PERSPECTIVES on Science and Christian Faith

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In this issue . . .

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

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Perspectives on Science and Christian Faith

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The American Scientific Affiliation at 50

Evangelicals approached the latter half of the twentieth century ill-equipped and disinterested in grappling with issues outside the church. Fundamentalist-liberal battles of the 20's and 30's had taken their toll and the church looked inward except for the missionary enterprise.

One precursor of the way that evangelical attitudes were to change in the latter part of the century was the founding of the ASA in 1941. The initial meeting of five men at the Moody Bible Institute just prior to America's involvement in World War II could not be considered an auspicious beginning. Yet, in the providence of God, this fledgling organization was to play a significant role in the post-war evangelical resurgence.

Early ASA leadership recognized the importance of a multi-disciplinary perspective when discussing science/Christianity issues and was able to draw on the thinking of a new breed of theologians and philosophers. Bernard Ramm is a leading example of the change in evangelical thinking and the problems faced when one breaks out of a mold, yet seeks to remain faithful to orthodox roots. His 1954 work *The Christian View of Science and Scripture* pointed the way for a generation of ASA members.

The ASA Journal (now *Perspectives on Science and Christian Faith*) has served as the most visible element of ASA for four decades. The challenge to the seven editors has been to encourage scholarly contributions which reflect current thinking on science-faith issues. This melding of ideas has seldom resulted in unanimity. The Journal has always sought to be an open forum and has stoutly maintained the position that it holds "no position" on issues. Yet it is clear that we speak from the evangelical perspective on which the ASA is based. For the most part, authors come from the evangelical community, more from self-selection than editorial policy. Reviewers are responsible for maintaining appropriate standards of quality and readability. The standards continue to rise as a reflection of the increasing quality of evangelical scholarship. The "amateur" is increasingly at risk as specialization increases and the work arising from an increasing number of evangelical "think tanks" competes for space.

Advances in transporation and communication, and peace in Europe offer opportunity for international dialogue not available 50 years ago. We have much to gain from these contacts but should be quick to listen and slow to speak to cultures unfamiliar with evangelical mores and often suspicious of American motives.

Today we recognize more fully the role that culture (including Christianity) has played in scientific thought. Few are adequately equipped to deal with the complexity of broad

integrative issues, suggesting that scientists need to team with biblical scholars, historians, sociologists, *et al* if a fuller story is to be told.

The path of the ASA has not always been certain. Changes in leadership, financial limitations, a major split in the 1960's, competition from new organizations and the inability to develop fully a national spectrum of members have served to blunt its impact. The work of ASA has gone forward because of the commitment of many women and men whose vision, writing, administrative skills, and financial support have provided a forum for discussing the interplay of science and Christian faith and an opportunity for Christian service.

ASA offers a unique potential for fellowship among those of common faith and profession. The annual meetings, local section activities, and committee work provide opportunity to build enduring friendships and to develop service projects. The *ASA/CSCA Newsletter* opens a window on the lives of our members, links people with positions and provides an informal way to test ideas.

The founders of ASA felt that they could contribute to the church by correcting misconceptions about science and by encouraging a more positive attitude toward science on the part of church leaders. This would remove barriers in witnessing to their peers. Today, that task seems more formidable than it may have appeared in 1941. Both science and the Church have changed and the issues have expanded in number and complexity. Today, no one sees science as savior but many find the Church irrelevent to their lives.

The ASA has often been far ahead of the Christian community in discussing issues and ideas. Yet, we have not always been able to communicate our thinking to the man and woman in the pew. This is compounded by a pervasive science illiteracy factor. We need to develop new ways to more effectively speak to the Church. The popularity of the "Sermons From Science" demonstrations and the Moody Institute of Science films from an earlier generation suggest non-print avenues applicable to our generation.

Over the years, the goals of the organization have been revised as new leaders and new challenges emerged. We need to ask whether ASA is primarily looking inward and is unwilling to speak to the general public and the scientific community on relevant issues. The wide distribution of the publication "Teaching Science in a Climate of Controversy," the anticipated six-hour TV series "Space, Time and God," and projected projects in Eastern Europe and Africa are representative of a larger vision. We need to remember that such efforts to enter the "market place" will not always be understood or received with approval. The challenge in the coming years is for a new generation of leadership to meet not only the challenge of scholarship but devise new ways in which the ASA constituency can serve the Church and beyond.

J. W. Haas, Jr.

Non-Existence and its Relevance for Medical Ethics and Genetic Technology

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The significance of non-existence is explored by reference to a hypothetical family, and in particular to the circumstances surrounding the births of the third and fourth children. From this, various issues are raised, including our moral and theological obligations to non-existent beings, the ramifications of the notion that children are "gifts of God," the role of human responsibility in bringing human beings into existence, and the moral and theological significance of fertilization. Against this background, the discussion is widened to consider the moral responsibilities of a family in which the gene for cystic fibrosis is being passed on to the children. This leads to discussion of induced abortion for genetic reasons, embryo biopsy and in vitro abortion, and gene therapy.

Non-Existence

I want to begin with a couple whom I shall call John and Jean. We pick up their story in 1970. By this time their first two children had been born. Up until the mid-1970s John and Jean were still not convinced their family should be extended beyond two children. After all, most of their friends and contemporaries had just two children, and they had already passed the stage of even questioning that decision. John and Jean finally decided to have a third child. A few years later they had a fourth child.

And so, today, John and Jean have four children—three teenagers, and one a little younger. The first two children, James and Susan, were always contemplated. What though about numbers three and four, Clive and Sandra? They exist today because John and Jean changed their minds about having them.

Clive and Sandra are unique individuals, both biologically and in God's sight. Very easily, though, they may not have existed—not because of any obvious rebellion or sinfulness on the part of John and Jean, but because of a sincerely held viewpoint. Clive and Sandra almost didn't make it. If they hadn't, they would never have risen beyond the realm of hypothetical beings, with no more substance to their existence than occasional wistful longings on the part of either John or Jean.

Clive and Sandra bring us face-to-face with a mystery. It is a philosophical and theological mystery, and perhaps in some ways a biological mystery as well. This is the control of fertilization, which is frequently depicted as the absolute dividing line between the absence of an individual and the appearance of a new individual. Consequently, many Christians place a great deal of moral weight on this process. The emphasis is almost always on the moral significance of interrupting the development of an embryo or fetus after the occurrence of fertilization. If this is done, there will be no individual in the future, whether this is due to induced abortion, spontaneous abortion, or some accident during prenatal life. However, exactly the same result is obtained by a decision on the part of the would-be parents against conceiving any future individuals. In this case, fertilization itself has been obviated.

In order to explore this further, let us put back the clock to a time when only James and Susan had been born, and let us imagine some alternative scenarios. In the *first* of these, "Clive" and "Sandra" were conceived, existed for a matter of three or four days as embryos, but then failed to implant in the wall of the uterus. Indeed, Jean may never have been aware that they even existed for that short period of time, and would have been disappointed had she known. According to a *second* scenario, we can suppose that John and Jean did not want any more children, and to this end Jean was using an intrauterine contraceptive device. By this means, any embryos that might have been produced would have been prevented from implanting.

A *third* possibility would have seen John and Jean employing an oral contraceptive, thereby preventing fertilization from occurring. Although John and Jean were quite capable of producing embryos, and of giving rise to a Clive and a Sandra, they decided against this. There is a *fourth* alternative, according to which John and Jean could have employed a "natural" form of contraception, and thereby once again avoided fertilization. A Clive and a Sandra would not have been given existence, although in this instance no artificial methods of contraception would have been resorted to. Precisely the same result would have been obtained by ceasing to have intercourse, or by either partner being sterilized.

These scenarios all have the same end-result, and yet they enshrine a range of differences—in motives, in the use or otherwise of contraceptives, in the adoption of natural or artificial forms of contraception, and in the occurrence or non-occurrence of fertilization. Beings whom we now call Clive and Sandra would have been prevented from coming into existence, and would never have become one-with-us in experiencing what "being human" means. Can we conclude from these scenarios that John and Jean would have been morally culpable in those instances in which they decided against conceiving (regardless of the manner in which they accomplished this)? The answer would appear to be "no," unless it is contended that we have moral obligations to non-existent beings.

But do we have *theological* obligations to non-existent beings? Does God expect married couples to "bring forth" children, and if so, is there any limit to the number of children? Is it more spiritual to conceive ten children than four, or four than two, or two than one, or one than none? Unless one believes that the *primary* purpose of marriage is the production of children, it is again difficult to understand how Christian couples can have theological obligations to non-existent children. If it is argued that one does have such obligations, it would appear to follow that contraception (whether *natural* or *artificial*) is contrary to the purposes of God, with natural forms of contraception being just as objectionable as artificial ones.

I wish to argue that the number of children conceived is not a simple matter of morality or theology. It is the result of a complex interplay of biology, culture, economics, and peer pressure. If this is the case, in what sense are *we* (John and Jean in our story) responsible before God for bringing other humans into existence? In what way are Clive and Sandra "gifts of God," rather than the products of human determination?

In attempting to answer these questions, we find ourselves once more face-to-face with profundity. Christians should approach fertilization in a spirit of awe and reverent wonder, since it is no less than the supreme creative act with which we, as humans, can be associated. We are doubly responsible: first, for bringing into existence new lives, and second, for guiding and directing those children throughout their growing stages until they can assume responsibility themselves for responding to God. As Christians, we view this form of creation as something

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we do in conjunction with God; we are creating beings who are the icons (or images) of God,[1] in precisely the same way as we ourselves are.

Clive and Sandra, therefore, are "gifts of God." They are God-like beings, regardless of the manner of their fertilization. They would also have been gifts of God if they had been conceived outside marriage, by AID (artificial insemination by donor), by IVF (*in vitro* fertilization) or by GIFT (gamete intra-fallopian transfer), or if genetic manipulation had been involved. Whatever we may think of the morality of any or all these procedures, the resulting children are to be treated as we should treat any icon of God.

But does this mean that, if Clive and Sandra had not been given human expression, John and Jean would have been guilty of rejecting a gift of God (since they would have overridden their biological ability of conceiving)? If it does, most married couples are guilty of that, since at some point and in some way, they have not had as many children as they were capable of having. And what about single women? If we approach their ability to conceive only in biological terms, we shall end up with a moral perspective far removed from any Christian one. The reason we do not move in this direction is that we view child-bearing not simply in biological terms, but within the much broader context of marriage and, therefore, of moral and social obligations.

To emphasize the ability of a married couple to conceive at the expense of making responsible decisions, is to demean God's gift, just as it is to have a child outside the marriage relationship.

The "gift of God" concept does not follow from physiological capabilities alone. It is to be viewed within a framework provided by moral principles (is it within the context of marriage?), human decision (do we want a child? is it responsible in our circumstances?), and physiological capabilities (are we capable of having a child?). Together, these three components comprise God's gift of a child. To emphasize one at the expense of the others is to have a misconstrued view of what God's gift amounts to. In other words, to emphasize the ability of a married couple to conceive at the expense of making responsible decisions, is to demean God's gift, just as it is to have a child outside the marriage (commitment) relationship. The decision to have no children *at all* within a marriage, in spite of an ability to have them, also has to be looked at very closely, for it too may demean God's gift.

If, then, human decision-making is of crucial importance in conceiving, it has to be accepted that the bringing into existence of children like Clive and Sandra is a legitimate function of human beings. We are co-creators with God in the creation of human life (as well as of other life), and there is no escape from the consequences of such decisions.

We are co-creators with God in the creation of human life (as well as of other life), and there is no escape from the consequences of such decisions.

And so to return to my starting point. Non-existence is something we have to accept. We may not understand it: after all, can I imagine what my own non-existence would have been like? What if my parents had quite deliberately decided not to conceive me, or had been unable to do so? Some have to ask what would have happened if their parents, in an irresponsible fling, had conceived them out-of-wedlock? Others are confronted with the knowledge that their existence stems from gamete donation. How do we cope with the knowledge that we ourselves derive from an activity which we may find morally unacceptable or even morally repugnant?

Somehow, we have to come to terms with the idea that our own non-existence is a non-question. I can only say that God had purposes for me, and that is why I was conceived, and why two humans "decided" to have me. And here I am as one of God's people (someone who has been created individually by God), with all the possibilities of enjoying God and of extending his kingdom on earth. One can only conclude that God does not have purposes for the unconceived, nor even for the might-have-been-conceived. Or, to use different terminology, he does not have a specific intention[2] for the unconceived. If this is the case, his intention is not thwarted by the use of contraceptives or simply by

a human decision to refrain from having a child (or further children).

But what of fertilization itself? What of all those embryos that were conceived, but existed for a few days or for a week or two, before being unintentionally discarded? They never had the opportunity of reflecting as I have done. They were never even recognized as icons of God. Indeed, they were almost as non-existent as if they had never been conceived. Did God have a specific intention for such as these, and was this thwarted by the spontaneous abortion?

Some argue that God's general intention becomes specific at fertilization, since the prospect of a specific embryo developing into a person is much higher than that a specific sperm or even a specific ovum will contribute to a person. This is true, and yet there is only a 50% chance that a specific embryo will develop into a fully-developed person. Not only this, but very early embryonic tissue gives rise to the placenta as well as to an individual person of the future, while the mother does not perceive the early embryo as an individual. It is possible to argue, therefore, that the embryo up to approximately 12 days or so of gestation is part-and-parcel of God's general intention rather than his specific intention. In view of this, it is possible to assert the following.

What of all those embryos that were conceived, but existed for a few days before being unintentionally discarded? ... Did God have a specific intention for such as these?

There is only limited theological distinction between the two groups, those which were never fertilized and those which experienced no more than a "milli-second" of an existence.[3] I freely admit that I cannot be sure about this, and I am only too aware that some of my Christian friends draw a distinction and censure me for not doing so as definitively as they would like. However, perhaps surprisingly, my deep sense of humans as the icons of God precludes me from doing so. In what sense are embryos lost early in development any more a Clive and a Sandra, than a sperm and an ovum which could have united to become a Clive and a Sandra, but which didn't? Either way, Clive and Sandra did not eventuate; they didn't even develop far enough for the mother to experience their presence. They were never one of us; they never became (or even nearly became) one of John's and Jean's family. Their lives as human beings hardly started. I am not arguing there is no difference at all between the two groups, but that we can be in danger of making the differences much larger than they actually are.

It is possible to argue, therefore, that the embryo up to approximately 12 days or so of gestation is part-and-parcel of God's general intention rather than his specific intention.

I am also suggesting that, when discussing God's purposes for individuals, we distinguish between *retrospective* and *prospective* arguments.[4] We can be categorical in saying that God has purposes for both Clive and Sandra in our story. As we look back at their lives we can say that God has been with them from the time of their fertilization, and that he even had purposes for them prior to that.[5] This is the *retrospective* certainty that applies to all God's people. We cannot, though, say anything about God's purposes for an ovum that *failed* to be fertilized by a particular sperm (or by any one of millions of sperms). Neither can we say anything about his purposes for an embryo aborted early on in its existence. We may regret that such an embryo failed to develop further (and the loss may be grieved), but to argue *prospectively* that God had purposes for that embryo, and that these purposes have now been thwarted,[6] is to assume an unnerving level of theological omniscience. Ethically, we need to be careful about what we do and do not approve even very early on in embryonic development, but we also need to be careful about the theological rationale we use to back-up our ethical perspective.

A final thought concerns the distinction between the replaceable and the irreplaceable. Clive and Sandra are irreplaceable individuals. They have been with us and we have known them; we have felt and seen them growing and developing, and coming to occupy a place in the human community (within the family, neighbourhood, church and school). Their interrelationships with us affect us and we are changed as a result of them. This is true to a lesser extent when children die at a very young

age; it is also true to a limited degree of late spontaneous abortions, and sometimes it may even be true of early abortions. It is not true in anything like the same way of very early natural abortions (within the first two to three weeks of gestation), and it is not true at all of any occurrence prior to fertilization.

In other words, the younger a fetus/embryo is when it dies, the more it is capable of being replaced by a different individual. This may mean that, in practical terms, many people regard the young fetus/embryo as having fewer of the definitive features of an individual than do older fetuses and children. In these terms, the borderline between replaceability and irreplaceability is not at fertilization. It is later; how much later probably depends on numerous factors. I would suggest, however, that these owe more to biological than to theological considerations.

Genetic Manipulation

Against this background, we are in a position to consider some of the possibilities opened up by genetics. Let us once again imagine a couple. We shall call this more modern couple Shane and Sarah. In their first pregnancy there were reasons to be concerned that the fetus may have cystic fibrosis. At 16 weeks an amniocentesis was carried out, and a small amount of amniotic fluid was removed so that some fetal cells could be tested using a recombinant DNA-based gene probe for cystic fibrosis. They knew beforehand that, if this turned out to be positive, they had a choice to make—either continue with the pregnancy knowing that the child would be afflicted with this debilitating and distressing condition, or have an abortion. If their pregnancy had occurred more recently, this testing could have been carried out at 8 weeks, with a chorionic villus biopsy. The choice, however, would have been exactly the same, and probably the chance of a spontaneous abortion would have been higher.

They knew beforehand that they had a choice to make—either continue with the pregnancy knowing that the child would be afflicted with this debilitating and distressing condition, or have an abortion.

How were they to act in terms of the earlier discussion? It is obvious that their choice had to be made at a much later time than anything I have considered. This may or may not be important, but there can be no doubt that we are dealing with a being who has existed for much more than a millisecond. We are dealing with a being of whom the mother, Sarah, is very much aware, especially when amniocentesis is used. From what I have argued previously it is appropriate that Shane and Sarah accept that they have a serious ethical decision to make. There is no escaping from it, and they should not wish to do so as those who have been created in the image of God. Of course, it may be queried whether this sort of decision is one that human beings should be allowed to make. After all, it involves the *destruction* of a human life, although the emphasis we place on the value of this life will depend on numerous ethical considerations.

Is this word "destruction" an appropriate one? After all, the fetus is aware of nothing at a conscious level ... and if an abortion is carried out, that existence will have hardly started.

But is this word "destruction" an appropriate one? After all, the fetus is aware of nothing at a conscious level (due to the relative immaturity of the cerebral cortex even up to 20 weeks gestation), and if an abortion is carried out, that existence will have hardly started. Is there then any ethical difference between the non-existence discussed above, and the non-existence in this case, that is, the destruction of an 8-9 week or a 16-19 week fetus? For most people the answer is definitely "yes," since the existence of a "recognizable" human form and a (potential) human person has been brought to an end.

Beyond this, there is an additional point that has to be taken into account in reaching a decision, and this concerns the good of the fetus-future child. The medical condition may be so severe that non-existence may be considered to be in the best interest of the child. I believe this is a serious argument in some very extreme cases. However, for the sake of our story, let us assume that Shane and Sarah decide not to abort, although the test for cystic fibrosis is positive. As a result, Catherine is born.

If we now move a little into the future, we pick up Shane and Sarah hoping to have another child. Understandably, they are worried about the prospects of another child with cystic fibrosis. On this occasion they are informed that the embryo itself can be genetically tested before it has a chance to implant in the uterus. This is the technique of *embryo biopsy*. They are told that fertilization will have to take place by in vitro fertilization (IVF), and that one cell will be removed from an early embryo, and will then be tested with the same genetic kit used previously. If this shows that the embryo does not have any indication of cystic fibrosis it will be implanted in Sarah's uterus in the normal way. If it tests positive for cystic fibrosis, it will be discarded and the same procedure will be carried out on a second embryo. This will be repeated until a negative result is obtained.

This process of discarding afflicted embryos is sometimes called in vitro abortion. Is this an ethically acceptable decision to make?

What are the two members of our couple to think of this? What are they doing? This process of discarding afflicted embryos is sometimes called in vitro abortion. Is this an ethically acceptable decision to make? Are they taking human life, and therefore in some way sacrificing human life, or are they making the same sort of decisions about non-existence as encountered previously with contraception? How does a preimplantation embryo in the laboratory compare with a preimplantation embryo in a woman's body?

In terms of the decision facing Shane and Sarah, they either knowingly go ahead using an embryo with a known defect that will result in a child suffering from a serious medical condition, or they decide that that embryo should be allowed to develop no further and they proceed with an embryo that, as far as this particular gene is concerned, is healthy. What is the nature of this choice? Is it choosing between two human beings, as one would choose between two children, or is it the choice between two kinds of potential? I would suggest that it is the latter, and that in Christian terms there is no overriding reason why one should implant a defective embryo. Indeed, I would put it much stronger than this, and suggest that it would be foolhardy and irresponsible to bring such a child into the world knowing that it will be afflicted with a serious ailment. Perhaps it would amount to a form of genetic predestination, since it is known that *this* three-cell embryo (one cell was removed for the genetic analysis) will give rise to a child with a specific, lethal ailment.

Of course, there are many arguments about whether a couple, such as Shane and Sarah, should opt for IVF under these circumstances, the dangers of quality control in this type of procedure, and the push towards allowing into the world only the healthy with the repercussions this could have for our treatment of the unhealthy. I think these are important points, and under no circumstances should a couple (or society for that matter) go unheedingly or even quickly in this type of direction. However, if this procedure is made available, Christians have to work out substantial theological and rational arguments either for or against it. I am not convinced that theologically convincing arguments exist against it at present; implicit within such arguments would be the lack of any moral distinction between the fate of a three-cell embryo carrying the gene for cystic fibrosis and of a child suffering from cystic fibrosis.

