But farmers who want a harvest plow and plant, and God rewards their diligence. The time has come for the Christian educational community to work with God's purposes in diligence instead of against God's purposes in ignorance.

Though the failure of Christian colleges to provide graduate training in environmental sciences has been due, in part, to a lack of resources, it has been primarily a lack of vision that has kept those colleges and their constituencies from seeking the resources necessary to begin. The work cannot be put off any longer. The Christian educational community must make the commitment to professional, graduate-level training in resource sciences if it hopes to lay a new foundation of environmental ethics. If Christian colleges fail to produce individuals in which factual knowledge is wedded to moral conviction, the Christian community has no hope of influencing the outcome of the environmental crisis.

The Difference In Us and the Difference It Makes

In his book, *Pollution and the Death of Man*, the late Francis Schaeffer discussed the implications of an important article published in *Saturday Review* entitled, "Why Worry About Nature?"[44] The author, sociologist Richard Means, suggested that the ecological crisis was really a moral crisis, and that a solution to it would be found in pantheism. Means said, "What, then, is the moral crisis? It is, I think, a pragmatic problem." Schaeffer responded, "Here is a remarkable combination of phrases being put together; the moral dissolved into the pragmatic. He starts off with a moral crisis but suddenly all one is left with is a pragmatic problem."[45] And Schaeffer is right. As he concluded later, "The only reason we are called upon to treat nature well is because of its effects on man, and my children, and the generations to come. So in reality, in spite of all Means' words, man is left with a completely egoistic position in regard to nature. No reason is given — moral or logical — for regarding nature as something in itself. We are left with a purely pragmatic issue."[46] The outcome of such thinking is well summarized by Schaeffer himself. "The ... thing to notice is that what one has here is sociological religion and sociological science .... One does not have religion as religion; nor does one have science as science. What one has is both religion and science being used and manipulated for sociological purposes."[47]

Many scientific writers, if they acknowledge religion at all, usually express the hope that someday it will go away.

I began by considering the content of an important letter published by Carl Sagan, appealing for a joint commitment by science and religion to preserve and cherish the earth.[48] It is time I returned to it. Sagan's appeal has many things to commend it. It recognizes the present and historic reality of religion, and the effect of faith on human life. This is a dramatic change from many scientific writers

who, if they acknowledge religion at all, usually express the hope that someday it will go away. Sagan's letter is also commendable because it implicitly admits, by appealing to religion, that science and technology alone are insufficient to solve the environmental dilemma. This is a clear-sighted perception, and a remarkable admission from a recognized spokesman for science. Finally, Sagan's appeal is commendable because it is expressed in a way which is gracious, courteous, and sincere, rather than being condescending, rude, and shallow. The appeal itself acknowledges the possibility for dialogue and interaction between science and religion, and for greater understanding between them.

Recognizing and appreciating the positive aspects of Carl Sagan's appeal, we must recognize, at the same time, some shortcomings of it. This is not because we want to be picky or polemic, but because it is in this recognition that we come to understand most clearly what a truly Christian environmental ethic is, and what it is not. Sagan acknowledges that "religious teaching, example, and leadership are powerfully able to influence personal conduct and commitment."[49] This is true, in fact, inarguable. But religion in general, and Christianity in particular, is more than teaching, example, and leadership, and faith is more than just another behavior modification device. Living faith produces virtuous behavior, including virtuous behavior toward God's creation, but it is not the behavior that makes the faith valuable. Faith is to be valued because it provides real insights about the nature of God and reality that a lack of faith cannot. Faith has value because it is true, and because it genuinely has the power to change merely nice people (or, perhaps, nasty people) into new creations.

Religion in general, and Christianity in particular, is more than teaching, example, and leadership, and faith is more than just another behavior modification device.

We might produce desirable behavior (or, at least, controllable behavior) through drugs or propaganda. This is exactly what is done to George Orwell's hero, Winston, in *1984*. But an Orwellian dictatorship is not what most people have in mind when they imagine an ideal society, because there is nothing ideal about getting people to do the right things for the wrong reasons. As Christians, we must make clear, and require the scientific establishment to acknowledge, that faith lays claim to real truth, truth which impacts not merely human behavior but the practice of science itself. We must ourselves understand and (graciously) make clear to others what Paul means when he writes, "For by him (Christ) all things were created, both in the heavens and the earth, visible and invisible, whether thrones or rulers or authorities — all things have been created by him and for him." (Colossians 1:16).

As Christians, we must make clear, and require the scientific establishment to acknowledge, that faith lays claim to real truth, truth which impacts not merely human behavior but the practice of science itself.

The cosmos is not all that is, all that ever was, or all that ever will be. Christ stands, not only as its Creator, but as its Consummator; not only the One who began its existence, but the goal toward which it moves. We cannot insist that all scientists believe this, but we must make clear that faith is about something real, not merely a means to produce the right behavioral results in a good cause. If we fail to do this, we will be but one short step away from the kind of "ecological religion" proposed by environmental philosophers like Garrett Hardin. Hardin has urged that we "reshape" (Hardin's word) humanity into " mature" creatures who no longer depend on the support of God (whom Hardin refers to as "Providence"). This will be done by embracing ecology *as* religion, and then by adhering to its two major dogmas: 1) not all things are possible and 2) the world is limited. Therefore, demand must be restrained.[50]

Our ecologic crisis represents more than "Crimes against Creation." Indeed, it is meaningless to speak of a creation without reference to a Creator, and the crimes to which Sagan refers are primarily crimes against the Creator. The psalmist understood this when he wrote, "Against thee and thee only have I sinned." (Psalm 51:4). The only way that religion has been able to influence "personal conduct and commitment" is to convince individuals of the reality of a creator God who is also their Judge, before whom they will one day stand to give account. The

Bible treats land abuse matter-of-factly as criminal activity against God (i.e. sin, Leviticus 25:1-23) precisely because it recognizes God as Creator and the world as his creation. Without a God who is also Creator there can be no creation, and without a God who is holy there can be no crime.

Finally, we must understand what is sacred and what is not. Carl Sagan will be disappointed in the Christian witness if he hopes that we will teach others that the earth is sacred. This we cannot do, for sacredness can be ascribed ultimately only to God. The ground upon which Moses stood was holy because God was present in the burning bush upon it, not because of the inherent sacredness of soil. The creation, including this earth, is not to be well-treated because it is sacred or because it should be worshipped, but because God made it and called it good (Genesis 1), and its goodness is independent of human utility.[51] Likewise, we value creation because God finds pleasure in it, and so to value creation is an act of honoring God.

We also value and love God's creation because he intends to redeem it. And we, being creatures ourselves, will be redeemed with it (Romans 8:19-22). It is sometimes possible to influence personal conduct and commitment by erecting an idol, but it is never wise. Christians cannot offer to other men and women the graven image of a sacred earth so that they will bow down before it and treat it well. This would be devious and false. Christians can offer only One who is himself sacred, and through obedience to him learn to love a creation which is precious to him and of which we are a part. It is popular today, even in some Christian circles, to infuse nature with spirit. Whatever warm feelings this may generate, it is false. Its outcome is to make creation unknowable, and this is not what the Bible or what science teaches us.

The creation, including this earth, is not to be well-treated because it is sacred or because it should be worshipped, but because God made it and called it good.

These distinctions are not made contentiously, and no one can expect a single letter to address all the implications of an appeal for such a joint commitment as Carl Sagan has proposed. But, sooner or later, these distinctions must be addressed, for such distinctions lie at the heart of Christian witness, as well as at the heart of what a genuinely Christian environmental ethic really is. They are necessary to the integrity of what Christianity is and, if the truth be known, they are necessary to the integrity of what science is. We must escape the trap of "sociological science" which Francis Schaeffer correctly perceived in the pantheistic solution of Richard Means; no science as science, no religion as religion — only science and religion used to manipulate humanity for a predetermined sociological purpose.

It is popular today, even in some Christian circles, to infuse nature with spirit. Whatever warm feelings this may generate, it is false.

Such manipulation may not be Carl Sagan's intent. For my part, I want to assume that it is not. But Christians should advise Sagan, as they should advise others, to beware. Such snares as these show no partiality for their victims, whether they are ordinary Christians or great scientists. To both, Christian faith offers a different, and distinctive, appeal. It is an appeal to take seriously the claims of God; about himself, about us, and about his creation. In this lies our one true hope.

"For the anxious longing of creation waits eagerly for the revealing of the sons of God." (Romans 8:19) ✣

NOTES

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Anyone who has looked across a ghostly valley at midnight,
when moonlight makes a formless silver unity out of the drifting fog,
knows how impossible it often is in nature to distinguish mass from hallucination.
Anyone who has stood upon a lofty summit and gazed over an inchoate
tangle of deep canyons and cragged mountains,
of sunlit lakes and black expanses of forest, has become aware of a
certain giddy sensation that there are no distances, no measures,
simply unrelated matter rising and falling without an analogy to the banal
geometry of breadth, thickness and height.

Robert Marshall, *The Problem of the Wilderness*

Communications

A Missionary Evaluation of the Creation-Science Controversy

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If the late Donald McGavran were with us today he might well say, "Look at the world science community through 'church growth eyes.' Are not men and women of science more responsive to religion than they have been for a century? What is being done to win men and women of the science community for the cause of Jesus Christ?"[1] Indeed, the insights of missiology, a science of cross-cultural communication, can be helpful in the current creation-science controversy. The mosaic which represents the world science community should be looked upon as consisting of sub-cultures that are winnable to Jesus Christ.[2]

Biblical Models

Biblical models of cross cultural communication are not lacking. The positive approach of our Lord to the Samaritan woman by Jacob's well demonstrated the effectiveness of his use of the analogy of "living water" in making a point of contact. Paul's careful observation in Athens gave him his opening as he explained to the Stoic and Epicurean philosophers gathered in the Areopagus the nature of the "Unknown God." He went on to establish a degree of "common ground" as he described how the Creator had so made us that we all have a religious propensity — a need to seek after him and find him. The Apostle even quoted Cleanthes, one of their Stoic poets, to reinforce his point that God was not far from us (Acts 17:28). In both rural Samaria and sophisticated urban Athens there were receptive responses.

Numerous mission analysts, reacting to the ethnocentric approaches of western missionaries in the past have pointed out that some of their lack of success may have been due to over-looking biblical models. Roland Allen initiated the modern missionary dialogue with his classic, *Missionary Methods: St. Paul's or Ours?*[3] Donald McGavran began the Church Growth Movement with his searching volume, *The Bridges of God.*[4] He was affirming that God had providentially placed communication causeways leading to responsive people groups for the missionary's benefit. Those who found those bridges were reaping the "spontaneous growth" of which Roland Allen wrote.[5]

Approaching Diverse World Views

Don Richardson's breakthrough with the Sawi tribe of Irian Jaya came when he learned of their custom of presenting a "peace child" to end tribal warfare. Satiated with killing, a family from each of the warring factions would exchange an infant to be raised by the opposing tribe. As long as the child was cared for safely there would be no war. Richardson now had a match for scripture, a "redemption analogy," understandable to Sawi culture, and he could explain the gift of God's Son to bring peace.[6] The supracultural nature of the gospel lends itself to analogies that make the message relevant to vastly different cultures.

Missionary approaches to animistic cultures have met with failure when overly influenced by western rationalism. The attempt to teach such primitive tribes that many of the spirits they feared did not exist at all was bound to fail. The daily life of many tribal peoples is dominated by spirits — both good and evil. Their rationale for all misfortune is that the evil spirits have been at work. The legitimation for their Shaman is the belief that they, in some measure, have been able to control the demons.[7] Highly successful communication resulted when missionaries accepted their world view and countered it by telling them the good news of the Holy Spirit, who could overcome all of the evil spirits.

The early encounters of Protestant missionaries with world religions were also negative. Tension exists to this day between anthropologists and missionaries partly because of the overstatements of the latter.[8] The compulsion to emphasize the dark side of Hinduism, Buddhism, or Islam, reflected what appeared to be an uninformed bias. Such judgmental encounters failed because of a lack of balanced information about these traditional religions. William Carey was an exception when he initiated the work of "the Serampore trio" in translating the Bhagavad Gita into English in order to gain better insights about this popular form of theistic Hinduism.[9]

August Reischauer's insights are helpful.[10] He distinguishes between "value" and "truth." While not accepting as ultimate truth many of the claims of the world religions he can credit them with values. There are numerous examples of what can be called "wisdom literature" in non-Christian belief systems. Rather than attacking the religion in a hostile manner it proves more effective to find positive points of contact to begin communication. In this process there is the danger of syncretism but compromise is not necessary.

Bridge Burning

Similar to those of the missionary enterprise have been the communication oversights in the current creation/science controversy. Among some there appears to be an unwillingness to distinguish between "value" and "truth." In their earnest desire to uphold what they believe to be the ultimate truth they refuse to recognize the genuine values in the science community. Their approach is hostile and argumentative and as a result defensive reactions close the doors to effective communication. The cause of this attitude is apparently an inflexible biblical hermeneutic that equates their *interpretation* with the Word of God. They feel compelled to attack all efforts at accommodation to scientific world views.[11]

"Big Bang Bashing" is one example of this bridge burning. Failing to see that the Big Bang cosmologies are a welcome change from the "steady state theory" of the universe, certain creationists attack it out of hand. Here is a paradox. Since the time of Plato western science has held that the universe has always existed. A 20th century view has come along that affirms evidence that the universe had a beginning and will apparently have an end.[12] Creation purists pass up the opportunity to bridge into the science world view with this handy analogy to biblical statement.

The rejection of the time dimension of modern science on the assumption that it contradicted scripture has closed many doors to communication. From the viewpoint of the science community the approximations of the geolgists of a 4.5 billion year-old earth are quite plausible. The processes of sedimentation and erosion appear to work within the time frame clocked by the measurement of radioactive decay. The case for "continental drift" alone is convincing to unbiased observers that our earth has undergone many changes over a very long period of time.[13] When the "young earth" creationist insists that the biblical evidence indicates an earth of only six to ten thousand years old, all communication bridges to the secular science community break down. The communication gap widens and such reactionary creationist views are labeled "folk science."[14] The scriptures and the gospel are consequently dismissed as meaningless.

The Rejection of Options

Since the 19th century conservative theologians have worked out accommodation theories to reconcile the first chapters of Genesis with the discoveries of science. A "gap theory" allowed for a long period of time prior to the ordering of life in six creative days. The "age day theory" attempted to match the order of creation with the geological column. "Progressive creationism" perceived God creating distinctive life forms progressively over time without the necessity of evolutionary links between. Bernard Ramm points out that some of the finest Christian scholars of the 19th century were theistic evolutionists.[15] All of these were sincere efforts to establish concord between the special revelation of the Bible and natural revelation as discovered by science.