There is just one final scenario for Shane and Sarah, a scenario that pushes them yet further into the future. This time they are again advised to use IVF, but the emphasis on this occasion will be on testing the embryos with the intention of correcting any genetic defect that may be found. Hence, there will be no question of an in vitro abortion; instead, if the first embryo tested is positive for the cystic fibrosis gene, that gene will be replaced or will be overridden in some way by inserting some other gene. This is the realm of gene therapy.

What is the nature of this choice? Is it choosing between two human beings, as one would choose between two children, or is it the choice between two kinds of potential?

In practical terms it has to be admitted that gene therapy would be far more difficult and far more costly than refraining from implanting defective embryos. That, however, is not relevant in the present context. If gene therapy were feasible, what objections could there be to it? It appears to be an

extremely sophisticated means of overcoming a deficiency. The problem is that it would also affect subsequent generations if done at this stage, so that its effects would not be confined to this one embryo. This far-reaching perspective is daunting, and takes medicine out of its accepted domain. Quite apart from this, it is difficult to see why one would want to go to these lengths when the option is the far simpler one of choosing to implant an embryo shown to be free from the particular genetic defect.

And so our couple has made their choices. They have two children—Catherine who has cystic fibrosis, and Rebecca who hasn't. Rebecca was the result of implanting a healthy embryo following gene testing. Two embryos were discarded prior to this. Should they have any theological qualms? They could have avoided the birth of Catherine, who is now 13, is far from well and has a poor life expectancy. That would have meant a late abortion. Two non-existent beings could have existed, but did not. If they had existed they would have had cystic fibrosis. Rebecca is a delight. Both children are icons of God, and both are deeply loved and cared for. In a different age, and with different medical technology, the situation would be very different, but that is not something which either of our couples, or even we, are responsible for.

Conclusions

The thrust of this article has been that we repeatedly make decisions about existence and non-existence, and most of us accept that this is an integral part of responsible human (and Christian) decision-making. And that is as it should be, since such decisions are part-and-parcel of our responsibility as those who are co-creators with God. It should not surprise us, therefore, when we are confronted with comparable decisions shortly after fertilization. These decisions do not allow us to do anything we like with early embryos (we have to make ethical decisions and we have to demonstrate our commitment as faithful servants of God), and we may decide to protect them under every possible circumstance. Nevertheless, there are decisions to be made, and my argument is that these decisions have more in common with decisions that are made prior to fertilization than has traditionally been thought.

More specifically, within the context of genetic technology, non-existence is a concept with which we should be grappling as we aim to come to terms with the burgeoning facets of the genetic debate. This form of technology confronts us with new decisions, and yet they have far more in common with conventional decisions than is generally realized. A major obstacle stems from our lack of analysis of the nature of our day-to-day decision-making in the reproductive area, the result being that we are unprepared for the very precise decision-making now being demanded of us. This is a challenge to our theology, as much as it is to our ethics and science. ❖

Notes

[1]N. Wolterstorff, "The wounds of God," *The Reformed Journal*, 37: 14-22 (1987).

[2]Robert N. Wennberg, *Life in the Balance* (Eerdmans, Grand Rapids, 1985), pp. 106-115.

[3]Although my argument is not the same as that used by Donald MacKay a few years ago, there are similarities. See his argument in "The beginnings of personal life," *In the Service of Medicine*, 30(2): 9-13 (1984).

[4]This point was touched on by Duncan Vere in his article, "When is a person?," *Journal of the Christian Medical Fellowship*, 34 (3): 18-23 (1988).

[5]See the discussion in my book: *Manufacturing Humans* (Inter-Varsity Press, Leicester, 1987), pp. 125-128.

[6]For example, Martin A.K. Allaby, "When is a person?; reply to Duncan Vere's article," *Journal of the Christian Medical Fellowship*, 35 (1): 27 (1989).

Friend, I had said,
Life is too short for
Religion; it takes time
To prepare a sacrifice
for the God. Give yourself
To science that reveals
All, asking no pay
For it. Knowledge is power;
The old oracle
Has not changed. The nucleus
In the atom awaits
Our bidding. Come forth,
We cry, and the dust spreads
Its carpet. Over the creeds
And masterpieces our wheels go.

R. S. Thomas, from "No Answer"

Mutual Interaction: Newton's Science and Theology

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Since Newton is such a pivotal figure in the history of science, it is significant to consider how Newton's science and his theology interacted. This paper proposes three ways in which this occurred: 1) Newton found evidence of a Creator through science, 2) he struggled to understand God from a scientific perspective, and 3) he used a scientific approach in theology. In particular, some suggestions are made concerning how Newton's scientific background may have influenced his views on the deity of Christ.

Nature and Nature's laws lay hid in night:
God said, "Let Newton be!" and all was light.
-Pope

Galileo, after years of struggle to reconcile the teaching of the Roman Catholic Church with the theories of the new science, died in 1642; that same year, Isaac Newton was born. Newton was to play a pivotal role in the development of science for the next two centuries; only with the relativity theory of Einstein and the development of quantum physics in the early part of the 20th century was the influence of Newton surpassed. In addition the debates in the philosophy of science were widely affected by Newton's thought and practice. Of greater significance for this paper is Newton's treatment of the relationship between Christianity and science.

Of course the discussion of science and Christianity was not new with Newton. He entered the public debate somewhat reluctantly, perhaps because of his desire for peace and privacy. Some critics have suggested that Newton's interest in religion was attributable to a touch of insanity; in fact, he pursued theology and its interaction with science with the full powers of his intellect. Unfortunately, he never produced a complete or systematic discourse on his views. Rather, he has left us a legacy of short manuscripts and digressions within larger works which have received diverse interpretation.

Nonetheless, it is clear that Newton as a scientist and Newton as a theologian interacted in a variety of ways. He believed that God revealed Himself in Scripture, nature, and history, and that this revelation would yield its secrets to careful scrutiny. He utilized the methods of science to study the Scriptures. But in the end he recognized the limitations of both science and theology in their respective attempts at understanding.

Background

The religious climate in which Newton grew up was quite unsettled. He was born during Cromwell's Commonwealth, and the Puritan influence on him seems evident. The Puritan morality of "scrupulosity, punitiveness, austerity, discipline and industriousness" is clearly evident in his life.[1] His devotion to the text of the Scriptures also seems to stem from this influence.[2] Newton studied the Scriptures widely and intensely, employing the original languages and doing effective textual criticism. His family background linked him to the Church of England, his step-father and uncle being Anglican clergy. The Church of England at this time stressed strong ecclesiastical authority; extreme Arminianism

led to a de-emphasis on the themes of sin and salvation; morality and rationalism were the prevalent concerns. Newton's religion was more one of law than of grace. And while Newton would not have consciously supported it, the foundations were being laid for Deism.

Controversy was often fierce, and Newton was one of many who felt that neither side in such violent controversies could be the defender of the true faith. For most of his life, Newton sought to avoid public controversy in religious issues, just as he did in mathematics and science. To find the truth, Newton looked to the Old and New Testaments and the early church. He appears to have sincerely submitted to the authority of Scripture, but he did not automatically assent to accepted interpretations of the Bible. His search for a primitive Christianity led him to re-examine some of the creeds of the early Roman church, and to border on heresy in his doubts and conclusions. In his quest, he was very much the scientist, observing evidence and reasoning carefully. This similarity of approach in both science and religion was not new: the Reformers returning to the Greek text of the New Testament parallels Galileo's emphasis on experimenting directly with physical objects. The tension between being told the truth and discovering the truth for oneself was growing, no matter what the subject matter might be.

In the Middle Ages, there had been an accepted synthesis between Aristotelian science and theology. The Scientific Revolution of the 16th and 17th centuries was as significant a movement in science, and culture generally, as the Reformation was in religion, and culture generally. The scholastics had viewed science as dealing with the role of events in God's plan. Aristotelian science had sought knowledge of the real essence of a thing. "The great intellectual revolution of the seventeenth century lay in the realization that in the subject of mechanics it is possible to work out a system of explanations that is not teleological but thoroughly deterministic, which refers not vaguely to God's purposes or preferences but brings out the quantitative relationships which a mathematical account of the phenomena requires."[3] Science was now offering a mathematical and mechanical description, not teleological explanation.

However, this view of science, which sounds so familiar to our modern ears, was not the only scientific tradition competing for the minds of the 17th century. Alongside the emerging mechanistic model of the universe lay a view of nature with much deeper roots, some of which had been Christianized by various thinkers such as Comenius and Kepler. Nature was seen as the work of an artist-magician who had endowed it with beauty and mystery; the quest of the scientist was to uncover its secrets.[4] While the mechanical view of nature was cold and lifeless, this mystery tradition "asserted the primacy of spirit; all that happens in nature is the work of active principles."[5] This view

> incorporated certain Pythagorean assumptions, which stressed a mathematical harmony in the cosmos. The secrets of the cosmos had been written by God in a mathematical language, which could be discerned, for example, in musical harmonies. [The cosmos] was a world full of magical powers, the secrets of which were open only to the chosen few who were willing to look beyond the surface phenomena. The explorer of nature was an ascetic, studying the occult, within the confines of an esoteric community.[6]

One of the principle pursuits suggested by the mystery tradition was alchemy, which Jung has suggested met a religious need of the age: that as theology became the battleground for increasingly rigid and intolerant factions, alchemy became the stage on which the glory of God could be harmoniously displayed.[7] As a matter of fact, alchemy was one of the main pursuits of Newton's life: in one large collection of Newton's manuscripts, alchemy ac-

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counted for about 550,000 words, compared to 1,000,000 on science and mathematics, and 1,400,000 on theology.[8]

Newton's Theology and Science

When writing a list of seven "Statements on Religion," Newton placed first on the list the rule: "That religion and Philosophy (natural science) are to be preserved distinct. We are not to introduce divine revelations into Philosophy nor philosophical opinions into religion."[9] Newton's practice suggests that to interpret this rule as opposition to "integration of faith and learning" is incorrect. When placed in the context of his life, this isolated statement suggests that Newton held the opinion that since the methodology of science required observation and experiment, the introduction of unsupported propositions from the Bible, or for that matter, from Aristotle, was simply out of place. On the other hand, the rule also refers to scientific "opinions" (note the contrast) as inadmissible for theology. Theology has an authoritative source of information, which Newton treated as given and perspicuous. He had no desire to weaken its arguments with the theories of science.

1. Newton found evidence of a Creator through science.

Newton was a firm believer in the revelation of God in nature, and its value for apologetics. In responding to Bentley's request for aid in developing lectures to oppose atheism, Newton writes, "When I wrote my treatise about our system (the *Principia*), I had an eye upon such principles as might work with considering men for the belief of a Deity; and nothing can rejoice me more than to find it useful for that purpose."[10] In his next letter to Bentley, he wrote

> So then gravity may put ye planets into motion but without the divine power it could never put them into such Circulating motion as they have about ye Sun & therefore for this as well as other reasons I am compelled to ascribe ye frame of this Systeme to an intelligent agent.[11]

Newton seemed to feel that his discovery of the design of the cosmos as displayed in the universal law of gravitation provided strong evidence for the existence of a Designer.

If God is revealed in nature, is this general revelation compelling, and furthermore sufficient for salvation? Citing Romans 2, Newton notes that God's law has been revealed "to all mankind by the light of reason, and by this law all men are to be judged in the last day."[12] He definitely seems to believe that general revelation is sufficient to allow God to hold humankind responsible. However, he also admits that God's existence is not a necessary implication of science. The truth or falsity of scientific propositions may be determined by a person independent of his theological convictions, since the tests of scientific theories are experimentally verifiable predictions and comprehensive explanatory power. Especially when studied as individual questions, "positive scientific inquiries" were distinct from "questions of ultimate causation."[13]

If God is revealed in nature, is this general revelation compelling, and furthermore sufficient for salvation?

Beyond God's mere existence, Newton acknowledges that a special work of God is necessary to open eyes naturally blind to saving truth.

> I could wish they would consider how contrary it is to God's purpose that the truth of his religion should be as obvious and perspicuous to all men as a mathematical demonstration. Tis enough that it is able to move the assent of those which he has chosen: and for the rest who are so incredulous, it is just that they should be permitted to dy (sic) in their sins. Here then is the wisdom of God, that he hath so framed the Scriptures as to discern between the good and the bad, that they should be demonstrations to the one and foolishness to the others.[14]

Thus Newton was convinced that while science discovered valid knowledge, it did not disclose all of the truth. In particular, Newton claims that his mechanical explanation of the universe only explains the current operations (and even this not ultimately), and cannot explain how it all began: "it is not to be conceived that mere mechanical causes could give rise to so many regular motions."[15] Newton speculates occasionally on the relationship of God to gravity or motion, or on exactly how God created and maintains the universe. But this "speculation does not come within the compass of scientific knowledge, nor is it premise or foundational of the scientific theory presented in the *Principia*."[16] So the existence of God seems to be suggested by, but not a part of, science proper.

For the third edition of *Opticks*, Newton was encouraged to add comments on God to his scientific work. In response, he included this statement:

> The main business of natural philosophy is ... not only to unfold the mechanism of the world, but chiefly to resolve these and such like questions.... Whence arises all that order and beauty which we see in the world? To what end are comets...? And these things being rightly dispatch'd (sic), does it not appear from phenomena that there is a Being incorporeal, living, intelligent, omnipresent, who in infinite space, as it were in his sensory, sees the things themselves intimately, and thoroughly perceives them, and comprehends them wholly by their immediate presence to himself.... And though every true step in this philosophy brings us not immediately to the knowledge of the first cause, yet it brings us nearer to it, and on that account is to be highly valued.[17]

The fact that Newton seems to have vacillated about the interaction of the revelation of God and science is a problem. Whatever its explanation in his own thought, it allowed those who followed him to interpret him according to a variety of views, or to use the inconsistency to argue away the whole matter to a position of skepticism.

In any case, Isaac Newton himself came to the task of science as a Christian. He believed in a God who created and sustained the universe, and who was a God of order. This God would certainly have created a world which was rational, and would have given human beings a rationality capable of its understanding. For him, then, the religious value of his work was one of support. Religion and science may be fundamentally different interpretations of the universe, each valid in its own way. For Newton, however, the realm of science was dependent on God, and led the reverent mind to a fuller assurance of his reality and a readier obedience to his commands.[18]

2. Newton struggled to understand God's nature and activity from a scientific perspective.

What is the cosmos capable of revealing about God to the person who believes in its Creator? What are the attributes of God which the universe displays? How can we see God at work in the world? It is difficult to separate Newton's concept of God into the part derived from nature and the part derived from Scripture; this is perhaps a positive aspect of the interaction of his science and his theology. Consider the following rather "scientific" description of God which appeared in the second edition of the *Principia* following a discussion implying the need for an Agent of creation.

> This Being governs all things, not as the soul of the world, but as Lord over all.... The Supreme God is a Being eternal, infinite, absolutely perfect.... And from his true dominion it follows that the true God is a living, intelligent, and powerful Being; and, from his other perfections, that he is supreme or most perfect. He is eternal and infinite, omnipotent and omniscient; that is, his duration reaches from eternity to eternity; his presence from infinity to infinity; he governs all things and knows all things that are or can be done. He is not eternity and infinity, but eternal and infinite; he is not duration or space, but he endures and is present. He endures forever and is everywhere present; and, by existing always and everywhere, he constitutes duration and space.... He is omnipresent not *virtually* only but also *substantially*.... In him all things are contained and moved, yet neither affects the other; God suffers nothing from the motion of bodies, bodies find no resistence from the omnipresence of God.[19]

It is clear that Newton is insistent that God is a Person, rather than some abstraction. His understanding of God as the sovereign "Lord over all" is definitely derived from Scripture. On the other hand, Newton is also struggling to "explain" the physical relationship of this Being to the world He has created. He wants to retain the scientific concept of absolute space and to distinguish God from it. At the same time he needs to explain how God can operate within space.

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E. W. Strong identifies three levels of abstraction from sense data in Newton's work: 1) "propositions ... inferred or induced from phenomena;" 2) "constructs" such as absolute space which are "not empirically grounded," "metaphysical in the sense of being unverified assumptions" for the particular model, but which "express a real order of nature"; and 3) the existence and attributes of God. "Science proper is limited, by Newton, to the first and second levels of abstracting."[20] While this scheme of levels of abstraction may help to clarify the distinction

between science and theology, on the other hand it indicates something about the problem of integration which Newton attempted to solve. "Absolute space" is a construct on level 2; God is on level 3. Naming the different levels doesn't explain how they differ, nor does it give us any clue as to how constructs from all three levels are to be combined into a meaningful theory. If indeed some of our knowledge of God is not divorced from sense experience, then integration of at least that portion of theology with science should be a realizable goal.

Newton's system implied a dilemma: the choice was "either that real space is God, or else that there is something beside God which is eternal, uncreated, infinite, indivisible, immutable."

Newton also accepted a distinction between what an object is in itself and what we experience of it. Consider how he illustrates this with regard to God in the following passage from the *Principia*.

> As a blind man has no idea of colors, so we have no idea of the manner by which the all-wise God perceives and understands all things... We have ideas of his attributes, but what the real substance of anything is we know not. In bodies we see only their figure and colors, we hear only the sounds, we touch only their outward surfaces, we smell only the smells, and taste the savors, but their inward substances are not to be known either by our senses or by any reflex act of our minds; much less, then, have we any idea of the substance of God. We know Him only by his most wise and excellent contrivances of things and final causes... All our notions of God are taken from the ways of mankind by a certain similitude, which, though not perfect, has some likeness, however. And thus much concerning God, to discourse of whom from the appearance of things does certainly belong to natural philosophy.[21]

In the second edition of *Opticks*, Newton had made another attempt to explain God's actions within the universe. He writes that God,

> being in all Places, is more able by his Will to move the bodies within his boundless uniform Sensorium, and thereby to form and reform the parts of the Universe, than we are by our will to form and reform the parts of our own Bodies.... And yet we are not to consider the world as the body of God.[22]

This comment got Newton into immediate trouble with Leibniz, who read Newton as identifying God with space. Newton clearly rejected any such pantheistic notion.

After the publication of the first edition of the *Principia*, Bishop Berkeley had criticized Newton's concept of absolute space. He wrote that Newton's system implied a dilemma: the choice was "either that real space is God, or else that there is something beside God which is eternal, uncreated, infinite, indivisible, immutable."[23] (Incidentally, Berkeley also criticized Newton for his use of infinity in the mathematics of the *Principia*.) The above quote from the second edition of the *Principia* was undoubtedly in part a response to Berkeley's criticism.

A more contemporary critique of the concept of space came from C. S. Lewis in *Out of the Silent Planet*, in which "Space" itself is pictured as dark, void, and dead. It contains worlds admitting life, but these are separated by great distances. This, Lewis suggests, is the standard 20th century materialistic and scientific view, and it is in large measure a result of the Newtonian revolution. Lewis's hero, Ransom, comes to believe the old phrase, "the heavens," to be much more descriptive. Rather than an empty container, the heavens are full of life.[24] Newton certainly did prove the universe to be much larger than previously thought, and he viewed a lot of space as devoid of matter. However, he was not a materialist. Space was not empty, for it was filled with the presence of God. Newton's continuing struggle was to explain the relationship between space and the God of space.

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How God continues to operate within the world He has made brings us to the doctrine of providence. For many, a mechanical view of the universe was necessarily deterministic: while God might be necessary to create the world, establish its laws, and set it in motion, once started, the world could run by itself. The law of inertia, a cornerstone of Newtonian mechanics, said a body in motion would continue in motion by itself unless acted upon by an outside force. Indeed, if God were a really good

mathematician-physicist, could or would He have done anything less? It was only a small step to the god of the deists.

> A truly perfect Creator, Leibniz insisted, would have fashioned a world which would last forever unless He were to intervene purposely to destroy it. This contrasted with Newton's belief that God would wisely fashion His creation in such a way that " ... nothing is done without his continual government and inspection...," so that God had to act merely to allow the world to continue.[25]

But what science did Newton offer which would be consistent with his view of providence? Did God maintain the universe in a perfect state? If so, how could His intervention be seen? If He made the universe with imperfections, His intervention would be necessary at times to put the system back on track, but this god of the gaps might prove no better than some now-absent creator.

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Newton offered various proposals for the continuing role of God in the operation of the universe. He suggested that gravity itself might be the direct result of God's will.[26] He noted irregularities in the motions of the planets which he suggested would after a time require adjustment by God. But I find most interesting his suggestion that the universe was decaying, that the total amount of motion was decreasing (like the Second Law of Thermodynamics). Newton proposed that this decay would require a "Reformation" or act of re-creation of the universe by God at some point in the future. This naturally leads us to inquire about Newton's eschatological views.

Prophecy was one of the most significant areas of Newton's theological studies. "To Newton, the correspondence of prophecy with fact demonstrated the dominion of God, a dominion exercised over human history even as it is exercised over the natural world."[27] Newton spent a great deal of time interpreting Daniel and Revelation historically, and reconstructing and reconciling history with them; the result was a book entitled *Observations upon the Prophecies of Daniel, and the Apocalypse of St. John.*

Newton spent a great deal of time interpreting Daniel and Revelation historically, and reconstructing and reconciling history with them.

He also insisted on a literal interpretation of future prophecies concerning the second coming of Christ. In "Of the Day of Judgment and the World to Come," Newton expressed the belief that Jesus would reign on the earth for a thousand years.[28] It would be after the Millennium that the decay of the universe would reach such a state that "a new heaven and a new earth" would be created by God.[29] One should add that this belief was not unique to Newton; it was not uncommon among a variety of thinkers with ties to Cambridge.[30] What is significant for our purposes is Newton's synthesis of the universal laws of mechanics and eschatology.

3. Newton used a scientific approach in theology.

So far we have discussed the struggle which Newton faced as he attempted to relate the contents of the Book of God and the Book of Nature. Behind the content are the questions of epistemology: to what extent is knowledge available in science and theology? How is such knowledge obtained? Is revelation (both general and special) required to be "scientifically reasonable"? For Newton, there seem to be similar criteria for knowing in his study of both science and theology; the general issues will be discussed and then illustrated by considering an example.

We have seen Newton's desire to do science apart from the inclusion of revealed truths, but this was not an attempt to judge revelation by science. He simply believed that special revelation did not belong to science proper. He acknowledged the limitations of science. Consequently, he did not require the truths of revelation to be "scientifically reasonable." If his desire had been "simple common-sense rationalism, we should expect Newton to reject miracles, a Second Coming of Christ, and the resurrection of the body. In fact he accepts them all quite literally."[31]

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A principle which was foundational to Newton's science was that the cosmos was intelligible: the Creator had endowed both the world and man with a common rationality. His inclinations toward the mystery tradition of science may have suggested that the deepest secrets may be discernable by only a few, but much was clear to all. Newton applied the same principle to Scripture. He believed that the basic truths of the Bible were clear enough for all to understand, and these truths were the ones required to serve God faithfully. He acknowledged the existence of deeper truths in the Bible, but saw them as less essential.

Now if we push the two Book analogy, it would seem that the *Principia* would be analogous to a text in systematic theology. But several key features of the *Principia* are missing. It was, after all, the *mathematical* principles of the cosmos which Newton so profoundly displayed. But Newton did not believe that the key to the Scriptures was to be found in mathematical equations. What about *crucial experiments*? Again, no correspondent. One other feature of Newton's science was the abstract concept.

For instance, he mathematically described the effects of "gravity," but preferred not to hypothesize concerning the nature of "gravity"; in any case, such a hypothesis would not be a part of science. As another example,

> force was to Newton a concept necessary to the description of phenomena in mechanical terms. Its validity rested on its utility in demonstrations, not on hypotheses that might explain its origin. Newton believed that nature is ultimately opaque to human understanding. Science cannot hope to obtain certain knowledge about the essences of things.[32]

We have seen above how Newton struggled with the details of conceptualizing God and His relation to His creation. We have also noted that before Newton's time, science had sought for essences.

> Newton explicitly contradicted the traditional ideal for science. Instead of striving toward certain knowledge of the real essences of material objects, [he] sought an ordering of phenomenal experience which would enable [him] to predict nature's course... [33]

That is, Newton's focus was on describing how a thing functioned, not on what it was in itself. For Newton as a scientist, abstract constructs were valid insofar as they led to accurate predictions. What role could such concepts have for theology?

Newton chose to take the statements of the Bible at face value, rather than attempt some extra-Biblical, metaphysical explanation. He goes so far as to state, "What cannot be understood is no object of faith."[34] What he means by this is that the Faith, embodied in the creeds, should not contain statements which are unintelligible. It should be noted that this was not a rule used by Newton to eliminate portions of Scripture. It would seem to be similar to Newton's view of general revelation: there is knowledge about God to be had by a reasoning study of His works. By rejecting the need for "special illumination," Newton was rejecting the necessity of extra revelation (through Church tradition, for instance) or metaphysical supplements. He was not discounting the role of the Holy Spirit, as we saw earlier.

Newton chose to take the statements of the Bible at face value, rather than attempt some extra-Biblical, metaphysical explanation.

On the other hand, Newton was prepared to reject concepts of systematic theology which he found beyond understanding. He argues that true Christianity does not contain any article of faith beyond what Scripture explicitly states, in particular with regard to the introduction of foreign metaphysical concepts. In this, Newton is treating theology in a way which has some similarity to the way he treated science.

This is the perspective with which he came to theology. Metaphysical concepts are useful if they help to describe how things work or how they re-

late; such concepts have no role to play in explaining essences. It is with this background that I believe it will be enlightening to discuss Newton's views on the deity of Christ.

Metaphysical concepts are useful if they help to describe how things work or how they relate; such concepts have no role to play in explaining essences.

To put the matter succinctly and frankly, Newton is frequently interpreted as being an Arian, and not without reason. While some of the evidence is circumstantial, manuscripts only recently discovered have provided rather extensive documentation of his questions concerning the orthodox doctrine that Jesus was fully God. What I would like to do is treat Newton as a sincere questioner, and leave any decision about his being a heretic to others. It is the nature of his questions which I find most intriguing. It seems to me that they are a natural result of the influence of his scientific mentality.

Newton firmly believed that Christian doctrine was to be found in the words of Scripture; they were the "data" of theology. Consequently, he was very concerned not only with the proper understanding of Scripture, but also with having the proper text of Scripture. He wrote

> We are commanded by the Apostle (I Tim. 1:13) *to hold fast the form of sound words.* Contending for a language which was not handed down from the Prophets and Apostles is a breach of the command and they that break it are also guilty of the disturbances and schisms occasioned thereby. *It is not enough to say that an article of faith may be deduced from scripture. It must be exprest in the very form of sound words in which it was delivered by the Apostles....*(italics mine) Men are apt to vary, dispute, and run into partings about deductions. All the old Heresies lay in deductions; the true faith was in the text.[35]

This makes it clear how highly Newton regarded the very words of Scripture, and how careful he felt one must be, therefore, that doctrine is based on an accurate text. Consequently he spent a great deal of time and effort in studying the actual text of Scripture.

One of Newton's most significant theological works is "An Historical Account of Two Notable Corruptions of the Scriptures," contained in two letters written to John Locke.[36] This manuscript discusses two then-prominent proof-texts for the deity of Christ, I John 5:7 and I Timothy 3:16. The King James version of I John 5:7 included the phrase "the Father, the Word, and the Holy Ghost: and these three are one." Newton delved into textual criticism, and found that this phrase was not in the earliest manuscripts, nor quoted in the early Church Fathers. Thus he rejected it, and became one of the earliest to anticipate the verdict of modern scholarship.[37] In I Timothy 3:16, the King James version contained the phrase, "God who was revealed in the flesh." Again Newton discovered that the better texts were less explicit: "God" was really "he"; modern scholars agree.[38]

What should we conclude about a person who thus attacked these passages? Let me suggest a possible perspective. Newton was a mathematician, and as such knew the difference between a correct proof and an incorrect proof of a theorem. To show a proof to be incorrect is not the same as to disprove the theorem. Some of Newton's interpreters have erred at this point. Newton knew that an incorrect proof would detract from the force of the proposition; he constantly revised his mathematical work for this very reason. Concerning religion, he writes to Locke, " There cannot be better service done to the truth than to purge it of things spurious."[39] Since Newton viewed the book of Revelation as a key to Scripture, perhaps he was heeding the warning in Revelation 22:18, "...if anyone adds to [the words of the prophecy of this book], God shall add to him the plagues which are written in this book."

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The development of the doctrine of the deity of Christ revolved around the Greek word *homoousios.* Newton comments that, in the fourth century, "when the Fathers were not able to assert the position of Alexander [the Bishop who had charged Arius with heresy] from the scriptures, they preferred to desert the scriptures than not to condemn Arius."[40] Newton's suggestion is that the Arian heresy was defined by the introduction of a metaphysical concept foreign to the Scriptures, and which "is unin-

telligible. 'Twas not understood in the Council of Nice... nor ever since.' "[41] The first of his "Queries Regarding the Word 'Homoousios' " was "Whether Christ sent his apostles to teach metaphysics to the unlearned common people, and to their wives and children?"[42]

Newton's approach to the person of Christ is to quote Scripture, which seemed to him to overwhelmingly refer to a distinction between the Father and the Son, especially with respect to their functions. Even at the end of the ages, a clear distinction seems to exist as Jesus delivers His kingdom to God the Father.[43] To Newton, these Scriptural propositions were the phenomena of Christianity. They apparently made the best sense to him in a way which caused him to question the traditional doctrine of the Deity of Christ. To go beyond the descriptive statements Scripture provided in an attempt to speak of essences was to transcend a boundary which in science he had found to be an uncrossable barrier.

To go beyond the descriptive statements Scripture provided in an attempt to speak of essences, was to transcend a boundary which in science Newton had found to be an uncrossable barrier.

Could it be that he hoped for ecclesiastical peace, for agreement on the statements of Scripture, by suggesting that we resist the urge to go beyond them? The earlier quote concerning deductions from the text would seem to support this view. It could be objected that Newton certainly used deduction in science; true, but then experiments were available to test the accuracy of the resultant predictions. What predictions would result from a theory of the Trinity? If there are none, then how would the theory to be tested? How would one know if it were true? These are, it seems to me, the perspectives and questions which Newton the scientist would naturally bring to the task of discovering the nature of Christ.

Conclusion

Newton, despite all his intellect and efforts spanning a life of 83 years, did not answer all the questions, and even the answers he gave were not always correct. Pope had exaggerated; God let Newton be, but not all had become light. However, in the estimation of many of Newton's contemporaries, Pope was not far from correct. After some three centuries, can we find some light from Newton to guide our intellectual paths? In practice, Newton tended to write separately about science and theology; scientific content almost never appears in his theological manuscripts, and theology was almost always a later addition in his scientific writings. How does our understanding of the integration of faith and learning help us to improve on Newton's example? For Christian higher education, is today's curriculum a significant improvement over Newton's writings?

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Newton unified heaven and earth with a universal theory of gravitation. Perhaps his example should encourage us to seek a more unified doctrine of God's revelation of Himself in Scripture, nature, and history. We should respect Newton's struggles to understand God and His activity from the perspective of a rapidly changing culture. And perhaps we might emulate the humility of the man who, near the end of his celebrated life, wrote

> I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the seashore and diverting myself in now and then finding a smoother pebble or a prettier shell than the ordinary, whilst the great ocean of truth lay all undiscovered before me.[44] ❖

NOTES

[1]Frank Manuel, *The Religion of Isaac Newton* (Oxford: Claredon Press, 1974), p. 5.
[2]*Ibid.*, p. 11.
[3]Arthur Ernest Bell, *Newtonian Science* (London: E. Arnold, 1961), p. 19.
[4]Hugh Kearney, *Science and Change: 1500-1700* (New York: McGraw-Hill, 1971), p. 24.
[5]Richard S. Westfall, *Never at Rest* (New York: Cambridge University Press, 1983), p. 22.
[6]Kearney, *op. cit.*, p. 39.
[7]Betty Jo Teeter Dobbs, *The Foundations of Newton's Alchemy* (Cambridge: Cambridge University Press, 1975), p. 48.
[8]H.W. Turnbull, ed., *The Correspondence of Isaac Newton* Vol. 1 (Cambridge: Cambridge Univ. Press, 1957), pp. xvi-xvii.

[9]quoted in William H. Austin, "Isaac Newton on Science and Religion," *Journal of the History of Ideas* 31 (1970): 522.
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[11]*Correspondence* 3, p. 240.
[12]quoted in Austin, *op. cit.*, p. 530.
[13]Edwin Aurthur Burtt, *The Metaphysical Foundations of Modern Physical Science* (New York: Humanities Press, 1951), p. 17.
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[22]quoted in J. E. Power, "Henry More and Isaac Newton on Absolute Space," *Journal of the History of Ideas* 31 (1970): 289-296.
[23]George Berkeley, "A Treatise Concerning the Principles of Human Knowledge," *The Empiricists* (New York: Anchor), p. 198.
[24]C.S. Lewis, *Out of the Silent Planet* (New York: Macmillan, 1965), p. 32.
[25]David Kubrin, "Newton and the Cyclic Cosmos: Providence and the Mechanical Philosophy," *Journal of the History of Ideas* 28 (1967): 325.
[26]*Ibid.*, p. 338, n52.
[27]Westfall, *op. cit.*, p. 329.
[28]Manuel, *op. cit.*, p. 126.
[29]Kubrin, *op. cit.*, p. 332.
[30]Margaret C. Jacob, "Millenarianism and Science in the Late Seventeenth Century," *Journal of the History of Ideas* 37 (1976): 335-341.
[31]Austin, *op. cit.*, p. 531.
[32]Westfall, *The Construction of Modern Science: Mechanisms and Mechanics* (New York: John Wiley, 1971), pp. 158-159.
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[37]an {A} rating in Bruce Metzger, *A Textual Commentary on the Greek New Testament* (London: United Bible Societies, 1975), p. 715-717.
[38]a {B} rating in *Ibid.*, p. 641.
[39]*Correspondence* 3, p. 83.
[40]quoted in Westfall, *Never at Rest*, p. 314.
[41]Austin, *op. cit.*, p. 528.
[42]*Ibid.*, p. 527.
[43]I Corinthians 15:24.
[44]quoted in Westfall, *Science and Religion in the Seventeenth Century* (Ann Arbor: University of Michigan Press, 1973), p. 198.

The most beautiful thing we can experience is the mysterious.
It is the source of all true art and science. He to whom this emotion
is a stranger, who can no longer pause to wonder and stand rapt in awe,
is as good as dead: his eyes are closed. This insight into the mystery of life,
coupled though it be with fear, has also given rise to religion.
To know that what is impenetrable to us really exists, manifesting itself
as the highest wisdom and the most radiant beauty
which our dull faculties can comprehend only in their most primitive forms—
this knowledge, this feeling, is at the center of true religiousness.

Albert Einstein, in *Living Philosophies*

The Christian Character of Michael Faraday as Revealed in His Personal Life and Recorded Sermons

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During his scientific career Michael Faraday was a well-known public figure. For more than a century now, his scientific activities have been studied and described by various authors. There was another, more private aspect of Michael Faraday — his religious beliefs and activities. Contemporaries, such as Tyndall, Gladstone, and others have given us some insights into Faraday's personal life and character. However, little has been written regarding his religious activities. As an elder in the Sandemanian church, Faraday often presented sermons, or "exhortations," as they were called. Only a few of these have been preserved, but those that have been give us a view which is quite different from the typical biographical information. Here we see not Michael Faraday, the scientist, but Michael Faraday, the Christian.

A considerable amount of research has been done on Michael Faraday as a scientist and on the seeming dichotomy of his scientific and religious beliefs.[1] In contrast, little has been written regarding Faraday as a practicing Christian. There are two main sources of information on this topic. One is the various comments made by Faraday's contemporaries, and the other is to be found in his recorded sermons. Both of these sources will be discussed briefly.

It is universally agreed that Michael Faraday was one of the most important scientists in history. Some historians of science have gone so far as to refer to him as perhaps "... the greatest experimentalist in the history of science."[2] Faraday was also a devoutly religious man and a member of the Sandemanian church. His parents were Sandemanians, he was raised in the beliefs and practices of this religious group, and continued as a member until his death.

Although Faraday lived a very public scientific life, we know very little of his private life and religious activities. The Sandemanians were a very closed group, and not known especially for their evangelism. In his biography of Faraday, Tyndall pointed out that he was not one to force his religious beliefs upon others. Tyndall commented regarding this, "Never once during an intimacy of fifteen years did he mention religion to me, save when I drew him on to the subject. He then spoke to me without hesitation or reluctance ..."[3]

Tyndall was Faraday's coworker and succeeded him as head of the Royal Institution. Although his biography deals primarily with scientific matters, there are a few remarks concerned with the character of Michael Faraday. He speaks for example of Faraday's nobleness and gentleness. One of Tyndall's comments is especially interesting. He stated that "[t]he fairest traits of character sketched by Paul, found in him perfect illustration. For he was 'blameless, vigilant, sober, of good behavior,

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apt to teach, not given to filthy lucre.' "[4] These attributes referred to by Tyndall are, of course, used by Paul to describe elders or presbyters in the early church. It is interesting that Faraday served as an elder in the Sandemanian church for many years.

One of the most personal biographies of Faraday was written by J.H. Gladstone, who was another close associate of Faraday at the Royal Institution.[5] Gladstone wrote of the gentleness and kindness which were so characteristic of Faraday.[6] He also described him as having a warmth of temperament, a respect and love for others, and a reverence not only for God, but also for his fellow man.[7] He described Faraday as having a child-like simplicity, which parallels Jesus' statement that his followers must become as small children.

Gladstone recounts a statement by Tyndall referring to a meal which he had in the Faraday home. Tyndall described Faraday's prayer as the "... petition of a son into whose heart God had sent the Spirit of his Son, and who with absolute trust asked a blessing from his father."[8]

The charity and benevolence of Faraday was known to those around him. Gladstone relates how much of his yearly income was given away to the church and various needy individuals. Another biographer described how Faraday "... was continually pressed to be the guest of the high and noble, but he would, if possible, decline, preferring to visit some poor sister in trouble, assist her, take a cup of tea with her, read the Bible and pray."[9]

In addition to these glimpses of the personal life of Faraday, Gladstone has recorded one of the few descriptions of Faraday in public worship. Faraday was an elder in the Sandemanian church from 1840 to 1844 and from 1860 until 1864.[10] For most of his adult life he met with his brethren in the "plain little meeting-house in Paul's Alley, Red-Cross Street" in London.[11]

There was no clergy in the Sandemanian church, a noted departure from the Church of Scotland from which this group emerged. The teaching or preaching, which the Sandemanians referred to as the "exhortation," was done by the elders on a rotating basis.

Gladstone described a typical Sunday in which Faraday is to present the exhortation.

> It may be his turn to preach. On two sides of a card he has previously sketched out his sermon with the illustrative texts, but the congregation does not see the card, only a little Bible in his hand, the pages of which he turns quickly over, as, fresh from an honest heart, there flows a discourse full of devout thought, clothed largely in the language of Scripture.[12, 13]

Gladstone not only provided us with this interesting description of Faraday's manner of presentation, he also recorded two critiques of his preaching.

> One who heard him frequently, and was strongly attached to him, says that his sermons were too parenthetical and rapid in their delivery, with little variety or attractiveness; but another scientific friend, who heard him occasionally, writes, "They struck me as resembling a mosaic work of texts. At first you could hardly understand their juxtaposition and relationship; but as the well-chosen pieces were filled in, by degrees their congruity and fitness became developed, and at last an amazing sense of the power and beauty of the whole filled one's thoughts at the close of the discourse."[14]

Four sermons or exhortations preached by Michael Faraday were recorded in a small volume entitled *Selected Exhortations Delivered to Various Churches of Christ by the Late Michael Faraday, Wm. Buchanan, John M. Baxter, and Alex Moir.*[15] These sermons are all similar in format. As was already pointed out, these contain a series of quotations from both the Old and New Testaments interspersed

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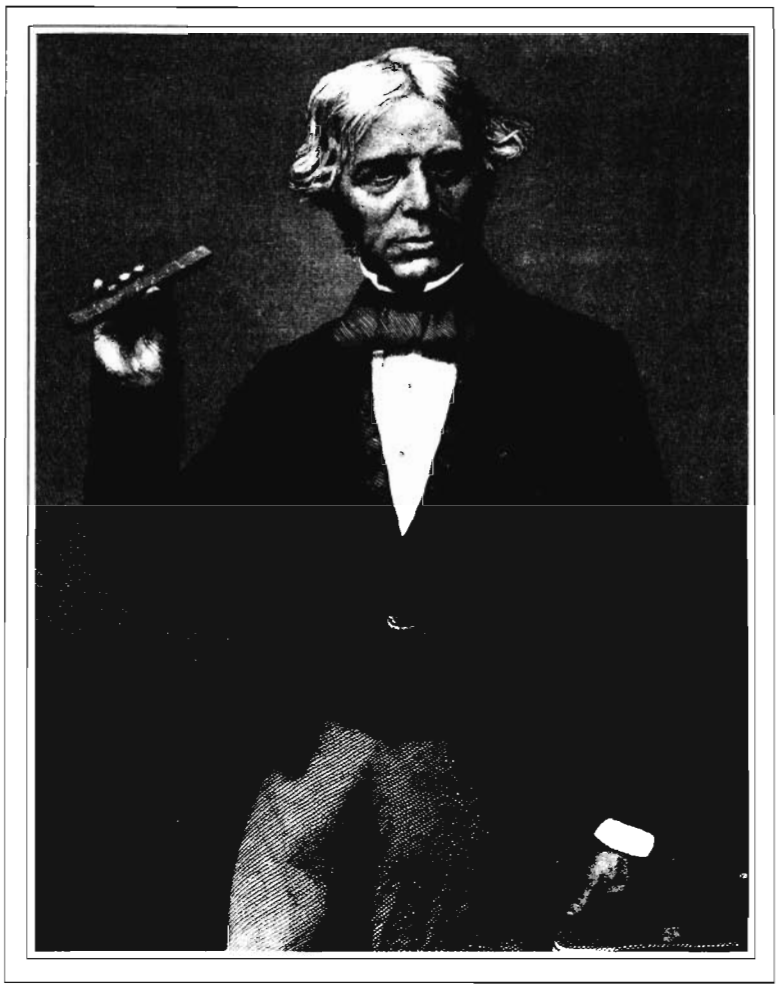
with commentary by Faraday. It becomes readily apparent from reading these sermons that Faraday, and no doubt his listeners, were very familiar with the scriptures. Such an extensive use of biblical references would not be possible without an intimate knowledge of the Bible.