The above viewpoints arose out of three major frameworks for interpreting Genesis One. There is (1) the concordant view, (2) the literal view, and (3) the literary view. The first seeks to reconcile special and natural revelation; the second desires to uphold the integrity of Scripture, and the third appeals to Hebrew writing style to alleviate the tension between science and religion. There are sincere conservative Biblical scholars aligned with each of these positions. All of them consider themselves creationists and all of them, including many who accept a literal view, have found ways to accom-

modate their position to the science world view's perspective on the age of the earth.[16]

The responsibility for communication breakdown falls upon those who reject the possibility of options and insist that their position alone is the correct one.

The Necessity of Contextualizing the Message

The latest buzz word in missions is "contextualization." At first it was looked upon as a mere synonym for indigeneity—the goal of cross cultural church planters. Now it is understood to be more inclusive in meaning. It implies the attempt of the missionary to bring the culturally transcendent gospel message into the cultural context of the target community. It conveys the new awareness, not only of our ethnocentric biases, but of our culturally conditioned modes of biblical interpretation. It implies a new honesty on the part of the western missionary. He now more fully acknowledges his past role in bringing a growth-inhibiting form of *western* Christianity to many parts of the third world. The present focus is to so contextualize the message that the receptor culture receives Jesus Christ as their very own Savior and Lord.[17]

It is of utmost importance that we contextualize the gospel message to our science communities. This can be done and has been done without the loss of a high view of scripture.[18] The God who left his signature on the pages of the Bible is the same God who is Architect of the universe. The admirable flexibility that has been bringing fruitful response on distant mission fields and among ethnic peoples of our inner cities must also be expressed to the men and women of our worldwide science communities. To stereotype scientists and approach them in a hostile manner is to repeat the communication errors that led to past missionary failures. ✣

NOTES

[1]This is a paraphrase of a typical McGavran response. Similar wording is found in, "Ten Prominent Elements in the Church Growth Point of View," *Christian Mission Today*, Vol. 11, No 3, 1970.

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[9]David J. Hesselgrave, *Today's Choices For Tomorrow's Mission*, (Grand Rapids: Zondervan, 1988), p. 151.

[10]August Karl Reischauer, *The Nature and Truth of the Great Religions*, (Tokyo: Charles E. Tuttle Co., 1966) pp. 176-290.

[11]The wording of one bulletin defines "creationists" as only those who espouse the literalist interpretation of Genesis. Those accepting the gap theory or theistic evolution are placed outside of this category. *Acts and Facts* Vol. 18, No. 8, August 1989.

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[15]Bernard Ramm, *The Christian View of Science and Scripture*, (Grand Rapids: Eerdmans, 1954), pp. 284-288.

[16]Henri Blocher mentions the reconstructionist theory, (which allows for six literal days), in addition to the literal, concordant, and literary views in his book, *In The Beginning*, (Downers Grove: InterVarsity Press, 1984) pp. 39 59.

[17]David J. Hesselgrave and Edward Rommen, *Contextualization: Meanings, Methods, and Models*, (Grand Rapids: Baker Book House, 1989).

[18]The American Scientific Affiliation and InterVaristy Press have done much to contextualize the gospel to the needs of the science community, in my opinion.

For the scientist who has lived by his faith in the power of reason, the story ends like a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries.

Robert Jastrow, *God and the Astronomers*

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* * *

JIS ISSN 0890-0132 is co-sponsored by the International Christian Studies Association and the Institute for Interdisciplinary Research, published in a double issue once per year (September release), O. Gruenwald, W.R. Marty & T.J. Smith, editors. Articles refereed anonymously. **JIS** is trilingual: English, German, and French. **JIS** calls for both more specialization and a multidisciplinary framework embracing methodological pluralism and rooted in a civic culture of free inquiry and tolerance. **JIS V (1993)** on "The Unity of the Arts and Sciences: Pathways to God's Creation?" (Mss. due by: *July 1, 1992*). **JIS** annual subscriptions: Individual: $15; Institutional: $25; Student: $10 (Overseas Air: add $5). Check/money order in U.S. funds payable to: **IIR**, 2828 Third Street, Suite 11, Santa Monica, CA 90405, USA.

Teaching Evolution as Non-Science: Examples From California's 1990 *Science Framework*

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Introduction

Since its initial scientific conceptualization, evolution has been under constant pressure to evolve in a non-scientific direction. Current non-scientific usage covers a broad range: generic ("the evolution of a great beer"); New Age religion ("the evolution of consciousness to higher states of reality"); Darwinist philosophy (the meaning of evolution is that "Man is the result of a purposeless and natural process that did not have him in mind"[1]). The treatment of evolution in a non-scientific manner has now made its official appearance in K - 12 education with the publication of the *Science Framework for California Schools.*

Adopted on November 9, 1990, the California *Science Framework* prescribes how science is to be taught in the public schools. The 220-page document also forms the basis for textbook approval and selection in the State. Other states are expected to follow California's lead, either directly by adopting similar frameworks or indirectly by using textbooks that meet California's new criteria.

While the California *Framework* contains some excellent statements of what science is and how it should be taught, it treats evolution as exempt from the very principles of science it so vigorously espouses. This paper presents three examples of the *Framework* departing from its stated rules of science to treat evolution in a non-scientific manner. The examples chosen are: 1. Lack of definition and consistency in use of terms; 2. Failure to discuss both similarities and differences when comparing evolution to other branches of science; and 3. Failure to present evolutionary science as open to challenge and free of dogmatism.

Lack of Definition and Consistency in Use of Terms

In biology, the word "evolution" has at least three separate meanings. These are 1. change over time, a statement about pattern; 2. Organisms are related by descent through common ancestry, a statement about process; and 3. A particular explanatory mechanism (Darwinism) for the pattern and process described in the first and second meanings.[2]

In addition to these generally understood biological meanings, evolution is often used as a synonym for change, development, and the history of natural things. Sometimes evolutionary thinking is extrapolated into a world view, best identified as evolutionism, which claims that the scientific concept of evolution provides a sufficient basis for rejecting the idea of divine origination and governance of natural processes. ("Man is the result of a purposeless and natural process that did not have him in mind.") To avoid bringing ideology into science, it is therefore important that both evolution and theory of evolution be defined and used with consistency of meaning. The *Framework* makes this fundamental point with forceful clarity as in the following:

> The process of teaching science requires a precise, unambiguous use of language .... (p. 14). Educators must be precise in the use of scientific language because that language is crucial to its teaching (p. 17). For clear communication scientists, teachers, and students must communicate the definitions of scientific terms and use them with consistency (p. 17).

Unfortunately, the authors fail to practice what they preach. The word "evolution" appears over

220 times in the *Framework*. It appears as a "fact," a "theory," an "idea," a "subfield" of Life Science, and as a synonym for the "history of life." Neither "evolution" nor the "theory of evolution" is defined or used with consistency of meaning. Sometimes a specific meaning is pointed out such as "change over time" or "descent with modification," but most of the time readers are left with their own flexible interpretation. Sometimes the meaning is obvious; sometimes the meaning is unclear.

Especially vague and inconsistent is the meaning of the "theory of evolution." After listing observations such as: plants and animals change over time, inherited characteristics are modified and passed on to offspring in plants and animals, genetic and biochemical sequences correspond to relationships inferred from fossils and anatomy, etc., the *Framework* offers the following reasons why the "theory of evolution" is the accepted scientific explanation for "evolution":

> These observations constitute some of the evidence that evolution has occurred; evolution is the most consistent and accountable explanation of these observations. The theory of evolution, like other theories, is more than the sum of the facts from which it is derived. It is the best explanation for the fact, and it has predictive value. How evolution has worked — its patterns, processes, mechanisms, and history — composes the theory of evolution, which is constantly being modified as new evidence emerges. Like the idea of a fifth force in physics, new mechanisms of evolutionary theory, such as punctuated equilibria, species selection, and periodicity of mass extinction, are current subjects of debate which, if they turn out to be well supported by all the available evidence, will modify current evolutionary theory. Regardless of the existence of a fifth force, apples still fall. And, regardless of whether the changes in plants and animals are gradual or sporadic, the evidence remains that plants and animals have evolved over time. Thus, the theory of evolution is the accepted scientific explanation of how these changes occurred.

If I understand this paragraph correctly, it is saying that the "theory of evolution" is "the accepted scientific explanation" for *how* the changes occurred because the changes occurred. In my judgment, the *Framework* authors have drifted away from rigorous science into non-science.[3] The solution here is not only to define terms, but also to carefully distinguish between evolution, the theory of evolution, and the study of evolution.[4] I also think that it would be wise to distinguish between evolution and the study of the history of life. Patterns of stasis (stability is one of the major themes of the *Framework*) could thus be studied alongside evolution for contrast.

Failure to Compare Both Similarities and Differences

> Scientists describe and picture what they observe in various ways, thus communicating their ideas to others so that they can exchange views and interpretations and pass along information. They test what they know against what they do not yet know, comparing features and behaviors for similarities and differences (p. 3).

There are several places in the *Framework* where the fact of evolution is described as similar to the fact of gravity and the fact of electricity. Also, the theory of evolution "is an accepted scientific explanation and therefore no more controversial in scientific circles than the theories of gravitation and electron flow" (p. 21).

Granted there are similarities. There are also very important differences, especially in quantifiability, repeatability, testability and predictability. There seems to be special pleading involved in claiming the empirical status of gravity and electricity for evolution. Evolution ("microevolution") can and should be taught as science. The larger picture, "macroevolution," is basically an historical science, based on non-repeatable one-of-a-kind contingent events. It lacks the repeatable data base of an empirical laboratory science such as gravity and electricity. Integrity and proper modeling of science require that differences be presented alongside similarities.

Failure to Present Evolutionary Science as Open to Inquiry and Free of Dogmatism.

> Nothing in science or in any other field of knowledge shall be taught dogmatically (p xi). The character of science is shown to be open to inquiry and controversy and free of dogmatism... (p. 8). The evolutionary and fossil histories of a few representative groups should be presented in life science curricula in detail... (p. 135).

Contrast these statements with the following restriction placed on the presentation of evidence from the fossil record.

> The evolution of life should be presented to students *not* [emphasis mine] as a disconnected series but as a pattern of changing diversity united by evolutionary relationships and distinguished by

changes in the environment and adaptations to those changes (p. 132).

What if there are fossil histories that cannot presently be connected by evolutionary relationships? For example, the disconnected emergence pattern of the animal phyla that appeared in the early Cambrian period may signal a need to alter or modify current theory. If we are going to show students how openness has an important role in science, we surely do not want to distort or suppress crucial scientific findings, especially if those findings conflict with orthodox expectations. The practice of science on this issue is stated as follows:

> Negative results — those that do not agree with the hypothesis — must be reported along with those that do agree (p. 18). Teachers must not be pressured by anyone to distort or suppress science... (p. 20).

Conclusion

When controversial claims arise concerning evolution, California teachers are advised to inform their students "that they have confidence that every effort has been made to make their curriculum as scientifically accurate as possible" (p. 24). It is my conclusion that this confidence is not warranted because of the treatment of evolution in a non-scientific manner in the *Framework*.

The corrective action for teaching evolution as science is obvious. Teach evolution as science by the simple expedient of following the principles outlined in the *Framework*. Those outlined in this paper include definition and consistent use of scientific terms, comparing differences along with similarities, and teaching science undogmatically by including evidence at variance with entrenched expectations. It is not enough to state that science is open to inquiry and free of dogmatism. Such openness must be demonstrated by the intentional inclusion of specific unanswered questions and unsolved problems along with areas of well established knowledge.

Copies of the *Science Framework* are available for $6.50 per copy, plus sales tax for California residents, from the Bureau of Publications, Sales Unit, California Department of Education, P.O. Box 271, Sacramento, CA 95802-0271 (phone: 916-445-1260). ✣

NOTES

[1]George Gaylord Simpson, *The Meaning of Evolution*, Yale University Press, 1967, pp. 345.

[2]See "The Meanings of Evolution," by Keith Stewart Thompson, *American Scientist*, Vol. 70.

[3]Observers have suggested that polemicists on both sides of the creation/evolution pseudocontroversy deliberately leave evolution undefined in order to win naive people to their position. Biologist David L. Wilcox has applied the term "shell game" to describe this phenomenon. The shell game is popularized in the Gary Cooper movie, *Friendly Persuasion*, where the con artist hides the pea under one of three different walnut shells. On the tactic of shifting the meaning of evolution to support an entrenched position see P. T. Saunders & M. W. Ho, "Is Neo-Darwinism Falsifiable? — And Does It Matter?" (*Nature and Systems*, 4, 1982, 172-196).

[4]On the meaning of evolution as well as its comparison to gravity and electricity see "The Status of Evolution as a Scientific Theory," *IBRI Research Report* N. 37, 1990. Write Interdisciplinary Biblical Research Institute, P.O. Box 423, Hatfield, PA 19440.

Why, if the court please, have we not the right to interpret our Bible as we see fit? Why, have we not the right to bar the door to science when it comes within the four walls of God's church upon this earth? Have we not the right? Who says that we have not? Show me the man who will challenge it. We have the right to pursue knowledge—we have the right to participate in scientific investigation, but, if the court please, when science strikes at that upon which man's eternal hope is founded, then I say the foundation of man's civilization is about to crumble. They say this is a battle between religion and science. If it is, I want to serve notice now, in the name of the great God, that I am on the side of religion.

A.T. Stewart, speech at the *Scopes* trial, July 16, 1925

Reflections on "Christian Discipleship and the Challenge of Physics"

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This paper by Robert John Russell (*PSCF*, September 1990) is a landmark paper. Eloquently written, sharing both personal and professional insights, it seeks to lay a foundation for a perspective on the relationship between science and Christian theology in the future. Russell seeks to uphold the validity of science and of theology without making one dependent on the other. All of this is cause for rejoicing. Why then these reflections?

The approach that Russell sets forth is at least apparently so close to the approach advocated by others with quite a different agenda, that it is necessary for clarification of the distinctions and recognition of the pitfalls. Readers without the background in science and theology that Russell has may not be able to tell the difference between what Russell appears to recommend and what others recommend.

Under "This I believe," Russell writes, "I believe we stand at the brink of a new Reformation, one in which virtually all of our theology will be rethought in new terms. We must begin to make sense of our cherished traditions in terms of contemporary science if we are to enter a new period of theological discovery and vitality." But what do we make of words like "new Reformation," "rethought in new terms," "begin to make sense of our cherished traditions in terms of contemporary science"? Doesn't this sound a little one-sided: our theology must be reinterpreted in terms of contemporary science for it to make sense? Has our science no similar obligation with respect to our theology? And is the reshaping of either of these two major disciplines to make it fit better with the other really an appropriate task?

Or consider Russell's closing remarks, which sum up his vision for the future.

> We are only now beginning a long road ahead, a seeking to re-formulate religious faith with intellectual integrity in this world of science ... Will the future bring a new coherence of religious beliefs and scientific knowledge, or are we at the end of an era of religion stretching back over four millennia? ... And I believe the pioneers of this coming age will produce a new community who will do "theology and science" by incorporating the truth of each into a broader integration, a new paradigm.

The troublesome words in this vision are "re-formulate religious faith," "coming age," "a new community," and "a new paradigm." The words in these quotes are troublesome because they call to mind two other, apparently quite similar, perspectives that differ radically from the Christian position.

Fifteen years ago, R.W. Burhoe urged a new approach to the interaction between science and theology: "scientific theology."[1]

> The primary point of this paper is to show that now there seem to be dawning in the recent pictures of man and his relation to the "ultimate reality" as portrayed by the sciences a clarification and substantiation of the basic insights of the great religions, but with much more concrete detail and evidence ... It is this synthesis to which I give the name "scientific theology."
>
> I shall seek to address myself to the elaboration of a scientific picture of religion that will be convincing to the scientific and skeptical minds who have not yet been provided with much scientific evidence for its virtues and potential. ... to show how religion may be reformulated and revalidated in the light of the sciences as salvatory for the present human predicament.

An analysis of what such a "reformulation" requires shows that the result is "an eclectic univer-

salistic religion in which nature is God, the natural system is the Kingdom of God, the supernatural is anything not covered by common sense, science is truth, evil means non-viable, and salvation is man's quest for survival. ... Finally optimism in the future must rest on the frail hope that increasing knowledge will lead men to do what they must to save themselves. The God who calls, empowers, forgives, loves and acts is no longer there; only the impersonal silence of the total ecosystem remains."[2] The first assurance that we seek is therefore that Russell's reformulation does not lead to these results.

A second vision that at least superficially resembles the one set forth by Russell is that of William Tiller,[3]

> We are on the threshold of a revolution... A revolution so vast, much more vast than this world has ever seen, even in the days of the Greeks. We are talking about a revolution of scientific understanding, vast new technologies growing out of that understanding, knowledge of man's relationships within himself, between himself, and his brothers. ... As we learn the true meaning of mind and thought and put them to work we will grow to a potential far, far beyond what, presently, we manifest; and we can make of the earth a rather fantastic place.

When we analyze what is involved in these "new" paradigms, we find that it involves the belief that "time, space and matter can all be changed by human beings," that "the world we perceive is not an objective world with existence independent of us. Rather it is a world altered by our intentions. We cannot perceive reality."[4] This perspective has perhaps more in common with Eastern Monism than with Christian theology, as has been commented by many authors in recent years. The second assurance we seek is that the new dimensions of Russell's vision of the future do not lead us to these.

Almost all talk of a new future with a new synthesis between science and theology leads to one of three results: (1) the rewriting of authentic theology so that it conforms to the thought patterns and concepts acceptable to contemporary science (the first case above), (2) the rewriting of both authentic theology and authentic science so that both conform to the visionary expectations of a New Age or Eastern religious thought pattern (the second case above), or (3) the integration of insights from authentic science and authentic theology in such a way that the distinctives of each are preserved while their inputs are interrelated in such a way that no damage is done either to science or theology. Although Russell may wish to put himself in the third camp, the historical position advocated by the ASA, the way he has stated his position may mislead others.

In another recent paper,[5] Russell has treated this same theme. He disclaims defense of a "natural theology," but it must be recognized that every time theology is shaped or changed in any major way because of supposed inputs from contemporary science, "natural theology" is being done. This is emphasized by the closing words of that paper, "One thing seems certain: many of the concepts appropriate to the 'reality' of whose 'intimations' we find in cosmology and quantum physics and of its Creator by whom we are grasped and redeemed through the Living Word will be vastly different from the traditional classical conceptions which have worked for so long." What does this claim portend for our very understanding of the conceptions of "Creator," "redeemed," and "Living Word"? If it is possible for them all to radically change, how can we continue to talk about a biblical theology?

A critical issue in this kind of approach is the constant explicit or implicit question, "What is the *meaning* of this scientific description for our theological understanding?" Now the growth in our understanding of the nature of the universe and the mechanisms of the physical world plays a large and continuing role in enabling us to rid ourselves of caricatures of the universe that have been attached to biblical statements in the past. The insights of quantum physics suggest to us that the faulty view we had of God's action in the universe in terms of classical determinism is no longer acceptable. It is indeed essential for Christians to understand as much of the present scientific description of the universe as possible when constructing the framework within which to present God as Creator and Jesus Christ as Savior. It is also essential that these insights be available when we address a number of crucial ethical issues. What is involved here is not the changing of biblical theology, but the correction of mistaken or limited views of the framework within which that theology should be presented.

The asking of the question about the meaning of a scientific description, however, usually assumes a particular worldview commitment. My answer to the question is simply that scientific descriptions do not have "meaning." Scientific descriptions are human inventions that are informative and useful when they provide us with testable insights into the mechanisms of the physical universe. They provide us with knowledge about "what things are like." If they are to have "meaning," however, in any but the most trivial technical sense, then we

will have to provide the meaning for them from our own reservoir of values based on our own faith commitments. Whether, for example, the activity of God in the world can best be described by a deterministic model, a chance model, or by a complex interaction of both, has no "meaning" for the concept of God as Creator and Sustainer of all there exists. We can find out more about the ways in which he acts, but whether or not he acts and what it "means" is not something we will somehow derive from science.

Another major problem exists. Efforts to produce some new formulation of theology that is consistent with scientific understanding seem to be consistently lacking when it comes to meaningful reformulations for such significant theological concepts as holiness, sin, salvation, and regeneration. Meaningful development of the human being is described in terms of the ongoing changes of evolution, not in terms of a new birth through faith in Jesus Christ. At best "salvation" is treated under the results of "creation," not under the effects of "Redemption."[6] If these are among the classical conceptions that are going to be changed by the new science/theology breakthrough, then whether we have anything "Christian" left seems highly questionable.

In the first paragraph on p. 146, Russell makes a moving statement of his personal faith. It is a statement with which most Christians would agree. And yet, in the midst of this statement, we read, "Christ bears our sorrows." But this is not the historic Christian position, which says quite plainly, "Christ bore our sins." Russell speaks of the "victims of injustice, disease, loneliness, war, poverty and despair;" whence come these victims and what is the ultimate cause of their suffering?

Once again, I do not wish to appear necessarily to be charging Russell himself with these various pitfalls and possible false starts, for I may have misunderstood him. But rather I urge that people writing on these subjects be very careful that the language they use and the perspectives they advocate are indeed consistent with a genuine integration of authentic science and authentic Christian theology.

Let me then address what Russell has written in a few places in the paper with comments based on the above remarks.

It is evident from his comments that he personally experienced difficulty in continuing his faith in view of developments in scientific understanding. But so often in cases like this we find that people ask the wrong questions. Russell seems to say that believing in a God in whom "we live and move and have our being," believing in the central role of human beings in the divine plan, viewing history as having a beginning and a purpose, seeing life as a divine gift and eternity a promise for those committed to justice and compassion—that all of these precious Christian perspectives have been seriously threatened or even done away with because of the developments of modern science.

But I have also grown up over the same period (reaching back a little further, to be sure), have experienced Apollo and the PC, had the experience of seeing Einstein in action in person, read about Crick, saw the Space Shuttle, read about the Jarvis heart and DNA, and studied relativity. None of these impacted my life in such a way as to make me reject the biblical concepts above. Perhaps it is not what has happened objectively in the world to Russell and me, but rather the personal experiences we have undergone and what our immediate contemporaries have led us to believe they mean.

I do not ask questions about religious values in a world of Star Trek (I enjoy the fictional Lt. Data but I do not build theological positions based on such an android), nor do I puzzle pointlessly about other unknown life forms in the universe. I try to recognize the difference between fact and fiction, between what is known and what is not known, and I do not build a perspective on life from the answers to questions that perhaps have no meaning.

The questions posed by Russell in this paragraph appear to be questions that would be raised by someone who thinks that scientific descriptions are the only valid descriptions. If he was led to raise them for himself, can this not rather be traced to experiences like when his minister answered his question about heaven after his father died, with the words, "We don't believe in that any more; science has changed all that." Otherwise, why would one ask, "What hope do we have in times of grief, illness and terror if death is no longer a step to a better world but a recycling of our atoms and molecules into the ecosystem of a planet which is itself merely a dust mote in endless intergalactic space?" Don't misunderstand me. I know that these questions are constantly being asked. But I do not believe that they *need* to be asked, nor that they *are* asked persistently by individuals who have placed their faith in God through Jesus Christ. I do not believe that asking them is forced upon us by the development of our scientific understanding alone.

Concerning a "scientific theory of everything," Russell asks, "Would such a theory be relevant to any of our biblical and theological claims about how the world came to be, or about God's continuing creative acts in the world?" The answer appears to be No. We do not authentically make biblical and theological claims about *how* the world came to be, nor about necessary scientific mechanisms for God's continuing creative acts in the world. Whether our description of the origin of the universe takes the form of Big Bang, Steady State, or any other such scientific description, makes not the slightest contribution to the content of the "biblical belief in God the Creator." Our scientific understanding will, of course, constantly inform us of what appears currently to be the mechanisms that describe the creative and sustaining activity of God.

These reflections are intended to give some feeling for why I react with great skepticism to all claims of profound new insights into theology because of what scientists happen to believe at the present time is a valid description of physical mechanisms. I have read many books and conference proceedings organized for this specific purpose, without receiving any reason to change this basic conviction. It profoundly disturbs me if capable and sensitive Christians give the impression that changes in our thinking due to science are ever going to make one iota of significant difference in our involvement in and expression of love, joy, peace, patience, kindness, goodness, faith, gentleness, and self-control,[7] not to exclude many other such central values of human relationships based upon life in Christ such as mercy, compassion, forgiveness, redemption, and regeneration. Here we can say, "Amen," to Russell when he writes, "Yet if the empirical method is the only reliable route to truth, then even science can be the reason for an overwhelming sense of meaninglessness."

NOTES

[1]R.W. Burhoe, "The Human Prospect and the Lord of History," *Zygon* **10**, No. 3, 299-375 (1975).
[2]R.H. Bube, "Scientific Theology," *JASA* **29**, 124 (1977).
[3]Quoted from R. Williams, *Quantas Airways*, May/June (1976) p. 8.
[4]R.H. Bube, "Cosmic Consciousness," *JASA* **29**, 165 (1977).
[5]R.J. Russell, "Theological Implications of Physics and Cosmology," in *The Church and Contemporary Cosmology*, J.B. Miller and K.E. McCall, eds., Carnegie Mellon Univ. Press, Pittsburgh (1990), p. 247.
[6]R.H. Bube, "Tension in Theology: Creation vs Redemption," *JASA* **32**, 1 (1980).
[7]Galatians 5:22, 23.

Science is more dependent on creative imagination and metaphor than we might think. A number of philosophers have suggested that science cannot be concerned only with "bare facts," for all data come to the observer within a context of assumption which are not provable by the immediate data . . . .

Most of the data cited in the theory of evolution was available long before Darwin's time. Scientific progress was made only when he created a context, a theory, around the notion of natural selection. This was as much a creative act as the writing of a symphony or the painting of a picture. The really significant moment for the scientist, as for the poet, is when he or she finds a new way to speak of what is familiar, creating a new context for understanding.

William H. King, *The Christian Century*, July 2-9, 1986

Book Reviews

FAITH AND REASON: Searching for a Rational Faith by Ronald H. Nash. Grand Rapids: Zondervan, 1988. 295 pages. Hardcover.

Faith and Reason is an introduction to some philosophical problems of religion designed to be read by an uninitiated reader and also used as a college textbook. As such, it starts from the level of definitions (especially in Part One) and a very good summary of Christian doctrine.

According to Nash, the philosophy of religion has recently revolved around five themes: 1) the problem of the existence of God and 2) of his nature, 3) the problem of evil, 4) miracles, and 5) the rationality of religious belief. The fifth theme is brought to the fore in Nash's book and is also reflected in its title. The presumption of atheism is often claimed to be more objective than any other one and nonbelief is held to be more rational than belief, especially religious belief. Nash subscribes to the Augustinian view that it is "arbitrary intellectual imperialism" (Plantinga) and says that it is "philosophically irresponsible" to do otherwise (p. 17). He discusses some objections to such a view, evidentialism and foundationalism (one being a form of another). The outcome of the discussion is that "it is perfectly rational, reasonable, intellectually respectable and acceptable to believe" (Plantinga, p. 87). Belief in God is to be a "properly basic" belief, a presupposition. Thus, natural theology's attempt, as the author argues at length, to provide more basic beliefs is unjustified. This closes the second part of the book and sets the stage for all other deliberations.

Part three presents some traditional arguments for the existence of God, for instance cosmological arguments, teleological argument, and argument based upon religious experiences (which, the author says, is used by most believing people, p. 143). Part four concerns the problem of evil. Part five discusses miracles, especially interesting in the context of our scientifically minded society.

The book reads very well, and being designed as a textbook, it does not shock the reader by any surprising or new view on any subject. Nash quotes several theological authorities, but he draws especially from Plantinga, whose solutions are in many instances a final word for him. The second author he quotes frequently is himself, to the extent that the reader is referred to his books ratherthan to those of philosophers or theologians whose views are presented (pp. 38, 253). It all means that the diachronic dimension is somewhat missing in this book. Nash makes only occasional recourses to history focusing rather on what seems to be *en vogue* in the most recent times. The only noticeable discussion in this context concerns Hume's opinion on the status of miracles. There are some minor slips, for instance—it is forgotten that already Husserl's phenomenology has been based upon the concept of the eidetic (p. 21), and logic certainly cannot be equated with the law of noncontradiction (p. 52). The author has also some tendency to be repetitious. Nevertheless, the book is a good introduction to the basic problems of theology, especially Christian theology, giving the reader a fair picture of the scope of problems, solutions, and discussions concerning the rationality of faith. The author quite clearly specifies his own position so that his deliberations are not divorced from his personal attachment to certain solutions. This adds to the value of the presentation.

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

BODY, SOUL, AND LIFE EVERLASTING: Biblical Anthropology and the Monism-Dualism Debate by John W. Cooper. Grand Rapids: Eerdmans, 1989. 262 pages. Paperback; $16.95.

The mind-body problem is as old as humanity and, as neurologist Roger W. Sperry phrased it, "much of man's religious dogma and his moral and even legal codes is deeply influenced in the final analysis by mind-matter concepts." It is also central to the Christian eschatology, since it determines the sense of life and hope for afterlife. "The central issue is whether the soul can survive and function apart from the human body" (p. 1). The problem, however, is that science is not much of a help in this matter; quite the contrary, it undermines traditional Christian theology concerning the immortality of soul by reducing it to bodily functions, by counting it as an epiphenomemon of the brain activities, or simply denying its existence. Therefore, science can hardly be useful in attempts to find a solution. On the other hand, there is no agreement among Christian theologians as to the nature of the soul either, and the traditional Christian view of dualism is also attacked by Christian philosophers. This antidualist opposition inspired Cooper to write his book which is intended to be an analysis and refutation of arguments of the monists and at the same time a defense of dualism, the doctrine faithful to the Scripture and "the traditional teaching of the church" (p. 5).