The first of these exhortations was delivered in London on July 7, 1861. The main text of the lesson was Matthew 19:16 and John 17:3. This is a



MICHAEL FARADAY, 1791 - 1867

short exposition of the account of the Rich Young Ruler. In this sermon Faraday emphasized that salvation cannot be earned by the keeping of the law, and that perfection can come only through Christ who lived a perfect life. Faraday stated, "The law of God required perfect obedience, which man could not render, and it was in the room and stead of guilty man that Christ fulfilled it."[16]

In the closing remarks Faraday stated:

> And therefore, brethren, we ought to value the privilege of knowing God's truth far beyond anything we can have in this world. The more we see the perfection of God's law fulfilled in Christ, the more we ought to thank God for His unspeakable gift.[17]

I think it interesting to note in passing that these words were penned by a man who is considered by many to be one of the greatest experimental scientists in history. Yet, Faraday clearly places the knowledge of "... God's truth far beyond anything we can have in this world." Thus, for Faraday empirical knowledge gained through science was not of greater value than knowledge gained through revelation. Further, this statement reveals to us a side of Faraday which is not often apparent in his scientific writings, but nonetheless an integral part of his being.

It would seem that Rorie, the editor of the *Selected Exhortations*, was aware of the significance of these writings in illustrating the religious aspect of Faraday's life. Faraday, as noted above, tended very much to make his religious convictions a private matter, and thus his strong religious beliefs were not known to the general public. Regarding this, Rorie commented that these exhortations exhibited "... a comparatively little known phase of his character, viz., his belief in a still higher means of reaching truth than by scientific investigation alone, namely, as laid open for the instruction and hope of mankind by Divine Revelation."[18]

The second sermon by Faraday was delivered in London on June 29, 1852. The text for this sermon was Hebrews 3:12-13. This sermon was very similar in format to the first, and was an exposition of the portion of the text which reads: "Take heed, brethren, lest there be in any of you an evil heart of unbelief."

The third sermon was delivered on June 7, 1863, and the text was Mark 8:34 and 38. The theme of this lesson was encouragement toward what Faraday referred to as "Christian obedience."

Faraday made a very interesting comment in this exhortation regarding the nature of the church.

> Think for a moment, brethren, of the Church of Christ, what it means and what it ought to be.

> Where the Word of God has sounded, there His people are drawn together; in small companies (and we may consider there are many such scattered over the world of whom we know nothing), gathered out of the world, to the obedience of all things that Christ has commanded.[19]

Michael Faraday presented what is thought to be one of his last sermons in Dundee, Scotland, on August 9, 1863. Gladstone commented on this particular event as follows:

> Among the latest of his sermons was one that he preached at Dundee about four hears before his death. He began by telling his audience that his memory was failing, and he feared he could not quote Scripture with perfect accuracy; and then as said one of the elders present, "his face shone like the face of an angel" as he poured forth the words of loving exhortation.[20]

This exhortation was preached in the meeting-house of the original Sandemanian church, started by John Glas in 1730. Riley gives some additional insight into this event.

> As Faraday's long life drew to a close the desire grew upon him to visit the birthplace of the faith that was the mainspring of his being and on 9th August 1863 he preached in the little octagonal meeting house in Dundee built by the followers of John Glas... Faraday's message is a simple homily compounded of Biblical texts and is all the more impressive for its lack of adornment.[21, 22]

The text for this exhortation was taken from John 11:25-26. This is the account of the raising of Lazarus. At this point in time Faraday was 72 years old and of ill-health. No doubt the great hope in the resurrection held by Faraday was of comfort to him as he looked to the day when his time upon this earth would come to an end.

In a letter written some two years earlier to de la Rive, Faraday had referred to his hope of "the future life which lies before us."[23] His health continued to decline over the next four years. Gladstone recorded the following account of Faraday's last days:

> When his faculties were fading fast, he would sit long at the western window, watching the glories of the sunset; and one day, when his wife drew his attention to a beautiful rainbow that spanned the sky, he looked beyond the falling shower and the many-colored arch, and observed, "He hath set his testimony in the heavens." On August 25, 1867, quietly, almost imperceptively, came the release. There was a philosopher less on earth, and a saint more in heaven.[24]

The funeral was simple, as Faraday had requested, and attended primarily by family and brothers and sisters in Christ. He was laid to rest in Highgate Cemetery in London. ❖

NOTES

[1]For a discussion of this topic see: P. Eichman, "Michael Faraday: Man of God—Man of Science," *Perspectives on Science and Christian Faith*, Vol. 40, No. 2, 1988, pp. 91-97.
[2]C.A. Russell, *Cross-Currents: Interactions Between Science and Faith*, (Grand Rapids: Wm. B. Eerdmans Publ. Co., 1985), p. 257.
[3]J. Tyndall, *Faraday as a Discoverer* (London: Longmans, Green and Co., 1879), p. 185.
[4]Tyndall, p. 207.
[5]J.H. Gladstone, *Michael Faraday* (New York: Harper and Brothers, 1873), pp. 34-37, 52-55. Gladstone himself was deeply religious. He had desired early in life to become a minister, but was persuaded by his family to study science. In later life he was involved in religious movements, wrote several religious pamphlets, and wrote a few hymns.
[6]Gladstone, p. 88.
[7]Gladstone, pp. 54, 88.
[8]Gladstone, pp. 118-119.
[9]J. Kendall, *Michael Faraday: Man of Simplicity.* (London: Faber and Faber, 1955), p. 171.
[10]Gladstone (p. 52) explains the gap in the time Faraday was an elder as follows: "The reason...is said to have been that one Sunday he was absent from the lovefeast, and on inquiry being made, it appeared not only that he had been the guest of the queen, but that he was ready to justify his own conduct in obeying her commands. He, however, continued to worship among his friends, and was, after a while restored to the rights of membership, and eventually to the office of elder." Recently it has been suggested that his dismissal may have had to do with dissention within the Sandemanian church. See: G. Cantor, "Why was Faraday excluded from the Sandemanians in 1844?" *British Journal for the History of Science* Vol. 22, 1989, 433-437.
[11]Gladstone, p. 53.
[12]Gladstone, p. 53.
[13]Several of these cards are in the archives of the Royal Institution. An example of the note cards has been reproduced in H. Bence-Jones, *The Life and Letters of Faraday* (London: Longmans, Green, and Co., 1870) Vol. II, p. 101.
[14]Gladstone, pp. 54-55.
[15]*Selected Exhortations Delivered to Various Churches of Christ by the Late Michael Faraday, Wm. Buchanan, John M. Baxter, and Alex Moir*, J[ames] R[orie], editor, (Dundee: John Leng and Co., Ltc., 1910), p. 5 (hereafter referred to as *Exhortations*). Rorie, an elder in the Sandemanian church in Dundee, was also a scientist and physician.
[16]*Exhortations*, p. 16.
[17]*Exhortations*, p. 18.
[18]*Exhortations*, p. 5.
[19]*Exhortations*, p. 26.
[20]Gladstone, p. 55.
[21]J.R. Riley, *The Hammer and the Anvil* (Yorkshire: The Dalesman Publ. Co., 1954), pp. 37-38.
[22]There is some evidence that Faraday may have travelled to Scotland due to problems in the church (Cantor, personal communication).
[23]L.P. Williams, *The Selected Correspondence of Michael Faraday* (Cambridge: Cambridge University Press, 1971), p. 1001.
[24]Gladstone, p. 80.

Reformational Social Philosophy and Sociological Theory

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In this article an argument is presented for an understanding of the social sciences as rooted in the created character of all reality including social life. Focusing on the discipline of sociology, an explanation of social reality is formulated which attempts to unfold the basic Christian position that our world was begun and continues to be held together by God's creative Word. A Biblical cosmology is presented which is relevant for academic work in the physical sciences as well as in the social sciences.

Sociology is an academic discipline with a wide variety of theoretical perspectives. Structural functionalism, conflict theory, social exchange theory, symbolic interactionism, and ethnomethodology are some of the major schools of thought that have shaped sociology as a field of study. Sociologists subscribing to these various paradigms often feel strongly about the value and importance of their particular approach. They have organized their own sociological associations, academic journals, and annual meetings. Very little cross-communication takes place between the various sociological schools of thought. When it does, it is usually acrimonious.

What can a Christian sociologist do in the midst of this theoretical pluralism? The temptation is to be eclectic. We reason that if we take what we regard as specific insights from the various theories, then we will have a composite theory which will be closer to the truth about social reality. So often, however, this effort results in a theoretical hodgepodge which creates contradiction and confusion rather than understanding and explanation. In this article I attempt to set forth the contours of a sociological theory which is neither eclectic nor inflicted with the ontological and epistemological relativism characteristic of non-Christian sociological thought. The social philosophy of Herman Dooyeweerd and others working in the perspective known as "Reformational Philosophy" has been quite helpful in my attempt to develop a Christian sociological theory which is compatible with a Christian world and life view.[1] In this article, then, I want to formulate the major outlines of a Christian sociological theory informed by reformational social philosophy.

Dooyeweerd makes an important distinction between philosophical sociology and empirical sociology.[2] Philosophical sociology investigates the nature of social structures and their interconnection. It seeks to uncover the various enduring, created structures which are fundamental to social life and which make social life possible. Philosophical sociology attempts to penetrate to the social structural bedrock, the ontological foundation of social life.

Empirical sociology studies the specific social forms which have emerged in a given society in a particular period of history. It describes, analyzes, and tries to explain the social relationships and social institutions which exist in a society. An analysis of social class in Canada, the nature of urban life in the United States, and specific forms of marriage and family in Europe are examples of doing empirical sociology. Dooyeweerd and those working in this perspective have done little empirical sociology. They have written extensively, however on philosophical sociology. A number of helpful concepts have been provided for a sociologist wanting to develop a distinctively Christian sociology.

We need to begin with Scripture.[3] God created the world by his word and upholds the world by his word. The entire creation is dependent on God and is subject to God's law. God's law gives structure and order to the creation. The world is held together by his law (Psalm 33:6-11; Psalm 147:15-18; Colossians 1:16,17; Hebrews 1:3). Everything which follows in this article is intended to be an implication and extrapolation of this fundamental Biblical stance.

As noted by poets, scientists, and people in general, God's creation is rich and diverse. There are many dimensions or aspects to this creation. The numerical, spatial, physical, biological, psychological, logical, social, economic, political, and ethical are some of the dimensions built into creation that we experience on a daily basis.[4] Every dimension or aspect of created reality has its own specific laws or norms. There are laws functioning in physical, chemical, and biological reality. There are mathematical laws. Norms exist for language, social relations, legal, ethical, and faith dimensions of life. Norms are laws but they have to be worked out by man. They can be ignored or rejected, unlike the law of gravity and other laws for the non-human part of creation. But creational norms cannot be ignored indefinitely. To reject public justice in government, stewardship and service in business, or love in marriage, for example, will have negative, even tragic consequences for Christian and non-Christian alike.[5]

> God's ordinances also extend to the structure of society, to the world of art, to business and commerce. Human civilization is *normed* throughout. Everywhere we discover limits and proprieties, standards and criteria: in every field of human affairs there are right and wrong ways of doing things. There is nothing in human life that does not belong to the created order. Everything we are and do is thoroughly *creaturely*.[6]

In formulating a sociological theory out of a Christian perspective, we want to develop a detailed understanding of God's norms for social reality. An adequate sociological theory must do at least four things. It should (1) identify and classify the various social structures which exist, (2) describe and analyze the nature of each social structure, (3) explain the function of each social structure, and (4) investigate how the various social structures in created reality are interrelated and interconnected.[7] I would define social structure as an ordered pattern of human relationships and of social institutions rooted in God's created order.

Identification and Classification

Our first task, then, is to identify and classify the various social structures which exist. We are all aware of social structures such as the family, church, state, school, business organization, labor union, club, and political party. In sociological theory we want to identify and classify these various social structures. Every scientific discipline—from physics, chemistry, and biology to economics, political science, and theology—must identify and classify what it is analyzing. In sociology we need to formulate a typology of social structures. Of course, every classification scheme will be somewhat arbitrary, and there will always be things that do not fit or that seem to fit in more than one category. Nevertheless, since we cannot take in all of the complexity and diversity of an aspect of creation at the same time, we need to identify and classify what we intend to analyze in order to make our efforts conceptually manageable.[8]

One fundamental social structure in society can be called a natural community. Marriage, the nuclear family, and the extended family are natural communities (cf. Diagram 1). A natural community unites people in a permanent way as members of a social whole. Membership is not voluntary. We are born into families. We did not decide to become

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part of a given family. We do decide to become part of the marriage relationship, but, from a Christian perspective, once this decision is implemented, the bond is permanent. Another distinctive characteristic of a natural community is that the relationship is grounded in biological ties. The sexual bond between husband and wife, and the blood ties between family members, constitute the foundation on which natural communities are built.

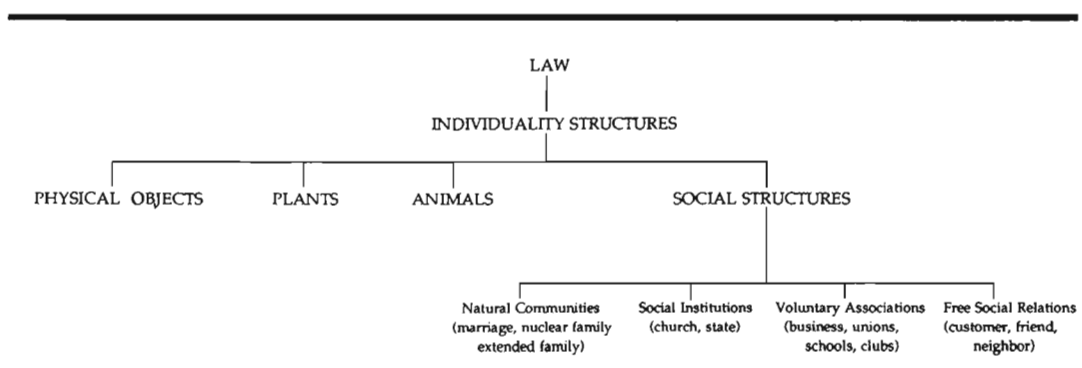
A second type of social structure can be labelled a social institution. Although in sociology we use this term to refer to a wide variety of social groupings, I want to confine its use here to a particular form of social life for the purpose of classification. I regard the church and the state, then, as social institutions. Unlike natural communities which are grounded in the biological dimension of creation, social institutions are grounded in the historical dimension of created reality. They are a product of human effort or form-giving over time. The family was around at the beginning of creation. The church and state were not.

The church and state unite people in a more or less permanent way. We are born into a state; we are citizens by birth. We can, of course, decide to become a citizen of another country, but until we make that decision we are attached to a state by birth. Whether by baptism or some other way, we also are brought into the church at birth. Of course, in our age of secularity many parents do not respond to the call to be part of God's people, but individual practice does not destroy the norm. Rather, the norm of belief makes possible the response of disbelief. Once again, then, being part of the church is a more or less permanent social arrangement. People can decide not to be part of this social institution, but until they do, the involvement and attachment are significantly stronger than being part of a social club or soccer team.

Voluntary associations are a third type of social structure. Voluntary associations include a business enterprise, labor union, political party, clubs of all kinds, and a school. They have an organizational structure with specific goals and some form of authority structure. Of course, natural communities and social institutions have authority structures also. The parent-child, elder-member, president-citizen relationships, for example, are authority structures within these social structures. But voluntary associations also have authority structures such as the employer-employee, union executive-union member, and principal-student relationships. Membership is based on a decision to become part of the social group. Unlike the family, marriage, and the state, it is relatively easy to join and less difficult to leave these associations. Like social institutions, however, voluntary associations are grounded in the historical dimension of created reality. They are the product of human organization and decision making.

DIAGRAM 1

A BIBLICAL COSMOLOGY



NOTES: In this diagram events, actions, and processes are subsumed under physical objects, plants, animals, and social structures.

Since this article is about social structures, only this individuality structure is expanded in the diagram. The challenge for Christian physicists, chemists, and biologists is to expand on the other individuality structures.

The word "voluntary" is used specifically in comparison with natural communities and social institutions. In one sense, of course, a school is not voluntary for a child who must attend by law. Nor is a labor union voluntary for one who must join the union in order to maintain a job. Nevertheless, when compared to a family or state, for example, a school or labor union is a less binding social structure. Parents can educate children at home, and a person is not legally required to work in a particular job. It must be remembered also that we are talking fundamentally about normative social structures, i.e., a structure which appears to reflect God's intention for a given aspect of His creation. Some or many empirical social structures at any given point in history may deviate significantly from the normative structure. The Christian Labor Association of Canada, for instance, has argued for over twenty-five years that compulsory unionization is anti-normative and has, instead, promoted an open shop policy of unionization. Furthermore, as stated earlier, individual practice does not destroy God's norms for social life.

We are talking fundamentally about normative social structures, i.e., a structure which appears to reflect God's intention for a given aspect of His creation.

The fourth type of social structure could be identified as a free social relation. This social structure includes a wide range of daily interaction between people. Relations such as businessman-customer, doctor-patient, neighbor-neighbor, friend-friend are encompassed within this social type. There is little or no organizational structure or authority structure. Free social relations are relationships between equals; equals in the sense that a businessman, doctor, neighbor, or friend has no organizational or normative authority over the customer, patient, neighbor, or friend. But there can be and often is inequality in the sense of expertise, knowledge, skills, and life experience. Free social relations, then, is not an egalitarian concept but a term which allows us to distinguish between a tightly structured social arrangement and one that is not.

The Nature and Function of Social Structures

This typology of social structures begins to satisfy the first requirement of doing sociological theory, which is to identify and classify the social structures that exist in created reality. The second thing a sociological theory needs to do is to describe and analyze the nature of each social structure. I want to combine this task with the third requirement, which is to explain the function of each social structure. The two tasks are closely related. Thus in this section we will be looking both at the nature and the function of social structures. This is a very comprehensive undertaking; therefore, I will focus on only one social structure, i.e., the nuclear family. What is said about the family, however, will be relevant for all other social structures that we have identified and classified. But first, a few fundamental concepts are needed.

Individuality Structures

According to Dooyeweerd, the family, like every other "thing" in creation, is an individuality structure.[9] An individuality structure is a concrete thing, event, action or process which has its own unique identity and existence. All physical objects, plants, and animals are individuality structures.[10] Social structures are viewed as individuality structures also (cf. Diagram 1). Each social structure has an internal structure which holds it together. An internal structure has various components to it. One basic component is a structural principle or structural law. A structural law is not empirically verifiable. It is an ontological given which provides order and permanence to a specific social structure. A structural law is analogous to the steel girders in an office building which provide shape and permanence over time. A structural law should be seen, then, as a basic assumption of the theory I am formulating. By definition there is no empirical proof for basic assumptions no matter what the theory. Yet every theory must have some fundamental assumptions.

In reformational social philosophy, a structural law organizes and groups all of the aspects and functions within a social structure and gives it a unique and distinct existence.

In reformational social philosophy, then, a structural law organizes and groups all of the aspects and functions within a social structure and gives it

a unique and distinct existence. The clearest way to understand how a structural law has organized a particular social structure is to identify what Dooyeweerd calls the leading and founding function of a social structure (cf. Diagram 2).[11] As indicated above, the nuclear family will be used as an example.

The Inner Structure of the Family

The family is rooted in the biological dimension of life. The biological provides the necessary foundation for a family. The sexual bond between a man and a woman constitutes the essential foundation for the existence of a marriage. The reality of adopted children does not negate the biological foundation of the family. On the contrary, the biological grounding of the family is the necessary legal and normative foundation for the possibility of adoption. We say, then, that the biological function is the founding function of the family. This founding function is one aspect of the inner structure of a family (cf. Diagram 3).