In the first chapter, Cooper presents scientific, philosophical and theological arguments, all concluding the same thing: "dualism is out, holism or monism is in" (p. 34). The core of the book is the next six chapters devoted to interpretation of biblical anthropology; he discusses the holistic emphasis and dualistic implication of Old Testament anthropology, the intertestamental es-

chatology, and New Testament anthropology. The conclusion is that "the intermediate state theory and its implied anthropological dualism are the most reasonable positions to hold in interpreting the New Testament" (p. 146).

The thrust of Cooper's splendid, knowledgeable, and scholarly argumentation is the desire to prove that dualism should be preferred over monism, that it fits better the scripture, Christian tradition and doctrine. The author also shows that many adherents of antidualism are, in fact, dualist on account of tacit assumptions they make. Besides, Cooper rather marginally and declaratively mentions the fact that the concept of dualism may cause problems of its own. The author does not want to accept a strict division between the spiritual and the material, the "essential disharmony between body and spirit" preferring what he calls "holistic dualism" (p. 179). However, he discusses very little the nature of the harmony between body and spirit. In fact, it is the most difficult problem. Monism disposes of the problem by rejecting one part of reality, thereby creating a one-dimensional, sterile image of man. However, if the existence of two parts of reality is assumed, there arise insurmountable problems of establishing their interplay. Science may support the view of dualism. However, as Cooper rightly states, its solutions cannot be decisive: "idealism can devise ways of making all the brain events somehow dependent on the mental events ... And materialism has proposed numerous accounts of how mental properties are really identical with or generated by events in the brain ... The crucial point is that the observable data from brain physiology and physiological psychology undermine all philosophical theories alike" (p. 227). This statement, however, is incoherent with the pronouncements that science undermines "the basis for considering the soul as a separate substance" (p. 34) and that science is needed for addressing the body-soul relation (p. 179). Cooper seems to state that science can never solve philosophical problems, but it should not be neglected altogether, especially in our scientifically minded age.

Body, Soul, and Life Everlasting remains, however, an excellent exposition of debates concerning the mind-body problem. It presents a superb and thorough discussion of scriptural arguments truly indicating that, after all, dualism is "clearly the correct position" (p. 253).

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

DIRT, GREED, & SEX: Sexual Ethics in the New Testament and Their Implications for Today by L. William Countryman. Philadelphia, PA: Fortress Press, 1988. 267 pages, bibliography, indices of biblical passages, subjects, and modern authors. Hardcover.

This book had its beginning when Countryman, professor of New Testament at the Church Divinity School of the Pacific in Berkeley, was asked to give a series of lectures on sexual ethics. He made a scholarly review of the biblical references to this topic and from that developed a sexual ethic for Christians today.

He proposes that what the New Testament writers say about sexual ethics has to be understood in the setting of the Old Testament ethics of purity (DIRT) and of property (GREED). He develops in great detail the purity ethic of the Torah regarding both food and sex and eventually helps us understand that through Jesus, we are freed from the laws of "physical purity" for the higher concept of "purity of the heart."

He also develops in detail the ethics of sexual property. He describes the family in biblical times as being strongly hierarchical. The patriarch had extensive rights of ownership of members of his family, and wives were regarded as not much more than slaves, property of their husbands. Acts of adultery and incest were therefore to be looked upon as violations of property rather than as sins *per se*. Jesus upset that whole hierarchy and gave women equal "property rights" to their husbands.

In his final section, entitled SEX, Countryman strives to outline an acceptable Christian ethic for today. Having placed the pertinent biblical references in their historical context, it is easy for him to claim they cannot be taken as direct, literal commands. He tries, however, to draw "generative principles" and "derived guidelines" from the previous study. It is at this point, however, that he seems to wander far afield from the Bible. He describes homosexual orientation as "increasingly recognized in our time as a given of human sexuality...this orientation is normally inalterable..." (p. 244). He then draws his conclusions from those observations rather than from his study of the biblical references to homosexuality. He explains the Romans 1 reference to homosexuality (pp. 109-123), which most readers find to be an unambiguous denunciation of the practice, as a description of an "unpleasingly dirty" habit of the Gentiles, which God gave them over to because of their more serious sins of idolatry and "social disruption." Nevertheless, he agrees that Paul described these acts as "unclean, dishonorable, improper, and 'over against nature' " but not sin. That justifies, for Professor Countryman, his support of homosexual practices and marriages. In fact, he tells us that heterosexual lovers can learn something positive from some homosexual couples (p. 260)!

In his conclusion, he discusses the "gift of celibacy" (p. 264). Presumably, he's referring to Paul's proposal that those men who can live without lusting for women can give their whole attention to the spreading of the Gospel. To Countryman, however, the gift of celibacy, given to but a few, allows those few to remain virginal until marriage. The majority, however, without that gift, will have sex as desired before marriage. Again, he's concerned with seeing the situation as it exists rather than speaking to a sinful generation to say "Thou Shalt Not!"

With this type of reasoning, he can condone pre-marital sex, sex for older widows and widowers, and use of

prostitutes in some (but not all) situations. He does condemn promiscuity, which he defines as "personal gratification at whatever expense to others" (p. 264). He also sees any exploitative use of another as a greater sin than violation of most of the sexual ethics rules of traditional Christianity. If you act "free of falsehood and violence toward the partner and in some way be compatible with the Christian person's relationship with Christ," (p. 263), most anything is permissible.

On the positive side, he makes reference to approximately 750 biblical (and apocryphal) passages and 150 other ancient texts. He writes clearly and explains his position well. Most ASA members, however, will disagree heartily with most of Professor Countryman's conclusions.

Reviewed by Edward M. Blight, Jr., Professor of Surgery (Urology), Loma Linda University, Loma Linda, CA 92354.

THE SEARCH FOR SOLUTIONS by Horace Freeland Judson. Baltimore, MD: The Johns Hopkins University Press, 1987, abridged edition. 266 pages, annotated bibliography, index. Paperback; $9.95.

Horace Freeland Judson is both the Henry R. Luce Professor of Science and Writing and a professor of the history of science at the Johns Hopkins University. This book, a lucid, well-written introduction to the nature of scientific inquiry, does credit to both sets of credentials. An earlier hard cover edition of the book, published in 1980, had numerous color illustrations which have been omitted from this edition, but the text from this earlier edition appears here unabridged.

The book is divided into nine chapters. The first chapter, "Investigation: The Rage to Know," presents the urge to understand the world as the underlying impetus for science. The scientist is compared to the artist in a search for order and beauty that cannot be mechanically arrived at. This theme recurs throughout the book.

The remaining eight chapters present various aspects of science: Pattern, Change (including parameters), Chance, Feedback, Modeling, Strong Predictions, Evidence, and Theory. Many of these topics are ambiguous in that they can apply either to the object of study or to the scientist. Thus, chance is applied both to chance involved in making a discovery as well as to random events in nature. Similarly, feedback applies both to a biological organism and to the scientific community.

The book concludes with a brief enumeration of "Eight Problems in Search of Solutions," an annotated bibliography regarding the history and philosophy of science, and an index.

One of the fascinating aspects of the book which should prove of interest to the scientist as well as the layman is the liberal use of illustrations, both scientific and everyday. Besides recounting the history of various scientific discoveries, the book is full of material from interviews Judson has conducted with numerous present-day scientists. Most of the chapters end with extended "conversations" with a scientist whose sort typifies the point of the chapter. These illustrations highlight the human side of science: the frustrations and problems, the routine and tedium, the flashes of insight and excitement of discovery.

As in many books discussing scientific inquiry, most of the examples in the book are taken from the physical sciences, biochemistry, and physiology, although economics figures prominently in the chapter on modeling. It is encouraging to see the number of current women scientists presented in the illustrations.

The interrelatedness of theory and evidence plays a prominent role in the book. Judson develops the idea that evidence takes on relevance only in relation to a broader theory. He shows how evidence has been laid aside, possibly to be shown to be incorrect, on the basis of a well-established theory. At the same time, he discusses instances in which anomalous evidence can be used to substantiate a theory which accounts for it.

My only complaint about the book is that Judson at times gets carried away with the place of science and scientific knowledge, as well as with the scientific method. For example, we find the following statements:

> Scientific knowledge, collectively, is the most reliable knowledge we have got (p. ix).

> Science has several rewards, but the greatest is that it is the most interesting, difficult, pitiless, exciting, and beautiful pursuit that we have yet found. Science is our century's art (p. 12).

> A new theory, in replacing a successful older one, at the very minimum must account for all the results that the old one explained, and at least as well as the old one did (p. 242).

Overall, however, Judson's exuberance is refreshing. Judson has done an admirable job of presenting the work of the scientist that should be of interest to the scientist and layman alike.

Reviewed by John M. Clifton, University of North Dakota and Summer Institute of Linguistics, Ukarumpa via Lae, Papua, New Guinea.

THE TRANSFORMING MOMENT by James E. Loder. Colorado Springs, CO: Helmers & Howard, 1989. Second Edition, paperback, 244 pages, index.

It will take more than a month to absorb the impact of this book. Its explication of the transformations inherent to the subject-object relation with the knowing of our being and the being of our knowing in this world is both profound and timely. The author, Professor of Chris-

tian Education at Princeton Theological Seminary, in his preface has expressed a deep satisfaction in knowing that another decade of readers will have the opportunity to consider his argument. It is a carefully written and deeply probing effort to uncover the kind of complex dynamics involved in creating real correspondence between the reality of God's freedom to be present for us within the order and structures of this world and the reality of human freedom.

To appreciate the clarity and integrity of the form and content of the argument is to agree with the author that his book is important and ought to be read not only in the nineties but the in the decade that marks the beginning of a new millennium. I myself could wish that I might have read it when I was a part of the "silent generation" at Princeton University during the fifties, when I was well on my own way into a romance with the "void."

Much of the agony, pain, and torment we can know when we face problems such as these might have been spared. Much of the self-destruction we can experience in the "silence" might sooner have been turned into the kind of convictional knowledge our author has explored with such great care and compassion. As it is, I must simply thank Professor Loder for his book now, and write more an appreciation than a review.

To compose a book about the way true knowledge is generated in human consciousness and the way that process affects human behavior is obviously no small task. But Loder's ability at integrating a life-long love of the works of Soren Kierkegaard along with his own experience of God, and his capacity to range among the great minds of the Western and Eastern traditions, gives his argument access to the transformations found in people like Einstein, Freud, and Jung, C.S. Lewis, Sartre, and Lao-Tzu.

With this kind of range, our author can confront us with the many real struggles in the race's effort to grasp the meaning and significance of its existence on the planet. In this way, he would have his readers face the truly ultimate questions in the vast mysteries and complexities that make up the history of the development of our thought.

And there is no lack of form and structure to the substance of his argument either! I believe any reader will easily appreciate the economy and consistency that have shaped Loder's purposes here. But, as I have said, it will take a while to evaluate his contribution to our on-going struggles to understand ourselves in a universe really made by God.

I found most immediately helpful the concepts of congruence and correspondence employed to explicate the knowing relation between divine and human realities. With these concepts, Loder is able to maintain a steady concentration upon the real intelligibility with which the relation has to do and upon whose freedom the fundamental principle of personal knowledge in the world must rely. This kind of penetrating attention is the constant enemy of any sort of reductionism that might be sought to determine the relation.

It is my belief that we would all be better poets and scientists in our various fields if we could indeed, with this kind of attention, seek to explore the depths with which we are confronted. It would go a long way towards avoiding the costly errors in our progress. We would more readily achieve that openness of being appropriate to a stance that is poised creatively in the true wonder of the miracle of real understanding.

With these concepts, then, our author attempts to show what is the nature of the kind of dynamics and kinetics inherent to the knowing relation. True knowledge is composed as human consciousness is transformed in such a way that the contradiction of existence on phenomenal levels of reality may be contradicted by the divine. Old habits of mind are made able to participate in what is truly "new" when the power to integrate is freshly and uniquely experienced. Here we must, argues the author, ultimately see the face of God as the One who knows or we must go blindly on our self-destructive ways.

Here, our freedom is understood as absolutely significant in the divine freedom to be present for us, and with much care and depth Loder allows his readers to participate in a number of cases he has himself experienced in his own counseling ministry. We learn we can understand within the frailties, errors, and the pathos of our woundedness the deepest need we possess to be known by God himself. To this end, Loder can write:

> Don't be afraid—trust and live. Live beyond the boundaries of the shelter you have built against the void. Live in the transparency of the self with the Holy. (p. 121)

The wholeness, joy, and freedom to which our author would point his reader cannot be known in these depths without the convictional knowledge that is appropriate to the transformed life. This is to know that, in the midst of our alienation, brokenness, and fragmentation, the Holy One is free to make us know that we are known and loved. Everything that would contradict our existence is here contradicted by God himself. I hope many will take advantage of this kind of intention in a book and read it prayerfully.

I would like to question, however, the place Loder has given Rudolph Otto's concept of the *"mysterium tremendum fascinans."* It was I believe Karl Barth who first asked this question. The great mystery of the eloquence of God's speaking with us is bound up with the substantiality of the Being of God himself. The "silence" of the "void" can never be thought of as essential to God. It must be bound up, therefore, with the alienation of the creature. How then can Otto's concept be employed to speak of the mystery? How can this fascination along with our dread be the same as the mediation inherent to the transforming moment?

It is a question I am sure the author would be glad to address with the same care and compassion with which

he has treated so many others in this good book. Read it, and pray we shall be made able to answer many of them perhaps in ways that will help us grasp a truly new world.

> The larger significance of the concern for self-worth is not to diminish superstition but to save the person from self-destruction. (p. 198)

Reviewed by John E. McKenna, Adjunct Professor, Fuller Theological Seminary, Pasadena, CA 91182.

DID DARWIN GET IT RIGHT? Essays on Games, Sex and Evolution by John Maynard Smith. New York: Chapman and Hall 1989. 264 pages, index. Hardcover; $22.95.

Maynard Smith is an ardent defender of natural selection as central to the evolutionary process. He is also one who is not ready to accept that stasis and punctuation are typical. And, he describes his views as being in accord with the "modern synthesis." Having said this much, it is clear that his answer to the question posed in the title can be summarized quite succinctly: Yes.

Smith, Emeritus Professor of Biology, University of Sussex, has had a hand in developing group selection theory, and has written on the evolution of sex, ecological models and evolutionary genetics. He has also been much concerned with the use of mathematics in solving biological problems. Unlike many of Maynard Smith's writings, the essays here do not contain math. But they do make it clear he is a strong advocate of thinking mathematically. *Did Darwin Get it Right?* collects 28 pieces, ranging from a 1968 review of James Watson's *The Double Helix* to an article on the evolution of sex written for this volume. In five section introductions, Smith briefly places each piece in perspective. Most of the writings are fairly recent—all but five are from the 1980s—and exactly half are book reviews.

It might at first seem odd to reprint reviews from *The New York Review of Books*, *The Listener*, and *The London Review of Books*, side-by-side with essays first published in *Nature*, a Presidential Address to the Zoological Section of the Association for the Advancement of Science, and the Bernal Lecture delivered to the Royal Society. Indeed, thinking about what you are now reading, you may question the value of reprinting reviews at all. However, I found the book to have a reasonably consistent level of presentation, one quite suitable for a thoughtful general readership, the book's target audience. There are two reasons for this coherence. First, I quite agree with the dust-jacket assessment, that Smith has the ability to convey the excitement and complexity of science "without baffling or boring anyone." When I first received the book, I opened it to browse a little and get a "feel" for it. The next I knew, I had finished the first and second, and was turning the page to begin the third essay. Even the more scholarly papers, while not exactly light reading, are clear and lively. Second, he tends to use reviews as an excuse to explain some biological principle. In his review of Eric Charnov's *The Theory of Sex Allocation*, for example, he describes various theories attempting to explain the sex ratio of most animals. While he mentions Charnov's work, it is not until the end of page six (of a six-and--a-half-page essay) that he gets around to discussing the book in question. Whatever Charnov might have thought of a review that made so little mention of his book, the result is a piece of enduring interest quite apart from one's interest in the book being reviewed.

The essays comprising each section are meant to provide an overview of a broad subject. In Part 2, sociobiology is covered with a summary essay plus seven reviews. One is of Lumsden and Wilson's *Mind and Culture*, famous when it appeared for its complicated mathematics presumably supporting the main tenets of sociobiology. Smith spent several months "trying to understand the maths" and concluded that the models "certainly fail to demonstrate any synergistic effect between cultural and genetic processes" (p. 52). He notes that the review is hard to follow and recommends that "unless you have a special interest in sociobiology... you should skip it, and get a bird's eye of the subject from the other essays" (p. 52). I suggest you ignore this advice. The claim that major conclusions of sociobiology have been demonstrated mathematically is significant, and it is worth some effort to know more about why the claim is not justified. But then, I have a special interest in sociobiology.

Taken together, these pieces introduce the major strands of Smith's work, and thus to many continuing concerns of evolutionary biology. This should appeal to those not familiar with the field, as long as the nature of the book is kept in mind. It is not a review of the current state of the field, and will not suffice, by itself, as a general introduction. These essays might also appeal to those with a good background in evolutionary biology, but for whom Maynard Smith's scholarly work is peripheral and better approached through brief, non-technical essays.

Some of the appeal of these essays for any reader is that they are not summaries, but rather arguments for specific ideas or perspectives. Part 3, for example, concerns punctuated-equilibrium models, but is not so much a review of the field as an interesting selection of arguments by a serious thinker who, for the most part does not embrace the idea. His is not a dogmatic rejection, but a skepticism that leads him to suggest the following about how the idea may be tested: "it will be of little use to analyze the durations in the fossil record of particular named forms ... because this is to study the habits of taxonomists rather than the evolution of organisms. There is no alternative to a statistical study of populations" (p. 132). And concerning the impact of these ideas, he states: "Punctuationist views will, I believe, prove to be a ripple rather than a revolution in the history of ideas about evolution" (p. 156). Perhaps they will—if you measure history on the right time scale.

Reviewed by Paul K. Wason, Assistant Director of Development for Foundations and Corporations, Bates College, Lewiston, ME 04240.

THE RISE AND FALL OF CIVILIZATION: From Creation Through the Flood by David Hocking. Portland, OR: Multnomah Publishers, 1989. 157 pages, index and bibliography. Paperback; 8.95.

Hocking, the senior pastor of Calvary Church in Santa Anna, California, is the author of several books on theology and pastoral care. This work is of primary interest to high school and college students or adults who have some background in theology and science and an interest in theological cosmology. Hocking's presentation is a straight-forward discussion of the biblical account of creation in a very readable, flowing fashion. Although a theological discussion of the major events in Genesis, the author touches on science where he feels it will add to the discussion. It is not a polemical book but simply endeavors to understand the biblical record, accepting it largely at face value. Differences in interpretation are often covered. For example, the author notes that the plural form of the Hebrew, *elohim*, could refer to an emphasis of God's greatness (called the majestic plural) or to God's three-person tri-unity.

Although stressing that "we should always be open to new discoveries and additional information, refusing to suppress scientific research or academic pursuit" (p. 26) the author concludes that "at the present time, the Bible's account of the origin of all things is not compatible with the conclusions of evolution." He makes only limited efforts to reconcile the two, concluding that "without the beliefs of evolution" there is "no reason why God could not have created things quickly in adult, mature, self-reproducing forms that reproduce 'according to their own kind.' " The work is not a critique of evolution, but a focus on the basic philosophical differences between those who look at origins from a theological versus a scientific viewpoint. He concludes, relative to the latter, that "the facts are that the chief proponents of evolutionary thinking in our world do not believe in the existence of a personal God as described in the Bible" (p. 27).

His goal is to understand the biblical record and the various interpretations purported to relate it to our modern view of the world and to resolve internal contradictions as well. The author argues for a twenty-four hour creation day, yet concludes that God "merely speaks the word, and it is done." He notes that both historical traditions of the church and biblical teaching conclude that *no time* is involved in the actual creation. Rather than a twenty-four hour creative day, the scriptures teach a zero second creative week. The author also notes that the long-age tradition was a common early church teaching. Josephus, Irenaeus, Origen, Augustine and Thomas Aquinas all concluded that the days of creation were "geological periods" at a time when no conflict existed between geology and Genesis. Thus, instead of reconciling the twenty-four hour creation days with long-age evolution, one must reconcile the biblical, instantaneous creation teaching with the long-age view held by many in the history of the church, and also with the evidence for the long-age view conclusion in fields as diverse as geology to astronomy.

The author also discusses specifically what happened during each of the creative days, using both the scriptural record and an analysis of the relevant biblical words. An example is his several page discussion on the firmament, concluding that it is "outer space" because God created the sun, moon and stars and placed them inside of the firmament. The firmament thus already existed, and if the sun, moon, and stars were placed in such, the "firmament" could only refer to the whole of outer space. As an introductory discussion of biblical cosmology, the author does not discuss in detail the many other possibilities for the firmament, such as the canopy theory, or the ancient metal dome theory.

The author notes that "many of science's theories that have been contradicting the Bible's teaching have in time been proven to be false" (p. 35) but that "Christians should not discourage scientific investigation or believe that all scientists are atheists and hostile to Christianity. The available scientific data is important for all of us to study carefully. At times we will not be able to give an adequate answer or explanation. More time is needed" (p. 35). Unfortunately, both our knowledge and time are clearly finite on earth—and will always be so. In the end, the author stresses, our choice boils down to a belief preference. Pleasing a professor may require the right answers on a test, but pleasing God in no way requires right answers to difficult knowledge questions. Much of the faith-science issue debate is to help persons deal with their religious doubts and concerns. Intellectualizing the right answer to such questions is not a prerequisite for salvation.

It is also clear that the only way that the Genesis account could be understood is, first of all, if the entire record was taken together, and one relied heavily upon a tremendous amount of archeological, geological, historical, and textual analysis in understanding it. As is English, the meaning of a Hebrew word depends upon the writer, the context, and meaning. For example, Hocking notes that the land animals are put into three categories in Genesis: 1) the beasts of the earth; 2) the cattle; 3) everything that creeps on the earth. To discern the *meaning* of this statement is no easy task. Does *cattle* refer to domesticated animals, *beasts* to animals such as lions, and *everything that creeps*, to very small mammals? While reasonable, this is an interpretation which is neither perfect nor beyond criticism, and may not be correct. Things that creep could also be worms, insects, or even reptiles.

The author concludes that the greatest hostility between religion and science is essentially over the question "were we created by God and thus, accountable to him, or are we the product of evolutionary process, mere examples of animals who have achieved a high level of intelligence and productivity" (p. 53). Often, the incessant debates, both among believers and between believers and nonbelievers, is over unanswerable questions such as the number of angels that can sit on the head of a pin. As it is often said, Christians are losing the battle because of their fighting among themselves. Much of this work is not devoted to speculation as to *how* we were created, but *what kind* of person was created. Although the focus

is on the topic of creationism, much information and insight is provided in theology as well as psychology. The author discusses in depth in several chapters what Genesis teaches us about human personality. In short, knowing about the creation process helps us understand our psychology. It is here that the author shines and where a more valuable contribution is made.

This work will likely not cause the emotional response typical of many of the creationist's works. It is clearly theological and does not purport to prove the Scriptures by the discoveries of science. It simply tries to understand what the scriptural record states by endeavoring to achieve biblical consistency. Unfortunately, this approach does not always help those who are trying to read both the book of life and the book of nature. Nonetheless, the work makes useful contributions in endeavoring to bring a wide variety of material together on the creation account and the Genesis flood.

In summary, this volume is primarily an extensive interpretation of the first few chapters of Genesis, covering the creation, the fall, the sanctity of life and related doctrines. The creation account, fairly literally read, is used as a spring-board to develop a theology and an understanding of humans and their behavior. The author presents what are probably the most common theological views among evangelical Protestants. Extensive scripture is quoted, and the theological presuppositions derived therefrom are discussed. The work concludes with a discussion on human depravity and divine judgment, and a section on the Noahian flood, focusing on the theological reason for such, and the implications of this event for today.

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THE NEW FAITH-SCIENCE DEBATE: Probing Cosmology, Technology, and Theology by John M. Mangum (ed.). Minneapolis: Fortress Press. Geneva: WCC Publications, 1989. 175 pages, no index, occasional references. Paperback; US $9.95, Canadian $12.50.

This book contains material from a conference entitled "The New Scientific/Technological World: What Difference Does It Make for the Churches?" Forty-five young professionals and students in church service or science came to the meeting in Cyprus during 1987. A parent body of what is now the Evangelical Lutheran Church in America cosponsored the event with the Lutheran World Federation while senior scientists, theologians, and church leaders donated their time.

The conference organizers worked explicitly in the tradition of faith-science conferences sponsored by the World Council of Churches (WCC) in the 1970s. Though dominated by Lutheran and "first world" participants, an effort was made to broaden participation well beyond those roots. Theologically, voices ranged from Eastern Orthodox to Reformed to Asian world religions, from panentheism to liberation theology to evangelical thought. Although the diversity was fairly broad (17 countries among the young professionals), no claims can be made for completeness or representativeness on a global scale.

Mangum does not give us a set of academic proceedings. The presentations which make up the bulk of the book are clearly targeted for a lay audience, often without the usual academic paraphernalia (references, index). But we would make a mistake by evaluating this volume solely on these criteria. Its aim is, like that of the conference, to nurture young up-and-coming professionals into a strong awareness of the possibilities for dialogue between science and faith. The book can accomplish that important aim. In this context the diversity of personal background among the conferees becomes an asset by providing varied springboards for discussion, reflection, and reaction. This collection is less useful for sorting out substantive issues or for providing a coherent direction for living out faith and science today.

A major theme of the collection is reflected in the title: the *new* debate. Several writers argue that the newness of science-faith relations since World War II reflects the growing realization that contemporary science and technology are responsible for problems like the environmental crisis or nuclear weapons proliferation. Some of these assertions mislead by blaming science in a simplistic manner. But the conference epilogue, written by Robert John Russell, develops these concerns by suggesting that a "new" debate follows from the "mutual modification" between Christianity and science. Such modification shows up as value-sensitive technology, scientifically literate theology, and churches actively involved in developing science/technology policy.

Another thing that comes through clearly in this collection is the value of Christians around the world talking with one another about the place of technology and science in our age. I found myself intrigued by the juxtaposition of concerns and experiences from five different continents. The appendixes are especially helpful in this regard because they summarize recommendations and priorities for each continent raised by people who live there. The Bible studies written by a leader from an Asian Eastern Orthodox church are also stimulating, especially for Christians unfamiliar with Orthodox traditions. For most North Americans and Europeans, the opportunity to listen to these voices from Africa, Latin America, and Asia will be quite valuable.

Perhaps one can benefit most by taking this book as a collection of sermonettes on science, technology, and the church in today's world. There are many "lessons" we could take away from this "preaching." Several contributors emphasize the necessity of denominational commitments to examine science and technology on an ongoing basis. A minor theme is the indispensable place of social science and social technology in practically addressing the questions raised at the conference. Different

readers will enjoy specific topics examined in various chapters: genetic engineering; mutual challenges among science, theology, and the church; admonitions to not take science too seriously though we can also see it as our vocation; the pace of technological change; and the importance of indigenous science and technology in contrast to traditional development models. While no one will agree with all the sermons, most ASA/CSCAers can agree that the "debate" should be transformed and widely disseminated.

So most Christians interested in science and the church can benefit from this book. When we disagree with certain authors, we can become inspired by developing constructive criticism of their views. Other chapters will support our concerns about church-science interaction and yet others will challenge us to greater commitments. Whether or not we support the WCC or Lutheranism per se, the Christian community cannot afford to ignore the range of issues raised at this conference. For certain uses, someone will have to provide background and guidance for bridging and evaluating the different parts of the collection. But we can all gain by facing the diversity of voices presented here and by taking seriously the challenges for contemporary churches ministering in the world transformed by science.

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THE OPENING OF THE CHRISTIAN MIND: Taking Every Thought Captive to Christ by David W. Gill. Downers Grove, IL: InterVarsity Press, 1989. 142 pages, bibliography. Paperback.

This book sums up the educational philosophy of David W. Gill, one of the founders of New College Berkeley (CA), a graduate center for Christian education founded in 1977, where he served originally as Dean and currently as President and Professor of Ethics. I was struck by the coincidence when I first saw this book: at the same time I was engaged in a two-year series of discussions at my church, which I had entitled, "The Open Mind," and I found our purposes to be remarkably similar. Gill states it this way:

> By the term *Christian mind* I refer to the giving of our minds to Jesus the Lord (and not practicing a mindless Christianity having to do only with our emotions or tradition). ... Let me also warn (reassure?) you that *The Opening of the Christian Mind* is not a manifesto for intellectualism in any sense. It is crucial that a Christian mind be properly located in a richly textured life of worship, evangelism, friendship, mutual care and all other aspects of the Christian life (pp. 13,14).

The book consists of nine chapters with titles such as "Six Marks of a Christian Mind," "The Christian Mind at Work," "Environmental Requirements for a Christian Mind," and "Strategies for Building a Christian Mind."