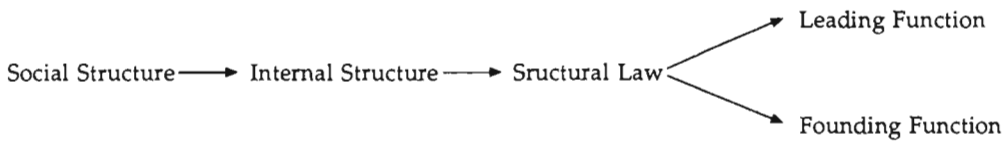
Another central aspect is the leading function of a family—namely, the ethical or moral love. The family can be defined as a community of love. Family life is to be led by mutual trust, respect, and self-giving, all of which give content to the concept of moral love. Again, the fact that a given family may not express this inner structure of a family, as in divorce, does not destroy the inner structure of the family as a social structure. Rather, such a failure to give expression to the structural law of the family should be viewed as an anti-normative response to the God-given call to be a family grounded in the male-female sexual union and governed by moral love.[12]

The inner structure of the family, then, is expressed, characterized, or qualified by its founding and leading functions. The family as a social structural type can be defined and understood as a community of love based upon the natural ties of blood between parents and children. This normative structure of the family allows for a wide variety of actual nuclear family forms. In sociology we are aware of this cultural diversity of family forms and types. This diversity, however, should not be viewed as a cultural accident, but as the result of the variety of human responses to God's normative call for the family to be a community of love rooted in biological union. There is room for rich and legitimate diversity. However, there is not infinite room. Polygamous and homosexual marriages should be viewed as disobedient responses to God's creational norm for family life. Yet even a disobedient response is a response. Living in God's creation order, no one can avoid responding to God's creation norms in one way or another.

Furthermore, if we do not have concepts such as inner structure and structural law for social structures like the family, we cannot give a theoretical account for the continuity of the family over time. This structural continuity is just as empirically apparent as is the cultural diversity of family forms.

DIAGRAM 2

THE ANATOMY OF SOCIAL STRUCTURE



NOTE: The arrows in this diagram are indicating that within a social structure there is an internal structure, within an internal structure there is a structural law, and within a structural law there are two central functions designated leading and founding.

Over the centuries people have not mistaken the family for a government, church, school, business, or labor union.[13] Conceptually and experientially we know the difference between these social structures. There has been continuity of the family structure and other social structures throughout the centuries. My argument, then, is that we need to give a theoretical explanation for this ontological continuity. Certainly from a Christian perspective we cannot rely on the idea of chance. The concepts of inner structure and structural law, therefore, are an attempt to provide an explanation for the observed and experienced continuity of the family as family over time and across cultures.

External Structural Relations

We have seen how the inner structure and specifically the structural law of the family are expressed by the family's foundational and leading functions. The inner structure of the family, however, is expressed in ways related to other aspects of the creation. Family life has a legal, juridical dimension (cf. Diagram 3). Family life involves rights and obligations. Parents have the right to discipline their children, but also the obligation to nurture these children. Children have the obligation to obey parents, but children have as well the right to be supported by their parents. But family rights and obligations are to be led by love. There is an intimate connection between family law and family love. The leading function of moral love is to infuse and give direction to the rights and obligations of parents and children.

DIAGRAM 3
Family Structure
Moral-Biotic Structuration

Modal Aspects	Family functions
confessional	family worship, faith
ETHICAL	family love
juridical	family authority, rights
aesthetic	family harmony
economic	family budget, management
social	family relations
lingual	family names
historical	family customs, tradition
analytical	family thought, opinion
psychical	family emotions
BIOLOGICAL	family sexual & blood ties
physical	family resemblance
spatial	family home
numerical	family unity

Note: The ethical and biological aspects are capitalized to emphasize that in the structure of the family the ethical and biological dimensions of creation are the leading and founding functions.

Source: Adapted from James Olthuis, "The Reality of Societal Structures," (Toronto: Institute for Christian Studies, n.d.), p. 15.

The family functions, then, in all aspects of the creation. The inner structure of the family expresses itself in the aesthetic dimension of created reality. We speak of harmony or balance in family life based on the mutual love of parents and children. Family relationships fit together or are interwoven like a well made tapestry. The management of a family household relates to the economic function of the family. The intimate relations within a family point to the social dimension of the inner structure of family life. We can speak of the historical dimension of a family in terms of family customs and traditions. Family faith is a crucial aspect of the structural unity of the family. The family roots its life in some ground of certainty. The family serves the God of creation or some false god. These few suggestions indicate the rich complexity of the family as a social structure which gives expression to its inner structure in a way that connects it to every dimension of God's creation.

We have been engaged in a preliminary way with a structural analysis of the family. It is possible to extend and deepen this analysis of family life considerably. It is also possible to carry out a structural analysis of all the social structures of created reality. We can do a structural analysis of the church, state, school, labor union, and a business enterprise, for example, by identifying the founding and leading functions of each respective social structure and relating these central functions to the internal and external functions and relationships which exist with all other dimensions of creation. Such an analysis is a life-time task and obviously beyond the scope of this article. Our extended example using the family as a social structure, however, is suggestive of the deepened understanding possible as we analyze the nature and function of social structures using the concepts of internal structure, structural law, leading function, and founding function.

The Interconnection of Social Structure

We have dealt with three of the four areas which are important in developing an adequate social theory. We have attempted to identify and classify the various social structures which exist. We have talked about the nature and the function of social structures. A fourth requirement is to investigate the interconnection between the various social structures. How do social structures interrelate or hang together?

Dooyeweerd talks about enkapsis as the interwovenness between two or more social structures to form a more complex social whole.

Dooyeweerd uses an unusual term for the mutual coherence of social structures. He speaks of "enkapsis."[14] This word is from the Greek word *enkaptein* which means to swallow up, but this is not the meaning that Dooyeweerd wants to give to this word. Dooyeweerd talks about enkapsis as the interwovenness between two or more social structures to form a more complex social whole. He stresses that in enkaptic relationships the identity of a social structure is not lost, dissolved, or swallowed up by another social structure. We are not talking about a part/whole relationship such as the relation of the liver, kidney, and heart to the human body. Rather, each enkaptically interwoven social structure has its own independent identity and existence yet is bound together in a mutual dependence on another social structure. For example, marriage and family are enkaptically interwoven. The family depends on the sexual union of husband and wife for its existence. Marriage is enriched and deepened by the family. The state and church are enkaptically interwoven. The state provides protection for church worship, and the church nurtures people to be responsible citizens of the state. Mutual dependence and interwovenness of social structures is an experienced and ongoing reality.

Conclusion

We have identified four important tasks for the Christian sociologist who wants to formulate sociological theory. We need to identify and classify social structure, describe and analyze the nature and function of these structures, and determine how the various structures are interconnected. It has been stressed also that if we are to do Christian sociology, this effort must be rooted in the confession that God has created the world by his word and daily upholds his creation by that word. Whatever we say needs to be an outworking of that confession. Reformational social philosophy provides an ontological framework and various concepts for the analytical unfolding of this confessional position. It provides insight and direction for Christian scholarship that attempts to avoid eclecticism and relativism. ❖

NOTES

[1]Dooyeweerd had a distinguished academic career as a professor of law at the Free University of Amsterdam from 1926-1965. His writings have influenced numerous scholars in the humanities, social sciences, and physical sciences. Cf. C.T. McIntire (ed.), *The Legacy of Herman Dooyeweerd* (Lanham, MD: University Press of America, 1985).

[2]Herman Dooyeweerd, *A New Critique of Theoretical Thought*, Vol. III, (Philadelphia: The Presbyterian and Reformed Publishing Company, 1959), pp. 157-160, 262-265.

[3]Cf. Bernard Zylstra, "Thy Word Our Life," in Robert Carvill (ed.) *Will All the Kings Men* (Toronto: Wedge Publishing Foundation, 1972); Albert Wolters, *Creation Regained: Biblical Basics for a Reformational Worldview* (Grand Rapids, MI: William B. Eerdmans Publishing Co., 1985), pp. 12-43.

[4]Cf. L. Kalsbeek, *Contours of a Christian Philosophy* (Toronto: Wedge Publishing Foundation, 1975), pp. 95-103.

[5]Cf. Wolters, *Creation Regained*, pp. 14-17, 21-24, for a concise explanation of the distinction between laws of nature and norms and for the nature of norms in society.

[6]Wolters, *Creation Regained*, p. 22.

[7]Herman Dooyeweerd, *A Christian Theory of Social Instructions*, (La Jolla, CA: The Herman Dooyeweerd Foundation, 1986), pp. 18, 19.

[8]For a more complex and detailed typology of social structures cf. Kalsbeek, *Contours of a Christian Philosophy*, pp. 196-204.

[9]Herman Dooyeweerd, *A New Critique of Theoretical Thought*, Vol. III, pp. 262-345.

[10]In Dooyeweerd's thought a human being is not an individuality structure but an act-structure. This distinction is complex and is not critical for our present discussion. Cf. Dooyeweerd, *A New Critique of Theoretical Thought*, Vol. III, pp. 87-89.

[11]Each physical object, plant, and animal has an internal structure also according to Dooyeweerd. This idea can be a useful integrating concept for physical scientists as they investigate the structure of living and non-living things.

[12]J.M. Spier, *An Introduction to Christian Philosophy*, (Philadelphia: The Presbyterian and Reformed Publishing Co., 1954), pp. 168-178, 194-206.

[13]In primitive, undifferentiated societies there were few if any social structures except the family, clan, or tribe which did perform school, government, religious, and work functions. But the family, clan, tribe were not mistaken for the state, school, church or labor union. These social structures in most cases did not yet exist. Where they did exist, they were fully integrated into the family-tribal structure and, therefore, were not yet distinct social institutions. My argument is that once the school, church, state, and labor union fully emerged in history as distinct, independent social structures, they were not confused with the family. People have an intuitive, pretheoretical grasp of the difference between the family, church, school and state.

[14]Dooyeweerd, *A New Critique of Theoretical Thought*, Vol. III, pp. 627-693.

Dialogue

Response to William Dembski's "Converting Matter into Mind"

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William A. Dembski's article of December, 1990 "Converting Matter into Mind: Alchemy and the Philosopher's Stone in Cognitive Science" quite nicely pointed out the dangers that accompany the confusion of natural science and poorly done philosophy. I endorse that general thrust of his paper but would like to suggest that his arguments may fail to establish his point.

The heart of the matter concerns the notion of value. Dembski's article insists that "the chief difficulty with semi-materialism is that from God's perspective it trivializes man" (p. 216).

Assuming with Dembski that God ultimately decides the value of his creation, why does semi-materialism trivialize people? I think that I can fairly state Dembski's basic argument as follows: (1) What is valuable is valuable to God. (2) In a finite universe, God most highly values intelligence.[1] (3) Thus, the "only reason the universe is interesting to God is because there are intelligent beings" (p. 216).

Dembski gives two arguments for the claim that God most highly values intelligence. These two arguments correspond to two different notions of "value." To be valuable can mean "interesting and novel" (p. 217) or "meaningful and purposeful" (p. 205). Both notions of value, Dembski thinks, imply some "extrinsic intelligence."

Pages 216-217 present the argument that the valuable is the interesting and the novel. I have reconstructed the argument as follows: (a) What is valuable is what God finds interesting. (b) What is interesting to God is novelty and thrills.[2] (c) Novelty must come from "outside" the universe. (d) We act novelly only through intelligent action. (e) Therefore, intelligent action must come from outside the universe.

Premises (a) and (b) would require a theological debate (with process theology?) which would lead us too far afield. For the purposes of argument, I am willing to grant the truth, or at least the interesting nature, of (a) and (b).[3] Here we must question premises (c) and (d) as stated below.

> To us a cube in a box is only interesting when an intelligence other than ourselves uses it to communicate with us. The same holds for the material universe and God. The only reason the universe is interesting to God is because there are intelligent beings, namely us, who express themselves through the universe, namely the matter that constitutes our bodies. If these intelligences are not external to the universe, then we land in ... a toy universe populated by toy people subject to a bored God who cannot be amused .... There are no other possibilities (p. 217).

Is this a good argument? Dembski claims that "To us a cube in a box is only interesting when an intelligence other than ourselves uses it to communicate with us. The same holds for the material universe and God." I suggest that the words "the same" are out of order here as there is no proper analogue between human experience and the relation between God and his creation. If Dembski's argument works, it only works by analogy. *To the extent that* God's experience of the material universe *is analogous* to our experience of a cube in a box, must intelligence be either external to the universe or operate on the model of a mechanical toy?

In answer to this revised question, Dembski presents us with two problematic notions. First, he appeals to the "outside" or to the "extrinsic." As far as I can tell, Dembski understands novelty *as* externality. Premise (c) would seem to be a matter of definition. The novel event is external to the object to which it is novel. To recognize novelty, one must recognize more than the simple relation of self-identity which allows for no "outside."

However, "outside" and "extrinsic," on Dembski's reading, are relative to a "physical system" or those principles sufficient to constitute such a system (p. 205). Furthermore, this system causally interacts. Hence to acknowledge a cause from the outside will mean that, in principle, we should be able to subsume the event into a cause-effect framework. Does Dembski think that we can develop a more inclusive system which could, through a more adequate view of causation, account for the actions of intelligence and, by analogy, of God? The alternative to a more inclusive system would need to attack not merely the limited materialism of the system but the notion of a "causally interacting system" itself as adequate to reality.

Dembski, as far as I can tell, takes the former option in arguing for a teleological view of the world and intelligence. Teleology, thus, would be a more inclusive system than one based merely on mechanical laws of motion. Our second difficulty, then, concerns the "come from" of premise (c). How does one provide a causal account of what are apparently "products" of intelligence? Novelty implies a lack of self-identity relative to a pre-defined physical system or set of principles. A more inclusive set of principles allows us to preserve the self-identity of the system, and overcome the "relatively" novel. Once we have made the move to teleology in order to account for intelligent actions, premise (c) "Novelty" must come from "outside" the universe, contradicts premise (d) which states "We act novelly only through intelligent action."[4] If the argument from novelty is to work, it must operate at the level of the absolutely novel which is irreducible to any possible system or set of principles.

Let us, then, turn to Dembski's argument on pages 203-205 that meaning and purpose establish value. There Dembski offers two examples, the Parable of the Cube and Huxley's simian typists. Both examples intend to demonstrate that, if we begin with only matter in motion as our guiding principles, we must infer an "extrinsic" intelligence to account for the example. "In both cases we have physical systems which express intelligence, but which fail to supply an adequate causal account of the intelligence they express" (p. 205).

How does one provide for a causal account of intelligence? The ancients claimed that "nothing can come from nothing." An actual intelligence could only be produced by another actual intelligence. Those philosophies which admitted movement and change as realities claimed that the production of intelligence was a gradual process. Becoming an actual intelligence would be described as the goal of a process which began with only a potential intelligence. The changing object moves from potency to act, from an unformed state to an enformed state. However, just as an acorn, a potential oak tree, could only come from a mature, actual oak tree, so only could an actual intelligence create a potential intelligence. Actuality is prior to potentiality. This structure of causation was developed into a Christian metaphysic. Thus, Dembski asserts his *Law of Priority in Creation:* "The creator is always *strictly greater* than the creature. It is not possible for the creature to equal the creator, much less surpass the creator .... Bootstrapping has never worked" (p. 222).[5] Must all Christians commit themselves to this kind of metaphysic?

Darwin's theory of evolution seems to upset this vision of the world. According to Dembski, "Darwin's theory of speciation by natural selection sought at all costs to avoid teleology. The appeal of Darwinism was never, That's the way God did it. The appeal was always, That's the way nature did it without God" (p. 204).

Dembski, here, joins a long list of philosophers who commonly read the history of the theory of evolution as Darwin against Religion.[6] Nevertheless, James R. Moore's *The Post-Darwinian Controversies*[7] successfully argues that the differing ways in which intellectuals responded to Darwin can be seen as a function of divergent theological commitments.

Darwin only opposes a form of teleology that insists that the purpose for which something was made be evident in history — Darwin claimed that the purpose of history can't be read on its sleeve. Those theological types who insisted on treating history as a single subject with its own goal and who insisted that the purpose of history was evident in its "forward march," introduced a valuational element into evolutionary theory not present in Darwin's theory. If one believes in a loving, good God whose purposes can be seen on the surface of the historical process, then Darwin represents a challenge to Christianity. If a species dies off, God does not highly value it. By contrast, those Calvinists who maintained a connection between God and the world such that God could value things in the world, but at the same time held to a distinction between God and his creation such that God's judgment was not identical with the judgment of history, were able to accept Darwinism in unmodified form.[8]

With this historical point noted, we can face a host of assumptions which Calvinism helps us to

call into question. If a Christian is not committed to a teleological view of the world such as Darwin challenges, then what are the options? Is it necessary to the purposes of God that those purposes be evident in nature? Must human intelligence be understood within a teleological framework? Does God's valuation of humans refer to human intelligence?

I take it as safe to claim that while God does work in history, his purposes are not, thereby, evident even to those whom he uses. God's use of Assyria, Cyrus, and those who crucified Jesus are stock examples. It strikes me as simply absurd to say that God values more highly whoever emerges at a given point in history as the victor — much less that this was his purpose all along. Such historical processes can only be taken as a provisional statement in an ongoing battle between good and evil. Whatever the relation between God's purposes and the actual historical process may be, it would seem difficult to establish any strict correlation. Thus, I am very suspicious of teleological notions of world history based on the claim that God has a purpose for history.

Must intelligence be understood from a teleological framework? I am willing to assume that all operations of the human mind are intentional, that they are directed toward something.[9] I am likewise willing to accept a definition which entails that such intentionality is necessary to "meaning."

This position on the directedness of the human mind, however, in no way entails an Aristotelian teleology or final causation. Dembski, on pages 203-205, simply assumes that intent is the same thing as Aristotelian teleology and then attempts to prove that teleology is necessary to meaning. Even here, were we to grant this unwarranted assumption, his arguments, in opposition to the Parable of the Cube and Huxley's monkeys pounding on the key boards, come up short.

Huxley's argument seems to be that an effect which appears to be the product of intelligence may, given a vast amount of time, result from random processes. According to Huxley, an effect may be greater than its efficient cause. Dembski's first objection claims that there must be an intelligence to judge whether an intelligent product has been created. Without intelligence presumed, nothing can be cut to its measure. Dembski, here, provides a proof not for teleology, but for formal causation. *Hamlet* must pre-exist the monkeys' typing of it and only that original form will provide the standard to judge whether "To be or not to nznxcmnv" actually counts as a line in the play. It does not take Shakespeare to judge whether a bunch of monkeys were able to produce *Hamlet*, it only takes someone who knows the work, or the order of the characters which appear on the page. "Meaning and purpose" are quite beside the point. (If Huxley had argued that his monkeys could produce a work that had the same meaning and purpose as *Hamlet*, then, *perhaps*, we would need Shakespeare to judge.) Monkeys may produce *Hamlet* but, contra Huxley, this does not mean that some form of intelligence is not required, though not as an efficient cause. But, Dembski's first rebuttal of Huxley does not establish a teleology, but only a hierarchy of creation which says that nothing can come to be unless it already exists.

Dembski's second argument against Huxley appeals explicitly to the nature of "meaning and purpose."

> Humans naturally see meaning and purpose in a work of literature like *Hamlet*, just as they see meaning and purpose in the organisms of nature. What Huxley hoped to show was that such meaning and purpose, Aristotle's teleology and final causes, were in fact illusory .... Huxley's example presupposes an intelligence familiar with the works of Shakespeare. At the same time Huxley wants to demonstrate that random processes, the typing of monkeys, can account for the works of Shakespeare. Thus Huxley's example is supposed to show that the *works* of Shakespeare can be accounted for apart from the *person* of Shakespeare. Huxley wants it both ways (pp. 204-205).

He seems, here, to equate meaning and purpose with teleology and final causes. Thus, he now considers the person of Shakespeare and the claim that an author's work can only be explained by reference to the author.

As with the difficulty in relating the historical process to God's intentions, the relation of an "author" to his or her "work" is extremely vague. On the one hand, the "author" may refer to the body which actually, mechanically produces an article. But this can be done by monkeys. On the other hand, it may refer to the creative intelligence which intended to use language in a particular way. Dembski's words seem to suggest a theory which claims that the meaning of a work is identical to the author's intent. Presumably, a bunch of monkeys may produce the proper order of characters on a page, but the work would be without meaning if they did not intend to produce those characters in that order.

Let me note two simple problems with the claim that this sort of intention of an author is necessary to the meaning or value of a work.[10] First, it is particularly difficult when one considers the nature of language which the author employs. The proposition "I say what I mean" is not identical to the proposition "I mean what I say." "Why, you might just as well say that 'I see what I eat' is the same as 'I eat what I see'!"[11] The intention of the author and the meaning of his language are not simply identical. Second, we need to note that human subjectivity and intentions are subject to time. Because human authors change, forget, and work on different problems, it is not clear that they will have any special privilege in getting at the intent of something they may have written years ago. Plato, in his *Ion*, noted that the poets were often the least able to interpret their own poems. Are we to conclude that Plato's poets wrote meaningless poems or that a work loses its meaning as the author changes? Or are we to say that the meaning exists still but we cannot get at this meaning because it is locked in the past in the mind of the author *at the time* he wrote the work? In either case, it is problematic, at best, to claim that teleology is necessary to establish "meaning."

Finally, our last question, does God's valuation of humans (i.e., does being made in the image of God) refer to human intelligence? This, I take it, is still an open theological question. In any case, Dembski does not argue the point.

I have not provided the reader with an alternative notion of value. Rather, my point is simply that Dembski has not proven that, from God's perspective, to be valuable is to be intelligent.

As one trained in philosophy, I find the general thrust of Dembski's article, that one should not confuse philosophy and science, appealing. However, it also seems to me that philosophers ought to have better things to do with their time than patrol their borders looking for illegitimate trespassers. Might not philosophy be better served by expanding its borders through alliances with neighboring disciplines and practices? Many "advances" in knowledge occur outside the field of philosophy. Philosophy tends to arrive late on the scene to assess what, if anything, has occurred which might be assimilated for philosophy. Other fields — in particular artifical intelligence and medical technology — are engaged in projects with *properly* philosophical import. Surely, if philosophy is to advance it will not be by trotting out the old philosophical analyses of causation but through its ability to participate in novelty. ❖

NOTES

[1]I have added the qualifier "most" to this premise. Dembski does not seem to have this qualifier in mind on page 217. He uses the qualifier "only" in the conclusion. If we state this premise in theological terms, however, not only its questionableness but the need for the qualifier is apparent. In theological terms, the premise would read as two premises. (2_a) What is [most] valuable to God is made in his image. (2_b) Intelligence is the image of God. (2_a) needs "most" as a qualifier because the rest of creation is still "good," even prior to the creation of man, according to the first chapter of Genesis.

[2]Does Dembski mean to imply that God is uninteresting to Himself?

[3]"But in the real world it is more important that a proposition be interesting than that it be true." Alfred North Whitehead, *Process and Reality*, Edited by Griffin and Sherburne, The Free Press: New York, 1978.

[4]More strictly, if we read the "come from" of premise (c) as "is caused," and "novelly" as "external" then premise (c) is self-contradictory.

[5]The claim that "nothing can come from nothing" or that "nothing is in the effect which is not first in the cause" is not identical to the claim that the universe is teleological in nature. Parmenides and Plato could ascribe to the first statements but not to teleology. Dembski's *Law of Priority in Creation* only implies a hierarchical structure of the universe in which nothing absolutely new ever appears — for it would violate the principle of causation. A teleological view of the universe accepts this general structure of the universe but tries to give time, movement, and change its due. Thus, things have potencies, characteristics which are not nothing, but which are not actual.

[6]See John Dewey, "The Influence of Darwin on Philosophy," *The Influence of Darwin on Philosophy*. New York: Peter Smith, 1951 (1910).

[7]*The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America 1870-1900*. Cambridge: Cambridge University Press, 1978.

[8]Darwinism did have an impact on theories of the mind. In particular, it heavily influenced William James and, thus, American Pragmatism in general. On this view, the mind is a bodily organ which aids in survival. The fact that we survive may be evidence that it is well suited for dealing with this "blooming buzzing world" in which we live. It need not be the product of another mind. It is interesting to note, however, that James argues for a view of the mind which is intentional. See his *Principles of Psychology*, particularly Vol. II, chapter 28, "Necessary Truths and the Effects of Experience."

[9]By "intentional" I mean that all consciousness is consciousness *of* something.

[10]For some more serious and devastating difficulties with the notion of authorship, see Michel Foucault, "What is an Author," *The Foucault Reader*, ed. Paul Rabinow, New York: Pantheon Books, 1984.

[11]Lewis Carrol, *Alice in Wonderland*, ed. Donald J. Gray, New York: W.W. Norton & Company, Inc., p. 55.

Conflating Matter and Mind

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I've been asked to respond to criticisms of my paper "Converting Matter into Mind" (*PSCF*, December 90). My reaction to these criticisms is this: "Yes, I could have been more careful in some details and choice of terminology, but the substance of my position is unaffected." The critics were guilty of two faults. First was a failure to read my work with sufficient care. Thus I've been charged with, among other things, failing adequately to distinguish cognitive science from artificial intelligence and failing properly to understand supervenience in relation to the hierarchical levels constituting the human person — points I took pains to clarify so as to not be misunderstood. Second was the allegation that I claimed to prove more than I actually proved. Thus Gregory Clark contends that "Dembski has not proven that, from God's perspective, to be valuable is to be intelligent," when such a demonstration was not my intention. In the sequel I want both to recapitulate my arguments and to clarify my motives for writing "Converting Matter into Mind" (henceforth abbreviated CMIM).

My article draws from science, philosophy, and theology. Each of these fields brings a different perspective to bear on the mind-body problem, and particularly on the claim that computation can render a full account of intelligence. I want to examine what these disciplines have to say in turn. Concerning the connection between computation and intelligence, science poses both a theoretical question and an empirical challenge. The theoretical question is this: Given our scientific knowledge of the world, is it even possible/conceivable for computation to encompass intelligence? The empirical challenge is this: If we can build a machine which displays a sufficiently broad spectrum of intellectual abilities, this would prove that computation encompasses intelligence.

The theoretical question is usually answered first. An example will clarify why this is the case. Imagine humans have colonized Mars. We would like to communicate with our relatives on Mars much as we talk to our neighbors by telephone. AT&T wants to make this desire a reality. The empirical challenge confronting its engineers is to construct a device which will allow interplanetary dialogue without time lags. Theoretical considerations, however, demand that engineers renounce this quest since signals can be transmitted no faster than the speed of light, a fact which forces an inevitable lull whenever the speaker changes in an interplanetary dialogue. Theoretical considerations obviate the empirical challenge.

Of course one can always argue that the empirical challenge is unaffected — indeed, if the appropriate device can be fabricated, we may just have to alter our theory. But there comes a point when the empirical challenge must be withdrawn, lest the challenger be relegated to the company of angle-trisectors and circle-squarers. In the case of cognitive science, it is perfectly true that devices like *2001 Space Odyssey's* Hal and *Demon Seed's* Proteus — if actual (and here lies the big qualification) — would fulfill the empirical challenge. But with no such devices in the offing we must leave off the empirical challenge and address the theoretical question. This requires some mental exertion since the empirical challenge is always easier to deal with than the theoretical question. The empirical challenge is utterly straightforward. Can we send a man to the moon? Well, try building a rocketship and sending a man to the moon. In the words of a popular advertisement — Just do it! But when we've racked our brains trying to solve a problem (in this case the problem of artificial intelligence), we eventually ask whether the problem has a solution at all. This is the theoretical question, and it is this question to which much of CMIM is directed.

Is it even possible/conceivable that computation encompasses intelligence? To my mind the very notion of possibility is problematic. In particular we must distinguish abstract from concrete possibility. To see what is at stake in this distinction, consider the following example. Is it possible to factor a given 1000 digit number into primes? An elementary theorem from number theory guarantees that

any natural number has a (unique) prime factorization. Hence it is in principle possible to factor any 1000 digit number. But in practise this is beyond current computational resources. What's more, if factoring is "hard" in the sense of computational complexity, then given the resources available in the universe, there will be 1000 digit numbers we shall never be able to factor. Abstractly, it is possible to factor any natural number into primes. Concretely, the natural numbers we can factor are limited.

Is it possible for the computer to encompass intelligence? This is one formulation of the theoretical question. To explicate this question within CMIM, I had to do two things. First I had to argue that given the inherent finiteness of human behavior, some abstract computer can encompass human intelligence, if only by way of simulation. Such an abstract computer, however, sits in the abstract world of partial recursive function, and is therefore only an abstract possibility. Hence, the second point that had to be addressed was whether a small enough machine can be built which incarnates this abstract machine into the silicon and wire (actually, any physical medium will suffice), an actual machine which captures the full range of human intellectual functioning. Note that I always stressed this full range of intellectual functioning inasmuch as AI has made virtually no progress at this level.

Is such a machine a concrete possibility? This is a sticky question which to date remains unanswered. In the original version of CMIM submitted to *PSCF* I included about eight pages of material on computational complexity which address this question, but which were later deleted. The material was not only heavy going, but also inconclusive. Hans Moravec, for instance, offers estimates which indicate that such a machine is a concrete possibility. Yet the problems facing us are so daunting and our understanding of human intelligence is so incomplete that it is unclear whether a machine which captures human intelligent behavior (if only by simulation) is in fact physically realizable.

The obvious objection which the materialist will now raise is, "Just look at the brain, it's a physical system which captures intelligence. The complexity it evinces is large (10 billion neurons, 10 trillion synaptic interconnections), but not so large that it can't be realized via electronics." (At the time of this writing the word "tera" epitomizes the goal of supercomputer designers: they are after teraflop processors with RAM measured in terabytes; since tera = trillion, we appear to be getting closer to the complexity of the brain. Such estimates are of course crude.) If materialism is correct, then Church's thesis guarantees that computers are the only game in town — intelligence will in this case have to be subsumed under computation. But what if materialism is wrong? What coherent alternatives do we have to materialism? Here we enter the realm of philosophy and theology.

As a scientific question it is an open problem whether computation can capture intelligence: theory to date neither excludes nor demands it; moreover, the empirical challenge is still before us (I never claimed otherwise in CMIM). Philosophical and theological considerations, however, may force us to take a stand. The materialist, I believe, must take his stand with the computer — notwithstanding the objections of humanists who decry the dehumanization fostered by equating man and machine. Moreover, the materialist will argue that alternatives to materialism inevitably introduce some sort of dualism that is incoherent. Thus materialism is supposed to provide the only bona fide intellectual position we can take. Philosophy must now examine the grounds and coherence of materialism itself as well as the constraints materialism places on cognitive science.

Philosophy's work is largely a matter of clarification. Two points in particular needed to be placed under philosophical scrutiny: the question of supervenience and the nature of reality. In CMIM I could not have defined supervenience more clearly, first in plain English and then in terms of higher order logic. NO DIFFERENCE WITHOUT A PHYSICAL DIFFERENCE. I was at pains to show that supervenience is not reductionism. I'm repeating myself because one of my critics clearly missed the point. When a materialist or physicalist claims that mind supervenes on brain he is saying that the brain fully determines the mind. If you will, the mind can do nothing without the brain's approval.

Now my point in CMIM was that the claim that mind supervenes on brain (which is the position of such diverse figures as Jerry Foder, Willard Quine, and Donald MacKay) is not a substantive or empirical claim, but rather a bald assertion which rests solely on materialist presuppositions. Compare this to a reductive analysis which is not only substantive but also eliminative. If we have a reduction of mind to brain then we can dispense with mind and reconstruct it fully, if need be, from the brain. Supervenience, on the other hand, is reductionism without the reduction. It retains the spirit of reductionism without delivering the goods. Perhaps in principle there is a reduction, or in the mind of God there is a reduction, or if we had more paper than

can be packed into the universe we could write down the reduction, but in fact no reduction is on hand. The only way empirically to establish supervenience is to write down a reduction (see CMIM, p. 214). Yet with the mind-body problem no such reduction is available.

The nature of reality cannot be avoided in the mind-body problem. By reality I mean the totality of what exists. Now for the materialist reality comprises the material universe — nothing more. For the Christian, however, reality comprises God and the creation, with the creation (alternatively world or cosmos) itself divided into spiritual and physical. There are two distinctions here: God vs. creation and spiritual vs. physical world. Now the first of these distinctions is robust. Indeed, God is fundamentally other than his creation.[1] The distinction within creation, however, between spiritual and physical world is not robust. It was Descartes' great error to press the distinction between the physical and the spiritual so far that the physical world became autonomous. He did this by defining causality among physical things solely in terms of mechanism. Once this separation was in place, it proved impossible to rejoin physical and spiritual worlds into a coherent unity.[2]

This proved especially bad for humans, who with a foot in both spiritual and physical worlds became irremediably fragmented. Such was the unavoidable consequence when Descartes sequestered the physical world into a strictly autonomous compartment. The classical Christian conception of reality not only allows God and the world to interact coherently, but also permits causal relationships within the world not limited to what Hume might call uniform natural causes. But you ask, how do the physical and the spiritual interact? If in asking this question you demand an explanation in terms of uniform natural causes, then you've decided the issue in advance. The question has no answer in the categories of natural science. Science can explain neither the Incarnation, nor the Resurrection, nor miracles generally. The Christian's reality is richer than the materialist's reality, but it is also a reality that contains mystery, a reality not transparent to scientific inquiry.

Western secularism is so set against what I've just written that I quote the following extended passage. Its content deviates slightly from our main topic, but its form is directly relevant. Writing against idealism and in favor of realism, Etienne Gilson observes:

> Most people who say and think they are idealists would like, if they could, not to be, but believe that is impossible. They are told they will never get outside their thought and that a something beyond thought is unthinkable. *If they listen to this objection and look for an answer to it, they are lost from the start,* because all idealist objections to the realist position are formulated in idealist terms. So it is hardly surprising that the idealist always wins. His questions invariably imply an idealist solution to problems. The realist, therefore, when invited to take part in discussions on what is not his own ground, should first of all accustom himself to saying No, and not imagine himself in difficulties because he is unable to answer *questions which are in fact insoluable, but which for him do not arise.*[3]

What I called the historic Christian position on mind and body in CMIM fits coherently within the historic Christian position on reality. The Christian runs into problems with these positions only when he, like Gilson's poor idealist, tries to answer the materialist in materialist terms.

The materialist asks us to pretend that God does not exist, that all miracles recorded throughout history (Christian as well as non-Christian) are bogus, that all religious experience is a projection of vain desires, etc., etc., and then to meet him in debate. This is not to deny that the Christian shouldn't engage the materialist on purely scientific questions where they are directly relevant to Christian faith. For instance, the empirical challenge of cognitive science still holds (I fully grant that my theology would crumble with the advent of intelligent machines; yet without such machines on the horizon I feel secure in my "archaic" theology). On the other hand, we must bring the materialist to admit how impoverished his reality is and consequently how inadequate his understanding of the world is (e.g., a consistent materialist has nothing of substance to say about value or telos).

Finally we turn to theology. The key theological question for me is not a matter of dogmatic or systematic theology. The key question is a personal one and might even appear impudent. It is this: What must be true about myself and about God for me to want to worship him? To put it more crassly, What's so great about God that I should want to serve him? Why should I want to be with him in eternity? Whenever the torments of hell are described in lurid detail, we are apt to desire God simply to escape pain. Why should God let you into his heaven? is a question heard too frequently. Why should you want to go to heaven? is more directly relevant to our discussion. The answer, Because God is there, is void of content unless we know God. Let me stress that my question is not,

Why should I serve God, but Why should I *want* to serve God? Fearful judgement is, I suppose, reason to serve God, but insufficient reason to serve God willingly.

Frankly, when I consider the way God is frequently portrayed, even in Christian circles widely regarded as non-heretical, I have no desire to spend eternity with him. One God in particular I have no desire to spend eternity with is the God of the semi-materialists (cf. CMIM, pp. 215-219). Let us recall Donald MacKay's recommendation to all good semi-materialists that they "not hunt for gaps in the scientific picture into which entities like 'the soul' might fit." For the purposes of this discussion, semi-materialists are those Christians who hold that mind supervenes on brain. Why is this bad? If God decides to create us as physical systems whose consciousness and intelligence flow strictly from the constitution and dynamics of those physical systems, what's wrong with that? Is our value diminished because semi-materialism deprives us of a spirit or soul (spirit and soul being conceived as aspects of our person whose ontology transcends the physical organism)?

To this last question I answer, Yes. Nevertheless, by diminished value I'm referring primarily to my own, personal valuations, not necessarily to God's. I know my mind and I know what I value. I frankly know very little of God's mind, and I'm loathe to attribute valuations to God except in cases where the valuations I attribute to God are crucial to my valuation of God himself. If humans are no more than carbon-based machines (and here by machines I include any physical system of arbitrary complexity), if God loves and values such machines, if Christ died for such machines, so much the worse for God — I'll look for another religion. I cannot worship any old God and I cannot worship God while maintaining a warped view of myself. A great God can properly be worshipped only by a great creature. Machines are wholly inadequate for the task.

Now in CMIM (pp. 216-218) I formulate an argument which addresses these concerns. It is an a fortiori argument and it works as follows. First I argue that the motion of a single cube within a stationary box is uninteresting unless an intelligence guides the motion of that cube. Uninteresting to whom, you ask? Well, to me for one. An intelligence can use the cube's motion to communicate with me. Communication can be interesting or boring depending on the communicating intelligence, but if there is no intelligence guiding the cube's motion, then boredom is assured. Now I chose the cube-box setup because this physical system is so simple that to claim an intelligence guides the cube's motion requires we look beyond the physical system comprising the cube and box. Here we have the weaker premise of the a fortiori argument, namely that cube watching is boring unless an intelligence not strictly derivative from the physical system comprising cube and box guides the motion of the cube. You may question if I have adequately defined my terms. What do I mean by boring, interesting, or valuable? My usage is perfectly ordinary. I'm through with philosophical analysis. Henceforth, I'm examining a very personal theological question, theological in the truest sense of the word — talking with and about God. Do you grant my weaker premise? If so, we can continue. If not, I have no further argument — you will have to content yourself with my scientific and philosophical analyses.

What then is the conclusion which in true a fortiori fashion is supposed to follow resoundingly from the weaker premise? It is this: God finds even less interesting a physical world where all intelligence this world displays is strictly derivative from the physics of that world, than we do a cube-box system where the cube's motion is guided only by whatever intelligence is already inherent in that cube-box system.[4] Does this argument work? Does it accurately portray what is at stake in human and divine intelligence? Or does it turn on a fuzzy analogy, relating what's interesting to God with what's interesting to humans in the sense of a Freudian projection? The argument does indeed turn on an analogy. Nevertheless, if we mean anything in calling God omniscient, we must grant that God's knowledge of the physical states of the world (past, present, and future) is comprehensive and total. Since our knowledge of a cube's motion inside a box is incomplete, God understands the physics of the universe *better* than we understand the physics of any cube-box system. I'm bored with the physics of cube-box systems taken in isolation. By analogy I claim God is bored with the physics of the world when divorced from spiritual realities. Am I guilty of an egregious anthropomorphism, projecting human values onto a God who wants nothing to do with them, or am I simply as a creature created in God's image discovering a truth about myself (viz., boredom with physical objects taken in themselves — toys as I called them in CMIM) because this is a truth inherent in God (viz., boredom with finitary objects taken in themselves — in this case the physical world)?[5]

If there is a problem, it turns on the type of God-talk we permit, i.e., the type of things we may

legitimately attribute to God. Not only am I comfortable with the a fortiori argument I've made, but should I be convinced that such an argument, and more generally that such God-talk is nonsense, I would dispense with Christianity. Yes, God is transcendent and totally other, but he is also more and better. J. B. Phillips tells the following delightful story:

> A simple psychological test was recently applied to a mixed group of older adolescents. They were asked to answer, without reflection, the question: "Do you think God understands radar?" In nearly every case the reply was "No," followed of course by a laugh, as the conscious mind realized the absurdity of the answer.[6]

Why was their answer absurd? Obviously because God does understand radar. Moreover, he can convince us that he understands radar simply by writing out an explanation of radar on, say, stone tablets (he's been known to do such things in the past).

I have little use for the crude forms of apophatic theology which make the rounds in academia. Thus we are told that all human knowledge of God is strictly speaking impossible, or that to affirm anything about God is to define him and thereby deny him, or that anything we can say about God is at best loose metaphor and analogy, likely to be misleading if pressed too far. All such claims are positive, bold assertions about God and are therefore self-refuting. G. K. Chesterton saw this when he wrote, "We do not know enough about the unknown to know that it is unknowable."[7] Church historian Jaroslav Pelikan indicates that Gregory Palamas understood it as well:

> Apophatic theology did not negate or oppose positive knowledge, for what is said apophatically about God was true. The mistake of conventional apophatic theology, according to Palamas, was that it was not apophatic enough. It needed to recognize that God transcended not only affirmation, but also negation. Palamas attacked those whose preoccupation with the apophatic led them to deny any activity or any vision beyond it. If God transcended all knowledge, he transcended negative knowledge as well as positive knowledge.[8]

This is an appropriate note on which to end. ❖

NOTES

[1]For the distinctions between God and the created order see Robert Sokolowski's *The God of Faith and Reason: Foundations of Christian Theology* (Notre Dame, Ind.: University of Notre Dame Press, 1982).

[2]See Etienne Gilson's masterful William James Lectures, recorded in *The Unity of Philosophical Experience* (New York: Charles Scribner's Sons, 1937), part 2, for a full account of the resulting fragmentation of the cosmos.

[3]Etienne Gilson, *Methodical Realism* (translated by Philip Trower, Front Royal, Virginia: Christendom Press, 1990), pp. 127-128, emphasis added. I think the Apostle Paul said essentially the same thing when he told Timothy, "foolish and unlearned questions avoid, knowing that they do gender strifes" (1 Tim. 2:23). While no question is to be feared, not every question is to be entertained (cf. "Have you stopped beating your wife lately?").

[4]The reader should realize by now that I regard neither of these physical systems, taken in themselves, as incorporating a wit of intelligence.

[5]Cf. John 6:63: "It is the spirit that quickeneth; the flesh profiteth nothing: the words that I speak unto you, they are spirit, and they are life." Interesting that through *words* (Greek *rhemata*) we leave the realm of flesh and enter the realm of spirit.