In a chapter entitled, "The Challenge of a Techno-Pluralistic World," Gill deals with many of the challenges that Christians face as they strive to integrate their faith and life in the midst of a pluralistic and technology-oriented society. He points out how much more difficult it may be for Christians to live out the message of the gospel in their everyday lives, rather than simply keeping these two aspects of life compartmentalized. "Secular Christianity, not secular paganism, is the great enemy of the Christian mind and the gospel." A critical part of this whole situation is the "powerful technological infrastructure with which a Christian mind must contend. Jacques Ellul calls it *Technique*" (p. 41). Although this may be a particular problem for Christians who are also scientists and engineers, it is a general framework within which our culture rests.

> Technique is the method of reducing every phenomenon to rational analysis, reducing what is qualitative to quantitative consideration, thinking and working only in relation to measurable results. It is the worship of measurable effectiveness. ...Invisible, omnipotent, omniscient, omnipresent and not open to criticism: sounds like a god to me. ...Our lives are crushed and directed by the quest for quantifiable growth, measurable success, and rational efficiency (the Technical Trinity) (pp. 41-43).

An overly fastidious reader might notice that the power of technique (the almighty "How To") is so great in our lives, that even Gill himself speaks of the various "techniques" that Christians can use to "help us grow toward personal health and wholeness" (p. 95). This is certainly an area for mature Christian reflection and evaluation. Any attempt to plead for a necessary "schedule" for achieving basic goals such as an open mind must leave room for unexpected surprises from God. Any effort to prescribe methods for achieving a disciplined life must deal with the paradox that, whereas discipline is essential to be free and creative, blindly followed discipline can be enslaving and deauthenticating.

A Christian mind, according to Gill, should have six dimensions; it should be a mind that is theological, historical, humanist, ethical, truthful and aesthetic, with each pervaded by a deep sense of Christian joy. One of the most significant factors in faithful Christian living is the clear recognition of the priorities in one's life. "You can make all the other motions of a Christian mind, and work hard for personal health, but you will lose in the end if you don't make family and friends a priority" (p. 97).

Finally, Gill lists the five major components of an open mind that are essential if Christians are indeed to be "the salt of the earth:" (1) the conviction that Jesus Christ is Lord of the whole of life; (2) the courage to act on our conviction that Jesus is Lord of all; (3) the creativity to discern or invent ways of being faithful to our convictions; (4) competence in carrying out our creative alternatives; and (5) involvement with a community to support and correct our discipleship in the world.

This book would make an excellent study guide for a group committed to helping one another achieve an open Christian mind, one that takes every thought captive to

Christ. Members of the ASA will be happy to note that Gill recommends participation in the American Scientific Affiliation (p. 126) as one of the ways for a young person involved in science or engineering to share in a community dedicated to expressing Christian commitment in professional life.

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

WHEN SKEPTICS ASK: A Handbook on Christian Evidences by Norman Geisler and Ron Brooks. Wheaton: Victor Books, 1989. 348 pages, glossary, suggested readings, and topical persons and scripture indexes. Hardcover; $17.95.

Geisler is Dean of the Liberty Center for Research and Scholarship in Lynchburg, Virginia. A capable debater and a well known lecturer, Geisler has a national and international reputation for ably defending the Christian faith. He is the author of over 30 books, some of which have become texts in seminaries around the country. Brooks is the President of X-Press Ministries in Fort Worth, Texas.

Taking as their guiding text, "Always be prepared to give an answer to everyone who asks you to give the reason for the hope that you have" (I Peter 3:15, NIV), the authors address the general field of Christian evidences. Disavowing extreme fideism and Van Tillian presuppositionalism, these authors believe that the mind really matters.

Chapter 1 describes the main purpose of the book as pre-evangelism. The chart (p. 10) shows the differences between evangelism and pre-evangelism. (I would make a minor change in the chart and say that pre-evangelism is based on reason *and revelation*.) Also, the importance of logic (use of the law of noncontradiction) is stressed.

Chapter 2 concerns the classic arguments to prove God's existence. Although this line of reasoning has fallen out of vogue lately, the authors feel this is a legitimate apologetical approach. Geisler shows remarkable restraint in only referring to Thomas Aquinas (whom I know to be his favorite philosopher/theologian) only once (p. 16) in the entire volume.

Chapter 3 considers world views that are at odds with Christianity. A good chart detailing these views is included (p. 36). Of special interest is the treatment of Pantheism, which is the epistemological core of the New Age Movement, and a lesser known position—Panentheism. This later view believes that God is to the world as sap is to a tree. A current devotee of this position is John Cobb, Clairmont School of Theology, whom Geisler has publicly debated on the subject.

Chapter 4 addresses what is arguably the thorniest problem facing the Christian, the problem of evil. The authors say, "Evil is, in reality, a parasite that cannot exist except as a hole in something that should be solid," and "Evil is a lack of something that should be there in the relationship between good things." C.S. Lewis is quoted to good effect throughout this chapter.

Chapter 5 deals with miracles. The baleful influence of Bultmannianism is examined and found wanting. "First, it does not follow that because an event is MORE than objective and factual that it must be LESS THAN historical" (p. 85). The topic of miracles, magic and myth is treated at length in Geisler's book, *Signs and Wonders* (Wheaton: Tyndale, 1988). Also, Danny Korem's books, mentioned in the Suggested Readings Section, are helpful in this area.

Chapter 6, "Questions about Jesus Christ," deals with the most vital aspect of the Christian faith: The Person, Nature and Work of Christ. Topics such as the Nicene Creed, Docetism, the disciples' claims about Jesus, the Passover Plot hypothesis and the nature of Jesus' resurrection body are ably addressed. The last topic is dealt with at length in Geisler's book, "The Battle for the Resurrection" (Nashville: Thomas Nelson, 1989), written mainly in response to Murray Harris' *Raised Immortal*.

Chapters 7, 8 and 9 concern topics about the Bible. First the question, What do we mean when we say that the Bible is inspired? is addressed. The "secretary model," elsewhere known as the dictation theory, which I have never known any evangelical (or fundamentalist for that matter) to hold, is disavowed. Inerrancy (meaning no errors) incorporates both divine and human elements. A helpful chart is included (p. 147) contrasting the neo-evangelical and evangelical views of scripture. (This chart indicates no acceptance of higher criticism by evangelicals; I would exempt only the destructive portions of the criticism, allowing for the possibility of some positive elements accruing from this discipline.)

The apocryphal books and New Testament textual problems are examined and questions such as, Is the Bible meant to be a science text? are addressed. The authors encourage readers not to confuse error with imprecision. "No one was going to grade the biblical authors on their form as if they were writing research papers" (p. 165). Also, "Don't confuse falsity with perspective" (p. 166). Two excellent books by Geisler dealing with this important topic are *Inerrancy* and *Decide For Yourself*, published by Zondervan.

Chapter 10, dealing with science and evolution, will be of special interest to ASA members. Geisler (who is an ASA member himself) and Brooks discuss their understanding of the difference between "operation" and "origin" science. "Origin science studies past singularities, rather than present normalities. It looks at how things began, not how they work" (p. 215). The distinction between "young earth" and "old earth" creationists is explained. (The authors are of the later persuasion.) One might have wished for some discussion of the theistic

evolutionist position and perhaps mention of Bernard Ramm's classic work, *The Christian View of Science and the Scripture.*

Chapter 11 deals with the afterlife; Chapter 12 looks at truth; the 13th and last chapter deals with morals: abortion, gay rights, sex education—all serious contemporary problems facing Christians.

The amount of material Geisler and Brooks have included in a relatively small volume is impressive. It's a distinct pleasure to read a work such as this—presented in a popular format—without a subsequent loss of intellectual integrity and nuance. Highly recommended.

Reviewed by Ralph MacKenzie, graduate studies, Bethel Theological Seminary West, 5051 Park Rim Drive, San Diego, CA 92117.

LIVING ETHICALLY IN THE NINETIES by J. Kerby Anderson (Ed.). Wheaton, IL: Victor Books, 1990. 229 pages. Hardcover; $12.95.

Essays from Dallas Theological Seminary's *Bibliotheca Sacra* provide biblical insights for Christian responses to a representative sampling of today's ethical dilemmas. The premise is that, while the believer is not of the world, the dedicated Christian is necessarily in the world, for the Lord's purposes.

The Foreword attributes to the Lord a job description: Govern his world and develop and regulate the earth for his glory and to the benefit of his people. Believers strive to act justly, love mercy and walk humbly with the Lord (Micah 6:8). In performing we confront three kinds of dilemmas: Issues of moral and social concern, of law and of medical practice. This volume seeks actively to provide biblical guidance for resolutions.

Initially the tone is set through acknowledgment of the pervasive crisis in morality perceived by many. Examples ranging from misjudgments through outright abuses are attributed to substitution of individual concepts of love for a universal—divine—standard. The thesis is that one ultimate, intrinsic good cannot be denied in seeking out any ethical right.

The theme proceeds in recognition of an ongoing battle for the human mind. Where once we were moved by tradition and reason, we are now guided by science and reason. But what is needed is attendance on revelation and reason. Reasoning, then, remains a universal ethical prerequisite; the emerging imperative is abolishment of theological ignorance, indifference and intellectualism.

Reflection on compelling similarities among ethical codes suggests a sole source lodged beyond individual intellect or culture. Ultimately it is the Creator's character which provides an absolute moral standard, a standard implanted in the human conscience.

From these precepts of Christian morality the anthology turns to specific issues in contemporary society. Salient among these are homosexuality, pornography and drug abuse. In this social arena Micah's injunction is reaffirmed. Indeed, today's societal issues have much in common with those of the prophets' times—and the responses advocated share a biblical foundation. Words like "repent," "justice," "righteousness," "loyalty" are hardly obsolete. Moreover, the prophets, it is pointedly recalled, did not cloister themselves from society and its dilemmas. Neither should the modern Christian; the New Covenant continues to provide both guidance and spiritual power. The evolving instruction recognizes that Christians are living in two "countries:" First and foremost, the Kingdom of God and, not insignificantly, an earthly nation. Christians are to fulfill the responsibilities of both realms simultaneously. Thus, the anthology enters the legal (or political) arena.

In dealing with contemporary politico-legal systems, there are two divergent lines of theological thought each with a crucial bearing on Christian ethical belief. Postmillenarians hold the Church to be obligated to usher in the Kingdom of God, while Premillenarians believe only Christ can inaugurate it. Between these two extremes are the Amillenarians, inclined more toward Premillenarians.

These are distinctions with a profound difference. Postmillenarians constantly strive to effect the Kingdom through universal Christian perfection. Premillenarians, denying human capacity to establish the Kingdom, turn their energies to evangelism. The substance of ethical responses to politico-legal dilemmas flows from the individual Christian's place on this continuum. Desired ends and suitable means for their attainment will be so defined, suggesting that a single Christian ethos on either is unlikely. Given the anthology's exploration of viewpoints, the reader should expect disagreement among believers on everything from the place of Mosaic Law to the propriety of accepting medical advances in societal or personal application. The concluding medical area evaluated innovations in artificial reproduction (with the one jarring lapse in scientific precision) and provides a biblical appraisal of the levels of treatment for the terminally ill where professional intervention ranges to the extreme of involuntary, active euthanasia. Ethical issues falling between birth and death are addressed in essays on abortion and AIDS, both characterized as epidemics.

This rich anthology fully explores, at least in the abstract, ethical quandaries before contemporary Christians. It weds practical approaches to pure theology for a full complement. The intent is not to provide precise answers to individual dilemmas. Instead the selection and structuring of the essays work together to articulate a biblical foundation for contemplating those issues on the social, political and personal scales and for making decisions as citizens of earthly dominions who would serve the Kingdom of God.

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PERSIA AND THE BIBLE by Edwin M. Yamauchi. Grand Rapids, MI: Baker Book House, 1990. 578 pages, indexes. Hardcover; $34.95.

The cultural blight inflicted upon Iran (ancient Persia) by the present regime has affected archaeology as well; there have been no excavations since 1979. This is exceedingly unfortunate because there has been such a dearth of tangible evidence for Persian history. While scientific excavation at Susa goes back to 1897 and there were a scattering of other excavations in the pre-World War II years, it was not until the 1970's that "a great proliferation of excavations" (p. 9) began.

Yamauchi notes that, even though publication has gone on unabated since the shutdown of archaeological field work, there is now "no authoritative and dependable survey ... especially for students of the Bible" (p. 9). The last such survey was Robert North's *Guide to Biblical Iran* (1956). *Persia and the Bible* was written to remedy this lack. Yamauchi is eminently well qualified to undertake this task. He is an internationally recognized authority in Bible and archaeology with eleven books to his credit, including: *Pre-Christian Gnosticism, New Testament Cities in Western Asia Minor,* and *Greece and Babylon.* He has an extensive bibliography in scholarly journals as well as contributions to *Theological Wordbook of the Old Testament, The Expositor's Bible Commentary, The International Standard Bible Encyclopedia,* and other collected works. He was one of a dozen American scholars participating in the Second International Congress of Mithraic Studies, held in Tehran.

The book is copiously illustrated with more than 100 black and white photographs, numerous maps, and several drawings and tables. The photographs are all well-chosen and generally very clear, although a few are a bit murky. While the maps are quite helpful, they would have been more useful if there had been a table of maps or references to them in the text. The discussion of geography on pp. 20-22 would have benefited greatly from a good overall map. Also, a chronological chart of Persia and surrounding kingdoms would have helped the target readership of this book keep track of kings, civilizations and empires. Too often, a familiarity with the history and geography of the surrounding areas is assumed. Finally, a pronunciation guide would have been very helpful, especially with the strange Persian names.

These criticisms are relatively minor, however; the book does succeed admirably in its stated purpose. While *Persia and the Bible,* of necessity, has far more to do with Persia than it does with the Bible, the points of contact are discussed fully and fairly. The full "Index of Scripture References" will greatly enhance the value of the book for anyone interested in the Bible. The "Index of Authors" is an invaluable guide to the extensive footnotes throughout the text; it eliminates the tediousness of searching the preceding twenty pages of crowded footnotes for the full reference to a source that has suddenly become vital. This is a feature that should be added to all scholarly books produced under style manuals such as the *APA Style Manual!* An "Index of Subjects," an "Index of Names," and a 23 page "Selected Bibliography" complete the scholarly apparatus.

The organization of *Persia and the Bible* is interesting and effective. After the brief introduction, the book can be described under three groupings; the first provides a chapter for the Medes and a chapter for each king from Cyrus through Artaxerxes I. The available information on the various capitols is summarized in the next four chapters, and, finally, four topical chapters describe Persia and the Greeks, Zoroastrianism, the Magi, and Mithraism.