[6]*Your God is Too Small* (New York: Macmillan, 1961), p. 24.

[7]See G. J. Marlin, R. P. Rabatin, and J. L. Swan (eds.), *The Quotable Chesterton* (Garden City, N.Y.: Image, 1987), p. 336.

[8]*The Christian Tradition: A History of the Development of Doctrine*, volume 2 (Chicago: University of Chicago Press, 1974), p. 265.

It is easy enough to imagine the world without us, scrubbed of cities, clean of our creations, clear of consciousness. In fact, it is often pleasant to do so. A pristine Eden, still uninfected by man. But it is impossible to imagine without a mind. We are able to shape a sphere, marbled and miracled, ourselves erased. But even that image lives only in our mind. Take away the mind and the bubble bursts, dissolves, drifts into inarticulate arrangements.

There are no phenomena without perception, no perception without attention, no attention without desire. Beauty is in the eye of the beholder, says the cynic. Precisely. But he says more than he knows. More elusive than engrams is a code in our consciousness that recognizes beauty when it sees it, that builds it out of molecular movement. But an even more elemental code desires, searches for, insists on beauty.

Virginia Stem Owens, *And the Trees Clap Their Hands*

Two Problems With Torrance

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If Neidhardt correctly represents Professor Torrance's views in "Thomas F. Torrance's Integration of Judeo-Christian Theology & Natural Science: Some Key Themes," *Perspectives*, June 1989, I see two problems. First, there is a question about restricting analogy to a "God-created correspondence" (p. 92, emphasis omitted). If I am to understand that only divinely revealed analogies are binding for theological interpretations, that is no more than to return to the reformers' *sola scriptura* with an irrelevant qualification. Especially when God appears on one side of the comparison, the relationship of the familiar terrestrial experience to the revealed information must transcend logical and ontological levels. On this truism, Martin Buber's "I-thou" and "I-it" distinctions are relevant. His discussion is not normative for theology, but it is explanatory. For purposes of communication, we should have no problem with Patrick's reported use of the shamrock to illustrate the trinity, or butterflies and lilies as symbols of the resurrection. So the restriction of analogy either belabors the obvious or inappropriately restricts its use.

In addition, there are markedly different levels of inspired metaphors. The Father-Son and Father-child comparisons are obviously basic to theology, as the Groom-bride is to ecclesiology. Living stones and mustard seeds are surely less important to doctrinal discussions.

A more difficult problem occurs in connection with note 15 (page 98): hearing is not a passive experience. In addition, the visual experience of reading is not that different from the auditory experience of listening to a speaker. This fact allows me to communicate here rather than looking everyone up to deliver the information orally.

Listening and reading are so automatic, once we have passed the childhood hurdles, that we are not aware of all that is required. The lesson was learned when computers began to have enough memory to contain entire dictionaries. The programmers planned to have translations, say from Russian to English, by a simple process. Input sentence R, let the computer replace the Russian terms by referring to its dictionary, output sentence E. Only it did not work. With faster computers with more memory, they thought to solve the problem by including also the syntactical rules of the two languages, along with more sophisticated dictionaries. The programs still did not work, except for titles and simple captions. It was not merely that the syntax of any natural language is more complex than they first suspected. Investigators came up with a seemingly straightforward sentence: "Time flies like an arrow." It is, however, by the simplest syntactical patterns and assignments, three distinct sentences. The one we immediately grasp is a figurative description of the passage of time. The second states that a variety of flies is fond of arrows. The third commands that the apparatus for flies be set up as it would be for an arrow. We automatically exclude the latter two. On the one hand, we know that, although there are stable flies, house flies, fruit flies, sand flies, blow flies, horse flies, deer flies, blue bottle flies, and numerous other kinds of flies, there are no time flies. We also recognize that a fondness for arrows is not a plausible characteristic of insects. On the other hand, we recognize that we cannot time the usually erratic and unpredictable flight of flies by the techniques used for the regular flight of arrows, with other temporal considerations equally incommensurate. But all such considerations take us beyond language to a comprehensive knowledge of our world.

The upshot of this is the recognition that the listener provides at least fifty per cent of the information necessary to decode an utterance. The requirement normally runs around seventy per cent, and may rise above ninety per cent — when all the phonemes are heard. But phonemes are often mispronounced, omitted, garbled, buried by noise, or otherwise lost. Then the listener must supplement the heard phonemes in order to be able to decipher what was said. However, we do not normally hear phonemes as such. Instead, we hear the larger units as units. Noting phonemes and, usually, separate words in familiar languages, generally requires a special kind of analytical attention.

The problems in reading are essentially similar. However, the reader has the advantage of slowing or stopping at something unexpected, whether the

word is misspelled or unfamiliar. For example, "periodic" is a term in chemistry. But I need to know the context, whether it refers to acids or to a table, before I know its pronunciation and meaning. Pausing and repeating is normally possible orally only with personally controlled recordings.

Years ago many philosophers subscribed to sense data, with the view that the mind receives from the senses shape, color, temperature, tone, loudness, and other sensory bits, each a distinct datum. Many of these data bits, according to the theory, are coordinated by the mind to produce the complex images joined to concepts useful for recognition, communication and understanding. However, as scientists began to understand the levels of processing that go on in the sensory organs, it became evident that anything similar to sense data can be arrived at only by a complicated process of abstraction. Now it is generally recognized that we perceive "things," entities as units. We see chickens and clocks, not bits of sensations by which to construct them.

The theory-dependence of vision is today widely recognized. We tend to see what we expect. We recognize the tendency in the older maps of Mars that showed elaborate canal systems. Unfortunately, the use of language does not preclude the same sort of bias. For example, C.S. Lewis became the subject of theses and dissertations during his life. He noted that he kept receiving earnest letters from serious young students asking if he really meant something or other when, he said, he had been at the utmost pains to reject that view. Unless one exercises extreme care to guard against it, the common human tendency is to assume that someone like Lewis is intelligent enough to see things *my* way. When this expectation is destroyed, amazement is expressed that someone so intelligent did not see things the *right* way — that is, *my* way. What language we hear is forced into a theoretical mold as much as what we see.

What is relevant to theology is not the primacy of one or the other sense, but the matter of communication. It was originally oral in almost every instance. We are so dependent on written material that we do not easily grasp this fact. Yet this is not primary. The revelation, whether spoken or written, is verbal. Even what we recognize as divine lessons and chastisements depend vitally on the message of the prophets, the interpretation. For example, it appears that the writing on the wall was unintelligible until Daniel spoke. They could read the words, evidently, but they could not understand the message.

There is another reason for what seems like the biblical emphasis on hearing. In both Hebrew and Greek, the roots of the terms referring to obedience mean "to hear" or "to listen." But, contrary to the claim that this is a distinctly Hebrew notion, the meaning of *hupakouo* as involving obedience goes back at least to Herodotus, antedating the Septuagint by two centuries. Even *akouo*, though not so translated in 1611, means "to obey" in some contexts. This sense is attested in Homer. So it is not possible to pinpoint when the usage began. Yet this almost absolutely guarantees that this sense was not borrowed by the Greeks from Israel or Judah.

We tend to think of hearing, understanding and obeying as distinct. The original view joins hearing and obeying, so that I have not truly heard God's Word until I practice it. Indeed, understanding is also included. This coupling makes hearing the "sense" that is emphasized. So it is not a matter of the importance of a specific sensory input, but the primacy of making our wills comply with His revealed will.

I have heard contemporary Christians say, "I know the Bible says that. But I don't believe it." This is diametrically opposed to scripturally hearing the Word. The contemporary attitude probably is relevant to our Lord's question, "Will the Son of man find faith on earth when he comes?" (Luke 18:8). God grant that we shall never contribute to such faithlessness, that we shall truly *hear* His Word. ❖

Reflections on Remarks of David F. Siemens, Jr. Concerning the Theology/Science Integration of Thomas F. Torrance

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What does Professor Torrance mean by a *disclosure analogy?* Let me clarify what I wrote in "Thomas F. Torrance's Integration of Judeo-Christian Theology & Natural Science" (*Perspectives*, June, 1989). I don't believe my understanding of analogy contradicts the view of Professor Siemens.

As God's transcendent intelligibility creatively grounds, guides and sustains both the space-time universe and the thought patterns guiding human observers in their interactions with the universe, it might be expected that, as creative theologians and natural scientists reflect upon the objects of their respective disciplines, congruences in conceptual structures would develop. In many cases, it turns out that the theological and scientific conceptual structures that have congruent aspects derive some of their similarity from what Professor Torrance would call their disclosure origin and orientation. That is, they are molded by, and in turn point away from themselves to the object (Subject-Object for theology) of their respective disciplines. Therefore, it is appropriate to develop *disclosure relationship analogies* to model such congruent patterns of thought to enable theologians and natural scientists to better understand the universe they both live in and the personal character of the God who has created that same universe and lovingly entered into it through the *Incarnation Event.*

What is meant by a disclosure analogy? In an ultimate sense theologically, analogy is a *God-created correspondence existing between:* (a) two different objects or relationships of reality, (b) two different epistemological structures representing reality, or (c) an epistemological structure and an object or relationship of reality. Of these, we will be focusing our attention on the last two types. In any analogy there is similarity within dissimilarity, a commonality in the two different entities being compared. There is, thus, in an analogy true but partial likeness or reflection. In the particular case of *disclosure* analogies, the comparison is made across logical domains of reality. They are *heuristic,* exploratory, and discovery-oriented. Moreover, a *disclosure* correspondence between entities of two different logical levels of reality is established. This contrasts with the type of analogy that represents a purely formal correspondence between entities within the *same* logical level. *Relational disclosure analogies* (of great interest to Professor Torrance), thus represent the heuristic *pointing from one domain to another* that occurs *between* similar aspects of the two *relationships* which either represent or constitute the relational structures of the different reality domains. In the midst of all the similarity it is necessary to recognize as well the distinctive character of dissimilarity within the similarity in relational analogies of theology and natural science. Theological relational structures have a much deeper life-transforming and life-directing personal dimensionality than the analogous relational structures of natural science. Thus, when *relational disclosure analogies* are used to make comparisons between the two disciplines, both the similarities and the dissimilarities are heuristically insightful.

In terms of Professor Siemens' other remarks, Professor Torrance argues (as I understand him) that learning to know objective reality involves an epistemological attitude where hearing and seeing-grasping are in symbiotic relationship to one another with the former epistemological mode conditioning the latter. By passive I meant receptive to (or submissive to) an external agency. I did not intend to suggest that auditory experience does not require the ongoing participation of the hearer. The primary thrust of my remarks concern the epistemological attitude associated with hearing and seeing-grasping, not the physical mechanisms by which these cognitive modes take place. Hearing and seeing-grasping function jointly with priority being given to hearing molding one's sight and bodily activity so that one is fully open to the reality beyond being interacted with. This view is in agreement with Professor Siemens' comment that hearing, biblically understood, requires mutual understanding and obedience. This epistemological attitude where hearing has priority over seeing-grasping enables one to better apprehend the hidden intelligibility and

ethical content of reality beyond us. Let me restate the argument of footnote 13 in more concise and complete form.

Creative Human Knowing: A Differential-Relational Unity of Auditive and Visual-Somatic Cognitive Modes

The theologian, Thomas F. Torrance, and the physical chemist, Walter Thorson, have argued that human knowing, particularly as manifest in creative encounters with reality, occurs through differential integration by relational interaction of the basic cognitive modes — auditory and visual-somatic with the auditory mode "awakening and guiding" the visual-somatic modes.[1] Their argument concerning the nature of these cognitive modes as differentially integrated in creative human knowing is now summarized.

Auditory Cognition (Hearing and Listening)

Hearing and listening place primary emphasis on "the other" rather than the activity of the knower. "The objective other" consists of those objects and/or persons that exist externally to the knower. Hearing and listening is primarily a Hebrew notion. Both Old and New Testaments emphasize hearing and listening to the Word of God; the believer listens when "thus says the Lord" is pronounced by a prophet or finally by Jesus, himself. Auditory knowing stresses an attitude of being receptive and responsive to what is coming to us from the "other." Jesus Christ is reported to have said that to truly know him you must become as a little child. This was a favorite quote of Thomas Huxley who argued that a scientist must initially stand as a little child before nature listening to its behavior in a fully trusting, expectant, responsive and open fashion in order to gain insight into the intrinsic order that undergirds physical reality. It is by hearing and listening that we become "tuned in" to a "speech" embedded in reality beyond ourselves. In this manner we become aware of those ultimate commitments which motivate and guide all specific acts of understanding in any given discipline, theology, natural science, history, and so forth. It is by hearing and listening to all human experience (including religious) that natural scientists have developed the strong conviction that behind the rich, complex, regular yet sometimes chaotic behavior of physical reality there are intrinsic patterns of contingent order that can be discovered, i.e., revealed by patient theoretical and experimental analysis with "beautiful" mathematical structure often "faithfully" representing physical reality. Every natural scientist is motivated to formulate specific working commitments of theories by the hope that this ultimate commitment provides. Note also that hearing and listening may allow us to recognize intuitively a specific intrinsic pattern of order, thereby making a specific discovery concerning external reality.

The auditive mode of cognition, listening and hearing, functions only as we are *responsive* and *obedient* to what is beyond ourselves. It may be characterized by two distinctive features:

a. Listening awakens an attitude of awe and humility toward external reality. No deliberate attempt is made to impose our preconceived notions upon the reality being observed. In this receptive mode of cognition we allow external reality to reveal its intrinsic structures not distorted by our attempts to manipulate or alter such structure as would happen if we were to engage in active questioning.

b. The auditory mode allows an intuitive comprehension of reality to develop, intuition being defined by Calvin as "direct knowledge of an actually present object, naturally caused by that object and not by another" (or by one's own preconceived ideas — my comment). In other words, by first listening we allow the object being observed to control our understanding.

Thomas F. Torrance, following Michael Polanyi, defines intuition as "not the supreme immediate knowledge called 'intuition' by Leibniz, Spinoza or Husserl but the inexplicable apprehension or insight to hidden coherences or intelligible order... the spontaneous process of sensing and integrating clues in response to some aspect of reality seeking realization in our minds."[2]

Visual-Somatic Cognition (Seeing-Grasping)

Visual cognition or seeing, a Greek mode of knowing, is an active recognition of form and pattern motivated and guided by one's ultimate commitments to the existence of order and the possibility of finding "faithful" modes of representation of that order whether numerical, geometrical or more qualitative in character. Such holistic pattern recognition is central to theory formulation. It must always be tested against external reality as it is

self-centered and can easily become passive. This testing of pattern may be looked upon as a somatic, primarily grasping process.

Somatic cognition, specifically grasping, a Roman mode of knowing, is controlling and manipulative, being guided by one's working commitments and theories concerning external reality. It is indeed active but can easily become just a form of self expression. Taken together, seeing and grasping allow a knower to discover partial but potentially objective knowledge about reality, such knowledge can be "fed back" to enhance and alter the seeing and grasping process.

Creative human knowing takes place through the differential-relational interaction of auditory and visual-somatic modes of human cognition. In this differential integration, auditory cognition heuristically dominates as the knower truly listens, is fully responsive and receptive to particulars in external reality which in piecemeal fashion serve as clues or tokens of a yet unseen whole. Thus the knower's primary attention is on external reality itself and not on preconceived ideas about it. Accordingly an awareness of new clues becomes possible which awareness of former preconceived ideas would have suppressed.

Incorporating these new clues into seeing, the act of theoretical or contemplative integration of particulars into a whole, makes possible the recognition of new wholes or patterns which may faithfully represent external reality. In natural science such gestalts are often tested by directing "questions" into the form of physical manipulation under controlled circumstances of the physical reality that confronts us, i.e., experimentation. Such physical manipulation is done manually or often with sophisticated mechanical-electronic extensions of our hands, i.e., particle accelerators or robotic devices for manipulating radioactive materials.

In Judeo-Christian theology the testing of gestalts concerning the reality of God occurs as the theologian directs "questions" to God through petitionary prayer and reflection upon God's revelation as witnessed to by Holy Scripture. Often God's reality, as expressed in Jesus Christ's living presence as Subject of subjects (through the Holy Spirit) may "turn around" the theologian's "questions" so that he or she is compelled to reconsider and to alter all conceptual models concerning the Lord of the universe and a proper human relationship to that Lord. Then, God may graciously allow a form of manipulative questioning of physical reality to take place in order to reveal his loving sovereignty toward all creation. That is, God motivates in the believer a grasping of physical reality in a servant context. Through acts of physical grasping performed in meeting the needs of less fortunate creatures (fellow human beings or the fragile ecosystem that God provided for our well-being), the believer comes to a greater awareness of God's loving purpose for the Creation. ❖

NOTES

[1]Specific references to Professor Torrance's insights on the primacy of auditory cognition in its symbiotic relationship with visual-somatic cognition are: Thomas F. Torrance, "Theological and Scientific Inquiry," *Journal of the American Scientific Affiliation*, vol. 38, No. 1, pp. 2-10 (1986). Walter Thorson, "Scientific Objectivity and the Word of God," *Journal of the American Scientific Affiliation*, vol. 36, No. 2, pp. 88-97 (1984).

[2]Thomas F. Torrance, editor, *Belief in Science and in Christian Life*. Edinburgh: The Handsel Press, 1980, "Notes on Terms and Concepts (in particular intuition)," p. 139.

Science and religion are complementary and dialectical. Whatever their histories, neither is logically dependent on the other; and yet neither, despite the integrity of each, is complete without the other. Science discovers intelligible causes, but limps at discovering meanings; religion discovers intelligible meanings, but defers to science about causes. Both are theory-laden enterprises that need ever and critically to review their driving assumptions.

Holmes Rolston III, *Commonweal*, May 22, 1987

Essay Review

The God Who Would Be Known

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Both members of the American Scientific Affiliation, the authors form a remarkable team as they survey the way our modern scientific culture has been compelled to acknowledge the necessity for considering in its development the transcendent dimensions inherent to the universe. Their expertise in widely divergent fields gives both scope and depth to this effort to shape for their readers the state of the art and the crucial problems in the various fields of knowledge that comprise our investigations into the nature of physical reality. John Templeton, financial manager and patron of the Templeton Prize for Progress in Religion, is well versed in the principles of success within the created orders as well as an avid encourager in the redemptive orders of the creation. Robert Herrmann, Executive Director of ASA, is a Professor of Biochemistry and a molecular biologist well acquainted with the nuts and bolts of research and the struggle to gain conceptual power grounded in the empirical world of our experience. They have given their book a ready appreciation for the profundities and mysteries that is much needed in our struggle to create a positive dialogue between Theology and Science. From Big Bang theory to the challenges inherent with the Quantum World, they explore the boundaries of our universe and provide a voice that would call both scientist and theologian to meaningful relations.

Ten chapters are employed to make their argument. The first establishes the unique kind of necessity involved when we would plunge into the depths of created reality. Paul Davies is quoted: "Science offers a surer path to God than religion..." (p.11). The conflict between science and theology is a result of the split between metaphysical and physical dimensions of reality created by both bad science and bad theology. The history of the development of thought shows that the universe does not explain itself to us but rather possesses what the authors have called "signals of transcendence," to which we must now give serious heed. "Our thesis," they write, "is that God is revealing himself in all the immensity of an ever-accelerating pace through the rapid developments of the sciences" (p. 13).

Chapter two attempts to show us how the split between nature and supernature, reason and belief, knowledge and faith, has caused the church to abandon the world to the scientists and the paranormalists. The result was the mythical synthesis between cosmology and theology accomplished by the Middle Ages that led to the determinism and the deism developed out of our belief in a Newtonian Universe. But Einstein's work helped us to overcome this false dichotomy in the foundations of our knowledge, helped us see the necessity of holding together both belief and experience under the real depths of the nature of the universe, and has cleared a path for the advances we have made in recent years. James Houston is quoted as understanding in this development a need to rediscover *nature*, where both personal being and objective experience of the universe shall be significantly grasped as never before in the history of the race on the planet.

In chapter three, the necessity to move beyond the chance-necessity dialectic at the heart of so much of our thinking today is argued. Attempts to think together Relativity Theory and the Quantum World are compelled by more subtle and more real objectivities than what is merely visible. Modern progress through Prigogine, Bohm, and others, points to a unity that must take seriously both transcendent and phenomenal levels of reality. Stanley Jaki and John Polkinghorne are cited as theologians who have appreciated the commanding nature of this necessity. It is in the invisible realms that we must seek for an explanation of what is visible to us, so that the explicate orders of the creation are bound up with the implicate orders that will not allow us to cast nature and its freedom into the strait-jacket of determinism or to drown ourselves in the impersonal immensities of purely random processes.

Chapter four explores the nature of uniqueness in the complex orders of creation. John Archibald

Wheeler and the anthropic principle come into focus here. The strong interpretation of the principle means that this world is to be conceived as the home of the race. Only in the universe that actually is could mankind arise as it has, when the "big questions" are understood as inherent to the nature of things. A unitary view of the universe and God is demanded in which the role of mankind is given a surprisingly meaningful center hidden in the depths of the reality of the creation. This all means that the unseen must be taken seriously as the source and the ground for all that we do experience. Creation and evolution cannot be held up over against each other as opposite conceptions of the actual world.