The extent of uncertainty still remaining in things Persian is truly remarkable. This is no doubt due to the tremendous reliance that must be placed on the writings of Classical authors of varying degrees of reliability and varying distances from the scene of their pontifications. Interestingly, Herodotus is increasingly rehabilitated as quite reliable, as far as he goes and as far as his sources will allow him. It should be noted that Herodotus frequently didn't trust his sources, either. The inscriptional and literary evidence from Persia is minimal, and the area is still very inadequately excavated. However, Yamauchi moves through it all with a deft and sure pen. He very carefully summarizes both (or all!) positions to the question and concludes with the current condition of scholarship as he sees it. His personal position on Biblical matters would be characterized as evangelical or conservative.

This is an excellent book and can be well recommended for anyone interested in Persia or Persia in the Bible.

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DICTIONARY OF SCIENCE AND CREATIONISM by Ronald L. Eckert. Buffalo, NY: Prometheus Books, 1990. 263 pages including references and index. Hardcover; $32.95.

I found this to be a useful book, specifically because of its topical format. It offers a broad interdisciplinary scope which makes for a handy quick reference, but it is not very comprehensive. For a similar perspective with much more detail on earth-science issues, see Strahler's *Science and Earth History,* also by Prometheus Books. The overall perspective is pro-evolutionism and anti-creationism. A reasonable understanding of the issues is demonstrated in spite of Ronald Eckert's background as a librarian and co-translator of the *Canterbury Tales* into modern English.

Eckert's prime objective can be paraphrased from the preface as a desire to help counter the pseudoscientific wave that contributes to the dismal state of science education in the U.S. This is a clear reaction to "scientific" creationism with each dictionary entry worded to oppose

the viewpoint of Henry Morris *et al.* In the book's foreword, Martin Gardner sees politicians, educators, and the media as the dictionary's primary audience. He also expresses a hope that this may serve as a scientific apologetic among "open minded" conservative Christians. The effort would be better served without an overdose of scientism and reference to the close-minded likes of Isaac Asimov, Carl Sagan and William Benetta. I do appreciate the distinction that is made between creation science and other creationists (p. 8) and between the questions of origins and evolution.

Of the more interesting entries, the first, *Abiogenesis*, exposes a significant area of naturalistic faith. Old, weak explanations attend citations to studies by Fox, Miller, Walker, Cairns-Smith, etc. So what if amino acids and nucleotide bases form under manipulated experimental conditions ("simulated" pimitive-earth)? The total lack of free oxygen is specified as an essential starting condition for life. Should the absence of O_2 therefore be assumed even if inconsistent with the better interpretations of geology? Eckert's final statement may be wishful thinking, if not simply naive: "And all present evidence supports the view that the precursors of life arose naturally, and that life's subsequent emergence ... was a probable if not inevitable event." Respected investigators such as Kenyon and Shapiro express little of this certainty.

Under *Adaption*, Richard Dawkins is quoted as saying that natural selection has provided only "the illusion of design and planning." Similarly, the entry *Life* quotes Douglas Futuyama: "Tapeworms were not put here to serve a purpose, not by design but by the action of impersonal laws." The reasoning continues elsewhere, as under *Design Argument*. One is assured that an intelligent designer would have done so with perfection and not with extinction, vestigial organs, pain/suffering, and so on. Creation-science advocates argue against evolution with almost the same rationale, that natural selection is too cruel and impersonal. Perhaps both opposing "isms" presume much about the nature of the designer that need not be true.

Appearance of age cites Henry Morris as a proponent of this concept. Of course, it does not articulate well with a major scenario dependent on the Genesis flood as creative agent. Eckert has shown here one of many significant inconsistencies in the Institute of Creation Research descriptions of how all came to be. Were geological complexities spoken into place or were time and process responsible? Eckert also easily refutes creationist efforts to explain *Noah's Ark* and the *Tower of Babel* on a scientific basis.

The *Bible* is described from a typically liberal (for lack of a better word) viewpoint. For example, there are kind words for the documentary hypothesis of Genesis authorship, which "most biblical scholars accept" and a denigrating comparison of the biblical text with other creation and flood stories. The section on *God* is a bit more even-handed. Eckert endeavors to make a clear separation between faith in a deity, even a fundamentalist Christian one, and science.

Big Bang exhibits discomfort with the teleological implications of the theory. Here the argument against creation science is of secondary interest; the real intrigue comes in the need for disclaimers where the Big Bang leaves room for a true singularity and its philosophical first cause (see p. 41).

Skipping through the alphabet, I rest briefly at several entries including *Humanism*. Eckert somewhat misses the point that humanism in the broader sense is no threat to religion. It is really only the "secular" variety that attempts to dethrone God and replace him with enlightened intellectuals. *Polonium Halos* corrects the misinterpretations of Robert Gentry who is accused of invoking the "god-of-the-gaps" as an explanation. *Science* provides a good description of the scientific method in practice and problems in science education. *World View* helps to finish the entries with a tone more conciliatory to all but the young-earth creationist. A spectrum of creationist perspectives is described. Theistic evolution might actually be other than an oxymoron!

This dictionary is concise, nontechnical, and is cross-referenced. The bibliography is large, even though it excludes important publications that fall between the ideological extremes. The efforts of John Wiester, Dan Wonderly and Dave Young are glaring omissions in geology. I recommend the book for general use only if it is balanced with other pertinent information.

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SCIENCE AND PROVIDENCE: God's Interaction with the World by John Polkinghorne. Boston: Shambhala Publications Inc. 1989. New Science Library. 114 pages, notes, index. Softcover; $10.95.

Is a personal God, one who interacts lovingly with his Creation, interacts with individual people in specific situations, a credible concept in our scientific age? This is Polkinghorne's central question. A Fellow of the Royal Society, John Polkinghorne left his post as Professor of Mathematical Physics at Cambridge University to train for the Anglican priesthood. He is now President of Queens' College, Cambridge. With the demise of the 19th-century view of the universe—especially through consideration of complex dynamic systems—Polkinghorne can say, "The future is no longer contained in the past; there is scope for real becoming" (p. 2). His starting point is the acknowledgement of human freedom. And if we have some manoeuvering room, we should not be surprised that God has "left for himself some such opportunity also" (p. 1).

He begins by outlining the problem, raising for example the question of what would constitute evidence of God's activity. Assuming God is both consistent and the

ground of all there is, it will be impossible to contrast results with and results without God as an isolated cause. Polkinghorne believes the world would cease to exist if God's activity were removed; the atheist would expect no change. Acknowledging these problems with empirical verification, and admitting that no side has a "knockdown" argument, it remains that "without some recourse to the particular there is a danger that the God who does everything will be preceived as the God who does nothing" (p. 17). Characteristically he does not end here, but notes that to the problem of God's particular action we must add that of his particular inactivity on "those occasions when his powerful presence seems most needed and desired."

In chapter 2 he develops a general view of God's action in the world, and in seven further chapters addresses, briefly but with maturity of thought, providence, miracle, evil, prayer, time, incarnation and sacrament and hope. These rich discussions are not easily summarized, but two brief examples might help give a sense of the work. Example one concerns evil. About the evil that arises from the willed choices of people, he uses the classic free-will defense. He then applies the same idea to natural evil: "God accords to the processes of the world that same respect that he accords to the actions of humanity" (p. 67). Quite the reverse of some inevitable mechanical functioning, "the open flexibility of the world's process affords the means by which the universe explores its own potentiality, humankind exercises its will, and God interacts with his creation."

Example two concerns prayer. He begins with this central question: if God is not ignorant, forgetful, or open to magical manipulation, just what does prayer do? Perhaps we view it too abstractly; prayer is an encounter between God and a person, through which new possibilities could come into existence; prayer is "not a mechanical operation, predictable in advance, but ... a personal encounter with God, whose character and outcome are only revealed in the event itself" (p. 73).

At least one reader has remained unconvinced that any of this is credible in our scientific age—former Cambridge professor Sir Fred Hoyle, whose review of *Science and Providence* in *Nature* (v. 339, May 4, 1989 pp. 23-24) does not display the same level of enthusiasm for the book as the present review. It is not that one would expect a positive response from this deeply committed materialist, but Hoyle provokes additional frustration by making it clear that he does not intend to engage the basic question. Neither side, says Polkinghorne, has a knockdown argument. To continue the analogy Hoyle has responded by drawing himself up in disdain and declaring that (as everyone knows) only the unenlightened even go to the boxing matches at all.

This posture is established early with such statements as: "The procedure adopted by all religions is to postulate the existence of an entity or entities with a full understanding of the purpose of the Universe..." Is it Science that gives Hoyle the confidence to rule out revelation right from the start? Is it then Hard Science that permits him to ignore also the social (lesser) sciences, brushing aside the many findings of anthropology that contradict what he says about "all" religions? This is at best a "just-so story" designed to rule out any possibility that religious thought is other than human wish fulfillment. The irony is that Polkinghorne has here built a strong case that such a stance cannot claim support from science, while Hoyle persists in believing—on firm empirical grounds, no doubt—that the case has already been made, and one no longer need trouble oneself to answer the imaginings of Polkinghorne. And for Hoyle, even if people listen, it still has nothing to do with any truth content in what Polkinghorne says. Hoyle ends his review: "By eschewing issues that most people feel deeply about, science has produced a situation in which it has few friends outside itself. Polkinghorne may turn out to have far more."

Not everyone will be at such pains to insulate themselves from the substantive issues, and the book *is* writ ten with the skeptic in mind. Nevertheless, it may have its greatest impact on those already open to the possibility of God's existence, and thus for whom the questions of whether and how he interacts with the world have become important. This book will likely be of interest to many *Perspectives* readers, for it treats several central questions of science and theology with great insight. Because of the progression of thought from general questions to the God of Christianity, there would be some value (for anyone, but particularly for the open-minded skeptic) in reading Polkinghorne's three volumes on the subject (*One World, Science and Creation,* then *Science and Providence*) in order rather than starting with this work. Which brings me back to my main disappointment with this book, encountered in the very first sentence; "This is the third volume of a trilogy..."

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Letters

Another Perspective on Dooyeweerdian Social Theory

As a "soft science," sociology has little trouble with the idea that philosophy often assumes a prominent role in its development. Historically, philosophy has provided some of the most important stimuli for the shaping of new sociological paradigms. Even today, highly regarded sociological theories are deeply rooted in philosophical traditions. What is of concern for the sociologist is the tendency for philosophy to bring an air of exclusivity to a science. When philosophy advances its claims without adequate empirical safeguards, then social scientists may justifiably be concerned about possible ideological biases creeping into the discipline. It is only when philosophy is balanced with a proper concern for the "facts" of the case that philosophy fits well into a social science.

The distinction between "philosophical sociology and empirical sociology" made by MacLarkey (June 1991 *Perspectives*) is useful in that it recognizes the Dooryeweerdian approach to sociology is *not* a "complete" sociology. Since it is not empirical by intent or in method, Dooyeweerdian social theory is not clearly a science and is open to ideological bias. And while it may contribute to the development of "a distinctively Christian sociology," it certainly cannot claim to be that sociology.

Having said that, it is helpful to note that Dooyeweerdian theory does provide a rich conceptual scheme for analysis of social structure. Unfortunately, much of this scheme is esoteric and reminiscent of an earlier day when the sociologist relied on philosophical terms to refer to social phenomena. Witness, for example, the use of the term "enkapsis" to refer to "the interwovenness between two or more social structures to form a more complex social whole." Even with that definition, are we any more able to locate, describe, and measure such cases of interwovenness? Lacking clear referents for those concepts in society, the theory remains more an object of faith than a search for fact. I think MacLarkey is fully aware of these limitations and doesn't claim more for Dooyerweerdian theory than he should.

Nevertheless, there is little attempt to relate Dooyeweerdian theory to the world as we know it. As one theorist has said about another social theory: "It's all scaffolding and no building." Since the theory relates to God's created structure and order, no distinction is made between modern and earlier social forms or even among individual societies. The sole concern is with social reality as God intended it and not as we experience it daily. Consequently, social reality cannot be measured or compared, except in terms of God's law. If scripture were used to outline God's law as a basis for the theory, one could be more comfortable that there is some objective basis for the theory. In fact, this is not clearly the case. Usually, Dooyeweerdian philosophy itself and not scripture is the starting point for any social analysis. As MacLarkey states, "every theory must have some fundamental assumptions," and these are always Dooyeweerdian in origin.

There are times when Dooyeweerdian theory is reminiscent of structural-functionalism, a traditional and well-regarded sociological theory. But functionalism always has high interest in empirical studies and uses concepts with clarity and some precision. As a result, it contributes to social scientific knowledge, especially as that describes the stability and complexity of social structures. Like Dooyeweerdian theory, functionalism has a high regard for continuities in social structure and seeks to explain them in terms of social needs to be met. And like Dooyeweerdian theory, functionalism is less concerned with the individual and a description of his actions.

Here is where Dooyeweerdian theory is sorely lacking; it fails to explain (or even to consider) the place of the person in the dynamics of daily social life. This anti-individualism is not surprising when one realizes that the theory has its roots in the collectivism of Dutch social thought. Indeed, the Dooyeweerdian approach offers a refreshing balance to the compulsive individualism of contemporary American thought. Nevertheless, Dooyeweerdian theory provides a biased view of social reality with its omission of human interaction and its relation to human problems.

On the plus side, Dooyeweerdian theory offers a distinct and, perhaps, solitary alternative to current sociological assumptions that all social realities are constructed through human interaction. The claim is that social reality is created by God and not merely constructed by man. This is the most important and redeeming feature of Dooyeweerdian theory, and needs reaffirmation in any Christian social theory. But it is also a feature that needs to be tested as well as measured. Unless this can be done, Dooyeweerdian theory will remain more of a philosophy than a science and will continue to be vulnerable to the charge of ideological bias that has been directed at it.

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On Clouser's Interpretation of Genesis

Roy A. Clouser, "Genesis on the Origin of the Human Race," March 1991, makes an assumption that leads him to make 'literal' mean 'metaphorical.' He rightly notes that Genesis 1 should not be read as answering a modern

question: In what order did God create everything? (pp. 4-7) He applies this insight to both one-week and day-age views. He also dismisses mythological readings. But he assumes either creative sequence with 'days' XOR covenantal basis with 'day' only as a literary device. This arbitrarily excludes the possibility that *yom* is literally a day even though detached from questions of creative order. I have argued this point earlier (38:128-131 [1986]). That the week involved six days of God-given revelation and a day of rest meets his criterion of 'literal' better than his merely teleological interpretation. Yet it loses nothing relevant from the structural-teleological viewpoint.

Second, Clouser oversimplifies when he makes religious consciousness *the* human characteristic (pp. 9f). This view, in its usual manifestations, makes recognition of dependence and the need to worship primary. The biblical view of the image and likeness of God (Genesis 1:26f) makes this secondary. The divine declaration is that of dominion, with the created pair appointed God's viceroys (v. 28). As every viceroy recognizes the will of the sovereign in whose name he acts, so human beings ought to recognize the Ruler of the universe. But God, to be God, cannot be religious, except as he emptied himself in the incarnation.

God is, to the orthodox, outside of space and time. The creature is within both. Yet, in order to rule, the race must be able to understand, to anticipate. Human language transcends space and time, something that the communications of other creatures cannot do. We can invent: devices to accomplish something; scenarios that may include every part of the range between realized and totally unrealizable; the language to communicate it all, even though no one may even have thought it previously, let alone uttered it. Thus we emulate the Creator.

Because Clouser makes the human essence simply God-consciousness (or even belief in any sort of self-existent ultimate), he can hold that many proto-humans may become human. All they need is a sense of the numinous, supplied as well by animism or polytheism (or materialism) as by worship of the one true God, by dreams of totems (or atheistic philosophical speculations) as by divine revelation. So I do not see that his view meets the requirements of biblical anthropology and soteriology. Reading the scriptures, I get certain minimum requirements. First, God declares himself the ultimate source of all that is (Gen. 1:1). Second, he declares that He creatively transformed what he had produced to make animal life (vv. 20-23). Third, a separate creative act, again using what he had produced, made human life (vv. 26-31; 2:7). Fourth, everything else, though not declared an act of creation, is his handiwork. Consequently, there should not be a theological problem if one holds that God transformed plant life into animal life, or that he transformed inanimate matter; or whether God transformed animal life into human life or went directly from the nonliving. But there is a problem if any one of an indefinitely large class could become human simply by accepting a notion of the numinous, for this is merely an act by a creature. All such acts are within the Almighty's providential care, but they are not acts of divine creation.

Finally, Clouser confuses some relationships. Even on his view, we are all biologically related. But he makes only some of us descendants of Adam. The rest are descendants of Adam's close cousins, not such distant cousins as *Pan troglodytes*. But he holds that these creatures did something that made them human, whereas Scripture says that God acted creatively. On Clouser's view, it seems possible to lose humanity by never developing, or by losing, awareness of the numinous.

To continue Clouser's implicit analogy, human beings must do something to become children of God. This has a Pelagian smell. There is nothing we can do (see Romans 4:1-8). Even faith is declared God's gift (Ephesians 2:8f). The new life in Christ is the result of God's creative act (II Corinthians 5:17; Galatians 6:15; Ephesians 2:10; 4:24). So I am constrained by Scripture to believe that I am human by virtue of God's creative act, and then his providential care through all the generations since. I am similarly his child by his later creative act and providential spiritual care.

Clouser has presented some relevant information clearly. But, I believe, there are places where he has overlooked alternative possibilities or biblical declarations. I thank him for his thoughtful analysis, and hope that I have done as well.

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Selective Social Concern

The review of David Reardon's book on the psychological effects of abortion on women (March 1991 *Perspectives*) renewed my amazement at evangelicals' highly selective concern with contemporary social issues. Some may remember that in 1987 the Reagan administration asked then Surgeon General C. Everett Koop to prepare a report on the (presumably negative) psychological side-effects of having an abortion. After months of stalling, Koop, whose anti-abortion stance cannot be questioned, finally admitted that he couldn't produce such a report because he couldn't find any reliable medical evidence of lasting damage.

That some women who've experienced abortion have suffered psychological distress cannot be disputed. Such women should receive the counseling they need to deal with their trauma. Let's be careful, however, not to use post-abortion distress as another reactionary excuse to ban abortions. Those worried about the abuse of women by contemporary abortion practices forget that banning abortions will lead to greater suffering and death through illegal back-alley abortions. The lack of concern for tomorrow's maimed and dead women leads me to think that those voicing concern about "suffering women" either don't really care about women's health or are seriously lacking in perspective.

Like the evolution/creation debate, the abortion controversy divides evangelicals and has led to disingenous intepretations of scripture on both sides. A realist (cynic?) realizes that the law will never stop women from getting abortions. If anti-abortion evangelicals are serious about stopping abortions they must persuade individual women to keep their children or give them up for adoption. Crisis pregnancy services, love, and financial and emotional support can go a long way in this regard. What I fear is that most anti-abortionists would rather forego this difficult, grass-roots approach for a legistlated, top-down ban which serves to alienate women and to cast doubt on the motivation of anti-abortionists. I believe many evangelicals to be motivated less by a concern for social justice than by the desire to see the world conform to their image of it, and this with the least amount of effort on their part. Legislating a world view is easier than persuasion. I say this because evangelicals have historically allied themselves with the status quo, and have never been at the vanguard of social justice issues. The church had to be dragged kicking and screaming into repudiating slavery, into civil rights for women, minorities and the handicapped, and into caring for the environment.

It also surprised me that two pages from the review expressing great concern for women abused by abortion is the review of a book (by Payne and Payne) approving the use of weapons of mass destruction under the blanket of the just war theory. Is this a little schizophrenic or what? Whether first-trimester unborns are soul-endowed human beings is scripturally an open question. That already born people of whatever nationality or political ideology are living souls created individually in our God's image is eminently clear. Killing one unborn is wrong, but slaughtering millions is part of the geopolitical game.

An examination of armed human conflict reveals most of the geopolitical spoils of war to be short-lived. After a period, a former ally becomes an enemy and vice-versa. Peacemaking and non-violent methods for conflict resolution are neglected. If a cost-benefit analysis shows conventional war to be wanting, why should adding nuclear weapons to the arsenal change anything? Knowing that no lasting peace will come until Jesus, our Prince of Peace returns, how can his people advocate the use of weapons which have not made our planet safer, but many times more dangerous?

I believe it was Gandhi who said that the only people who don't believe Jesus and his message were non-violent are Christians. Fighting abortion while okaying nuclear genocide suggests that we have not seriously examined both the motivation behind and the consequences of our social and political positions.

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Midlife Crisis

The ASA at 50 is having a midlife crisis. It is not an agony of self-doubt that might actually correct the course, but rather the kind with a sports car and mistress. Isn't anybody embarrassed?

D. Gareth Jones' article on "nonexistence" prepares the way for a socially comfortable acceptance of abortion. He does it by renaming early abortions ("is the word 'destruction' an appropriate one?") and then likening them to decisions made prior to conception.

The selection from the poem, "No Answer" that follows Jones' treatise, teaches a faulty philosophy of science and an unbiblical theology. "Life is too short for / religion; it takes time / to prepare a sacrifice / for the God. Give yourself / to science that reveals / all ... Over the creeds / and masterpieces our wheels go."

Marvin Kuehn loves Paul Seely's *Inerrant Wisdom: Science and Inerrancy in Biblical Perspective* even though it softens the authority of scripture enough to make it nearly acceptable to the secular world, who may allow it to be true for us but not for them. Kuehn concludes that the book's "helpful comments about the roles of science and biblical revelation will receive a welcome ear among ASA readers." Of course they will. That is where the problem started. If you ignore the clear words of scripture, you need a clever cover-up.

It does not help for the editor to say, we are an "open forum" and hold "no position." If *Perspectives* did not reflect the membership, either the one would go or the other.

May I offer my tentative diagnosis? The problem is good old-fashioned peer pressure. One old-earther framed it well when he said, "I am a creationist, but I don't want to be treated by my colleagues as a cultic person." Jesus said it even better, "Woe to you when all men speak well of you."

I have seen a disturbing tendency among many modern American Christians working in hostile intellectual environments. They tend to take on protective coloration and adopt positions which are non-offensive to their secular colleagues.

This may be understandable if a job is at risk. But it does not fit the picture given in scripture of a universe that shouts out the Creator's existence, and disciples who are unconformed to this world system. It is time for contemplation.

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WHAT EXACTLY IS THE AMERICAN SCIENTIFIC AFFILIATION?

The American Scientific Affiliation (ASA) is a fellowship of men and women of science who share a common fidelity to the Word of God and to the Christian Faith. It has grown from a handful in 1941 to a membership of over 2,500 in 1990. The stated purposes of the ASA are "to investigate any area relating Christian faith and science" and "to make known the results of such investigations for comment and criticism by the Christian community and by the scientific community."

HOW DO I JOIN THE ASA?

Anyone interested in the objectives of the Affiliation may have a part in the ASA. Full, voting membership is open to all persons with at least a bachelor's degree in science who can give assent to our statement of faith. Science is interpreted broadly to include mathematics, engineering, medicine, psychology, sociology, economics, history, etc., as well as physics, astronomy, geology, etc. Full member dues are $45/year.

Associate membership is available to anyone who can give assent to our statement of faith. Associates receive all member benefits and publications and take part in all the affairs of the ASA except voting and holding office. Associate member dues are $40/year.

Full-time students may join as Student Members (science majors) or Student Associates (non-science majors) for discounted dues of $20/year. Retired individuals, parachurch staff, and spouses may also qualify for a reduced rate. Full-time missionaries are entitled to a complimentary Associate membership..

An individual wishing to participate in the ASA without joining as a member or giving assent to our statement of faith, may become a Friend of the ASA. Payment of a yearly fee of $45 entitles "Friends" to receive all ASA publications and to be informed about ASA activities.

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

MEMBERSHIP/FRIEND OF ASA APPLICATION/SUBSCRIPTION FORM

(Subscribers complete items 1-3 only)

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

1) Name (please print) _____ Date _____

2) Home address _____

_____ Zip _____ Phone _____

Office address _____

_____ Zip _____ Phone _____

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

4) Place of birth _____ Date of birth _____

Marital status _____ Sex ____ Citizenship _____

Is spouse a member of ASA? _____ Eligible? _____

5) ACADEMIC PREPARATION

Institution	Degree	Year	Major

Field of study (major concentration) _____

Area of interest (20 character limit) _____

Recent publications _____

Please complete back of this form ☞

WHAT DOES THE ASA BELIEVE?

As an organization, the ASA does not take a position when there is honest disagreement between Christians on an issue. We are committed to providing an open forum where controversies can be discussed without fear of unjust condemnation. Legitimate differences of opinion among Christians who have studied both the Bible and science are freely expressed within the Affiliation in a context of Christian love and concern for truth.

Our platform of faith has four important planks, listed on the back of this membership application.

These four statements of faith spell out the distinctive character of the ASA, and we uphold them in every activity and publication of the Affiliation.

WHY MUST THERE BE AN ASA?

Science has brought about enormous changes in our world. Christians have often reacted as though science threatened the very foundations of Christian faith. ASA's unique membership is committed to a proper integration of scientific and Christian views of the world.

ASA members have confidence that such integration is not only possible but necessary to an adequate understanding of God and His creation. Our total allegiance is to our Creator. We acknowledge our debt to Him for the whole natural order and for the development of science as a way of knowing that order in detail. We also acknowledge our debt to Him for the Scriptures, which give us "the wisdom that leads to salvation through faith in Jesus Christ."

Church Affiliation _____

What was your initial contact with the ASA? _____

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

Name _____

Street _____

City _____ State _____ Zip _____

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

STATEMENT OF FAITH

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

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

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

Amount enclosed _____ Category _____

Please mail to: American Scientific Affiliation, P.O. Box 668, Ipswich, MA 01938

OTHER RESOURCES AVAILABLE FROM ASA

"Teaching Science in a Climate of Controversy"is a 48-page booklet that guides science teachers in presenting origins with accuracy and openess. It is available from the Ipswich office for: $6.00/single copy; $5.00/2-9 copies (sent to same address); $4.00/10 or more copies (sent to same address).

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

Please enter gift subscriptions for:

Name _____

Address _____

City _____ State _____ Zip _____

Name _____

Address _____

City _____ State _____ Zip _____

We believe that honest and open study of God's dual revelation, in nature and in the Bible, must eventually lead to understanding of its inherent harmony.

The ASA is also committed to the equally important task of providing advice and direction to the Church and society in how best to use the results of science and technology while preserving the integrity of God's creation.

AS A MEMBER YOU RECEIVE:

- ASA's bimonthly Newsletter.
- ASA's science journal, *Perspectives on Science & Christian Faith*, the outstanding forum for discussion of key issues at the interface of science and Christian thought.
- The ASA Resource directory and Book List, a catalog of science books and tapes on current issues of concern.
- Member discounts on books and tapes listed in the Resource Book.
- ASA's Membership Directory.
- Opportunities for personal growth and fellowship, through meetings, conferences, field trips, and commissions.
- *Search: Scientists Who Serve God*, an occasional publication relating current trends in science and the people involved in them.

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THE CANADIAN SCIENTIFIC & CHRISTIAN AFFILIATION was incorporated in 1973 as a direct affiliate of the ASA, with a distinctly Canadian orientation. For more information contact:

Canadian Scientific Affiliation
P.O. Box 386
Fergus, Ontario N1M 3E2 CANADA

The American Scientific Affiliation

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

Canadian Scientific & Christian Affiliation

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

LOCAL SECTIONS

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

Central California	Chicago-Wheaton	Delaware Valley	Eastern Tennessee	Guelph, ONT
Indiana-Ohio	New England	NY-New Jersey	North Central	Oregon-Washington
Ottawa, ONT	Rocky Mountain	St. Louis	San Diego	San Francisco Bay
South Central	So. California	Southwest	Toronto, ONT	Vancouver, BC
Virginia-Kentucky	D.C.-Baltimore	Western Michigan	Western New York	

INDICES to back issues of *Perspectives* are published as follows:

Vol. 1-15	(1949-1963),	Journal ASA	15,	126-132	(1963);
Vol. 16-19	(1964-1967),	Journal ASA	19,	126-128	(1967);
Vol. 20-22	(1968-1970),	Journal ASA	22,	157-160	(1970);
Vol. 23-25	(1971-1973),	Journal ASA	25,	173-176	(1973);
Vol. 26-28	(1974-1976),	Journal ASA	28,	189-192	(1976);
Vol. 29-32	(1977-1980),	Journal ASA	32,	250-255	(1980);
Vol. 33-35	(1981-1983),	Journal ASA	35,	252-255	(1983);
Vol. 36-38	(1984-1986),	Journal ASA	38,	284-288	(1986);
Vol. 39-41	(1987-1989),	Perspectives	42,	65-72	(1990).

An on-line **subject index** is available on 5 1/4" IBM-compatible computer disks from the ASA Ipswich office for a nominal cost. Please write for details.

Articles appearing in *Perspectives on Science and Christian Faith* are abstracted and indexed in the CHRISTIAN PERIODICAL INDEX; RELIGION INDEX ONE: PERIODICALS; RELIGIOUS & THEOLOGICAL ABSTRACTS, and GUIDE TO SOCIAL SCIENCE AND RELIGION IN PERIODICAL LITERATURE. Book Reviews are indexed in INDEX TO BOOK REVIEWS IN RELIGION. Present and past issues of *Perspectives* are available in microfilm form at a nominal cost. For information write: University Microfilm Inc., 300 North Zeeb Rd., Ann Arbor, MI 48106.

ARTICLES

COMMUNICATIONS

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VOLUME 43 NUMBER 3 **SEPTEMBER 1991**