Then, in chapter five, Herrmann employs his expertise to analyze the great break-through in biologics with the discovery of DNA and argues that, far from pointing us back to deterministic views of the processes that comprise the world, the evolution of biological forms confronts us with a complexity demanding quite new concepts that will deepen our grasp of the rationality and intelligibility in this exciting field. In fact, one might see the 21st century focusing upon the development of conceptual power and attention in this field just as the 20th has become known for its development in physics. The Genome project is a good example, and Herrmann argues that we can say with St. Paul in this advance that "since the creation of the world God's invisible qualities — his eternal power and divine nature — have been clearly seen, being understood from what he has made" (p. 102).

I found chapter six the most satisfying part of the argument. Here, the concept of the contingent nature and rationality of created realities is given some serious attention. Science has been driven to recognize in our time the cogency of this ancient concept. Contingency belongs to the givenness of the creation of God out of nothing and demands that belief and personal knowledge be appreciated together in the foundations of our knowledge of reality. The priority of belief in the way that we face objective truth is bound up with the way things have freely been made to be. The divine freedom to create out of nothing means that transcendent relations are freely bound up with whatever is or ought to be in this world, and this means that *nature* is really the work of the Creator and cannot be grasped with static, antecedent conceptual systems inappropriate to the actual case. The authors point us to Torrance's work. The Scottish theologian has championed an appreciation of the concept of contingency in our time and won the Templeton Prize for his contributions, which helped to establish the Center for Theological Inquiry at Princeton. To follow Torrance in this matter is to be called to penetrate more deeply than ever into the lability of the *nature* of the universe and to discover truly new categories of rationality that take us quite beyond the random-deterministic dialectic employed still today by so many. We must learn to grasp a hidden center of the order of things where real transcendent air can be breathed and this will require, argues Torrance, a fresh appreciation of the divine and contingent orders and freedoms with the power of a conceptual wholeness free from the static reductionism commonly found in the old sciences. "Torrance's recommendation to the scientific community is to be done with the chance-necessity dialectic, and instead see what appears to be accidental as coordinated with a higher order" (p. 114).

Perhaps we are seeing an illustration of this kind of direction when we try to relate the work of people like Prigogine, Bohm, and David Ruelle, where time is sought to be understood as fundamental to both the Quantum and the Relativistic Fields in Physics. Time must be given a much more vital and serious role in our grasp of the *nature* of the universe and its function as an external operator brought into the heart of what physics is. The *nature* of time and space will point us then to something quite beyond our present ability to relate our thought to the actual case that the universe uniquely is.

For me, the force of the argument culminates with this chapter. The authors continue by attempting to expand its implications into areas that involve moral law as well as physical law, where what is and what ought to be may be considered as intrinsic and inherent to the *nature* of the universe. Here, our theory of evolution and our struggle to understand the development of human consciousness and self-awareness in the immensities and complexities of the world compel us into the future, where "the light of the light-giver" may become all the more bright for us (p. 199). That is to say, with the worship of the race shall be found the center of meaning and rationality whose wholeness will allow us to see both the transcendent and the visible dimensions to the unique process that the universe is under God's mighty hand. This is the final assertion of the argument, and we have been brought as readers full circle to the initial contention of the authors that the "signal of transcendence" now being sent us from almost every field of knowledge in our endeavors is real and most worthy of our committed attention.

I had many questions arise throughout my read-

ing of the argument and a deep reservation about the authors' appreciations of the freedom of God in relation with the world; perhaps a theologian's right with scientists who, in the history of thought, tend to think away the significance of the contingency of the world. What is the actuality that is the free relation between a free Creator and a free creature? If the relation cannot be conceived as a necessary one, how may divine and created causes be understood together to give *nature* its meaning and form and content? How shall we then distinguish what ought to be from what merely can be achieved in our future in the world? If revelation and reason cannot be held apart the way we have divorced them in the past, given the kind of evil that we face in the world, how shall we learn to take seriously this category in the depths of our grasp of the intelligibility of the world orders and freedom? Indeed, what is the relation of evil to the argument and to our scientific endeavors? What is the real function of the one triune God revealed in the Scriptures of the Church to the actuality the universe is? With this argument, have we really moved beyond in any serious sense to the compelling nature of the Blessed Trinity of God as the real source of all the rationality and intelligibility in the universe?

I realize that all these questions are bound up with the role and cogency of "natural theology" in the light of God Himself as He has revealed Himself to us in Christ. We are still here talking about understanding natural theology not as an antecedent conceptual system but one which assumes its shape and content from within the divine light of the Word of God. This Word is what we need to hear if my questions are going to be answered, and it is this Word for which our authors have certainly argued, and for this we owe them a debt. Scientists and theologians who want to enter the ever widening scope of our concerns for the relationship between the two fields will find this book true to its purposes — to introduce both to the kind of openness and integrity that will be required for progress to be made, a progress upon which the entire human race depends perhaps more desperately in our time than ever before in its history. I commend it to all really concerned. ❖

All arguments between the traditional scientific view of man as organism,
a locus of needs and drives, and a Christian view of man as a spiritual being
not only are unresolvable at the present level of discourse but are also profoundly boring—
no small contributor indeed to the dreariness of Western society in general.
The so-called détentes and reconciliations between "Science" and "Religion" are even
more boring. What is more boring than hearing Heisenberg's uncertainty relations
enlisted in support of the freedom of the will? The traditional scientific model of man
is clearly inadequate, for a man can go to heroic lengths to identify and satisfy his needs
and end by being more miserable than a Calcuttan.
As for the present religious view of man, it begs its own question,
the question of God's existence, which means that it is not only useless to the
unbeliever but dispiriting. The latter is more depressed than ever at hearing
the good news of Christianity. From the scientific view at least,
a new model of man is needed, something other than man conceived as a locus
of bio-psycho-sociological needs and drives.

Walker Percy, *Lost in the Cosmos*

Book Reviews

PORTRAITS OF CREATION: Biblical and Scientific Perspectives on the World's Formation by Howard J. Van Till, Robert E. Snow, John H. Stek, and Davis A. Young. Grand Rapids: Eerdmans, 1990. Paperback; $14.95.

This book is one of the best resources that is currently available defending the middle ground position between creation-science and evolutionism. Indeed, as chapter 5 of the book explains, the position of the authors (and probably of most ASA members) should not be considered a middle ground composed of a compromising mixture of creation and evolution, so much as a recognition that science and religion have distinct "domains of inquiry" for which each is appropriate. Science and religion offer different (but not contradictory) perspectives, or portraits, of creation. Chapters include: the historical development of the tension between science and theology; an overview of geology, and of astronomy; how scientists do their work; a critique of creation science; and an examination of scripture.

Portraits of Creation is in many respects a continuation of work begun in the earlier book, *Science Held Hostage*, which was reviewed in *Perspectives* (June 1989). Both books were produced by the authors' participation in the Calvin Center for Christian Scholarship. However, the present book differs from the earlier in several important respects:

1. The earlier book was structured as a critique of the creation-science movement and of nontheistic naturalism in separate sections. The present book has a chapter entitled "Critique of the Creation Science Movement" but contains no separate chapter devoted to the criticism of evolutionism.

2. The earlier book contains numerous references, mainly to the scientific literature and to the creationist literature. The present book (especially Chapter 7 by Stek) contains many more references, not only from the literature of astronomy, geology, and creationism but also from theology, philosophy, and the history of science. This makes it a valuable resource to keep around: if I ever need to find a reference in any of these areas, I will probably come here first to look it up.

3. The earlier book was mainly a critique of scientific creationism and was not intended to include a study of scripture. The present book contains a pretty thorough overview not just of the commonly cited "creation verses" but of what the Bible as a whole says about God's activity.

4. The earlier book focused mainly on the current state of affairs regarding creation-evolution controversies. The present book contains a whole extra dimension, as it extensively examines the historical development of the disciplines of geology, astronomy, and Biblical studies. This is an antidote to historical myopia: not only to the tendency of scientific creationists to make it sound like everybody was creationist until Darwin, and then came Henry Morris to the rescue, but also to the general ignorance of history that plagues the modern mind.

At the same time, there is some inevitable overlap in material. In both books Van Till criticizes creation scientists for their championing of the discredited shrinking-sun legend. In both books, Van Till outlines the requirements for competence, integrity, and sound judgment within acceptable scientific practice. In both books, Young provides extensive description of the geology of the Grand Canyon, providing evidence that the "missing layers" of rock are missing because they were eroded away.

Even though this book is intended more specifically than the earlier book as a critique of young-earth creationism, its wording is considerably more conciliatory, calling more for a prayerful resolution of differences than for judgment against young-earth creationists. The authors are very careful to describe young-earth creationists as well-meaning zealous defenders of scripture. This book is if anything too respectful of the proponents of scientific creationism who defend their viewpoints vigorously but carelessly. For instance, on p. 1 Young says, "When interpreted in a woodenly literalistic manner, [Psalm 24:2] appears to claim that the earth rests upon water," and mentions that seventeenth-century Christians in fact believed this. He very graciously does not mention that some modern creationists (see *Creation Research Society Quarterly* 15: 141-147, 1978) still believe this. This graciousness undoubtedly has been partly the result of the recent controversy experienced at the institution that sponsored the study group. However, it also results from the acknowledgement that there really are some very good creation scientists (see pp. 184-185). This does not prevent them from reaching two very clear conclusions, however: scientific creationism "has become a 'sectarian' distortion of science," and is "not solidly grounded in the [Biblical] text" (p. 12). Indeed, Snow presents a closely-reasoned argument that creation-scientists have formed a religious sect (pp. 176-179).

In the past, creation scientists have dismissed most criticism of their work as attacks against true Christianity, and they will probably dismiss this book in a similar fashion without reading it carefully or at all. Was so much careful scholarship (with footnotes that sometimes were more extensive than the text) really needed just to prove the creation scientists wrong? For instance, p. 72 notes that "the sandstone [in the Grand Canyon] is composed almost entirely of quartz grains, and pure quartz sand

does not form in floods." This one statement should clinch the argument, making most of the fifty-five pages of basic geology unnecessary for the narrow purpose of argumentation. However, the fifty-five pages is not extraneous; I learned a lot about geology. For polemic purposes, it is an overkill; for educational purposes, it is very good.

The authors admit at the outset that the book is narrow in its scope because its scientific aspects are limited to geology and astronomy. It is, of course, understandable that they had to limit their task to manageable proportions. But I think the book would have been not just broader but might have reached some different conclusions if it had included a treatment of biology. This is the reason: Stellar "evolution" is inevitable because it is caused by the very same processes that make the stars glow. Geological "evolution" is inevitable because rain falls and soil erodes. To a certain extent, it can be said that Darwinian organic "evolution" is inevitable: natural selection follows inescapably from the occurrence of mutations and from population processes. However, major evolutionary changes in organism structure are not inevitable. Red giant stars have to collapse but angiosperms and birds did not have to evolve. Certainly life did not have to evolve from prebiotic chemical systems. Ontogeny, the development of organisms from the fertilized egg, might be a better biological counterpart to stellar and geological "evolution" than is Darwinian natural selection. The authors are undoubtedly correct that no competent astronomer or geologist doubts the evolutionary view of the formative history of the universe and the planet. There is no need to go outside the network of scientifically investigable processes to explain anything in these formative histories; there are no inconsistent discontinuities. An astronomer, then, can say "the entire empirically accessible universe [is] coherent in the sense of entailing no inconsistencies or contradictions" (p. 143). Many competent biologists, however, do doubt that evolutionary processes by themselves can completely explain the origins of all biological phenomena. Here are found what seem to be discontinuities. Van Till seems to suggest (p. 273) that it is "methodologically inconsistent [to allow] continuity in the formative history of inanimate structures...while insisting on discontinuity in the genealogy of life forms," but such discontinuities may just be there anyway. Here, then, is a challenge that would make a future book from the CCCS team, a book dealing mainly with viewing biology as creation, much more than just a "part two" of *Portraits of Creation*.

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KNOWING THE TRUTH ABOUT CREATION: How it Happened and What It Means for Us by Norman Geisler. Ann Arbor, MI: Servant Books, 1989. 162 pages.

At first we would expect that any book with a title like this one would have to be presumptuous, not because an author should not presume to know the truth, but because the whole truth about creation could not possibly be contained within a book. Most of us would feel more comfortable with an approach more like *Portraits of Creation*, as Van Till and others have done. However, Geisler does a good job seeking out fundamental truths about creation, something which actually can be accomplished within the confines of a small book. He partly fulfills the expectations created by the subtitle; he does a good job telling us what creation means for us, but has not clearly told us (perhaps because it cannot be done) precisely how it happened.

Geisler's descriptions of the natural world are those of the theologian or artist rather than the scientist, but not less valid. Unlike many scientists writing about creation, he does not neglect "spiritual creation," e.g., angels and "the purpose of Heaven." Geisler does a good job explaining, in simple and interesting terms, concepts that seem so obvious to us that we do not even notice them, and which we have so much trouble putting into words. Examples are: "Once a creature, always a creature: the created can never become the uncreated" (p. 9) and "When [God] created finite beings, there was not more being; there was simply more who had it" (p. 9).

First, consider Geisler's discussion of "how it happened." As one would expect from Geisler's other writings, such as *Origins Science*, he begins with a distinction between origins-science and operations-science, which he here calls (p. 9) originating vs. conserving causality, or (p. 30) God's direct vs. indirect action, resulting in singularities vs. regularities. Geisler makes it appear that this distinction is absolute, the categories nonoverlapping. "Rarely ... does the Bible refer to God's work at present in sustaining the world as 'creation' " (p. 27). However, Geisler admits that there are exceptions. He further develops his distinction between origins and operations-science (p. 85). The overall idea is clearly presented and believable but difficult to put into practice. Where do you draw the line? Genetics is an operations science, yet must we use origins science to study the origin of each genotype? And we must remember that forensic sciences, to which Geisler likens origins science, uses uniformitarian principles to reconstruct past events, events that are assumed to *not* be singularities.

I have been repeatedly frustrated by the unvarying tendency in many creationist books to categorize all views of origins as either Special Creation or Atheistic Evolution. It was gratifying to see Geisler take, instead, a *three*-model approach: Materialism, Pantheism, and Theism, each with subcategories and with clear concise summaries and a helpful chart (p. 65). Theism implies creation, in the broad sense, and Geisler then presents his evidences for creation. Again in a manner different from most creationist books, he distinguishes philosophical from scientific evidences. And, again unlike many other writers, Geisler admits Darwin's success at explaining at least the operation of the biological world.

However, some of Geisler's scientific arguments are inadequate, which does not mean that his conclusions

are incorrect. For instance, the analogy of the progressive series of cooking pans with the progressive series of organisms in the fossil record (p. 104) will not work, because organisms, unlike pots, reproduce and have genetic variation within species. And (see p. 102) it is not fundamentally impossible for natural selection to explain the origin of an animal's ability to make preparations to cope with future events.

Second, the consequences of our creatureliness. According to Geisler, such consequences as male authority within the church (p. 121) follow from the acceptance of humans as created beings. But his conclusions do not always follow as simply as he presents them; and he does *not* tackle Paul's arguments that "nature itself" teaches that men should have short hair or that women are naturally gullible.

However, Geisler's description of the ecological implications of the fact of human creation is good. Mankind was created with the ability to choose, and, Geisler implies, this cannot help but give mankind rulership over the rest of creation. Human dominance is therefore not arbitrary but inescapable. To Geisler, the responsibility for the stewardship of creation is tied in with the very basic facts of human creation (p. 17, and chapter 7). "The question men should ask themselves today is this: 'Am I my earth's keeper?' For if I am not the earth's keeper, then ... neither am I my brother's keeper. For it is my brother's earth" (p. 128). A quote good enough to put on your wall.

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Books Received and Available for Review

(Please contact the book review editor if you would like to review one of these books: Richard Ruble, Book Review Editor, 212 Western Hills Drive, Siloam Springs, AR 72761.

P. Ackerman, *In God's Image After All*, Baker
G. Aeschliman, *Global Trends: Ten Changes Affecting Christians Everywhere*, IVP
W. Badke, *Project Earth: Preserving the World God Created*, Multnomah
J. Balswick & J. Morland, *Social Problems: A Christian Understanding and Response*, Baker
M. Coughlan, *The Vatican, the Law and the Human Embryo*, Iowa Univ. Press
W. Drees, *Beyond the Big Bang: Quantum Cosmologies and God*, Open Court
J. Ellul, *The Technological Bluff*, Eerdmans
R. Hazen & J. Trefil, *Science Matters: Achieving Scientific Literacy*, Doubleday
G. Marsden, *Understanding Fundamentalism and Evangelicalism*, Eerdmans
R. Orr, *Life and Death Decisions*, Navpress
J. & C. Penner, *Counseling for Sexual Disorders*, Word
B. Price, *The Creation Science Controversy*, Millennium
R. Shelley, *Prepare to Answer*, Baker
R. Sider, *Rich Christians in An Age of Hunger*, Word
S. Singer, *The Universe and Its Origin*, Paragon
Z. Sitchin, *Genesis Revisited: Is Modern Science Catching Up With Ancient Knowledge?* Bear and Co.
J. Skillen, *The Scattered Voice*, Zondervan
K. Stevenson & G. Habermas, *The Shroud and the Controversy: Science, Skepticism, and the Search for Authenticity*, Nelson
J. Swan, *Sacred Places: How the Living Earth Seeks Our Friendship*, Bear
M. Van Leeuwen, *Gender and Grace: Love, Work, and Parenting in a Changing World*, IVP
M. & L. Wallach, *Rethinking Goodness*, State University of New York Press
J. Walter & T. Shannon, (eds.), *Quality of Life: The New Medical Dilemma*, Paulist Press
J. White, *The Meeting of Science and Spirit*, Paragon House
J. Young, *Sustaining the Earth*, Harvard

CONSTRUCTION AND CONSTRAINT: The Shaping of Scientific Rationality by Ernan McMullin (ed.). Notre Dame, IN: University of Notre Dame Press, 1988. 250 pages, name index. Hardcover; $23.95; Paperback; $11.95.

This book contains the proceedings of the conference *The Shaping of Scientific Rationality* held at the University of Notre Dame in April, 1986. Included are seven papers and an edited version of a panel discussion. The participants in the conference have all had a close association in some way with the Department of Philosophy at Notre Dame.

Each of the papers in this volume deals with the issue of what constitutes rationality in science. In the main address, Ernan McMullin defines this rationality as "the methods employed by scientists as well as the values they try to maximize in the course of applying these methods" (p. 23). These papers do not deal with constraints on how individual theories may differ, then. Instead, they deal with how much the overall goals and methods of science as a general activity can change before it is no longer science. As Gary Gutting remarks in the panel discussion, "...This conference began from the assumption that would surely not have been accepted only a short while ago" (p. 223).

As can be expected from a set of conference papers, there is no one position common to all the papers. McMullin presents a historical overview from Plato and Aristotle to the present to justify his contention that a goal of all science has been to infer unobserved causes from their effects. Richard Rorty, on the other hand, answers the question "Is Natural Science a Natural Kind?" in the negative. Arguing for pragmatism, he claims that anything shared by all branches of science is probably a general feature of culture.

In "Scientific Rationality and the 'Strong Program' in the Sociology of Knowledge," Thomas McCarthy analyzes the claim that the rationality of any given belief should be evaluated only in terms of the overall belief system of the individual holding the belief, without reference to the actual truth of the belief. While arguing this claim is misconceived, McCarthy emphasizes the need for dialogue.

Mary Hesse, in "Socializing Epistemology," highlights some of the problems involved in establishing the social basis of the epistemology of science. Hesse argues for a "moderate" epistemology of science, between the extremes of total realism or of total relativism. She further argues that in socializing the epistemology of science it is possible to maintain the differences between science and other cognitive systems.

Richard Foley, in "Some Different Conceptions of Rationality," argues that the concept of rationality is not the same for all researchers, expecially between such disciplines as the philosophy of science and ethics.

In "Michel Foucault and the History of Reason," Gary Gutting presents the implications of Foucault's belief that the basis of reason should be determined by historical studies, not *a priori*. Gutting maintains that Foucault's historical methods offer an alternative to the traditional attempts to establish a set of fundamental truths.

Finally, in "The Rage Against Reason," Richard Bernstein traces the rise and fall of the belief that reason will inevitably result in the betterment of humanity. While acknowledging that even ideals such as consensus, dialogue, and community can act as straitjackets, Bernstein appeals for a renewed commitment to communication while at the same time "recognizing and respecting genuine plurality, difference, otherness..." (p. 216).

I particularly appreciate the fact that both the physical and social sciences are dealt with in this volume. This book will be especially valuable to those interested in cross cultural studies. Since the authors deal with the nature of rationality, not science, the issue of how to determine what is rational in nonscientific contexts or cultures is raised numerous times. A thread that runs throughout the book should be of special interest to the Christian scientific community—the importance of communication. McMullin sums it up nicely at the end of the panel discussion by stating:

> ...our deliberations here have brought into focus some very deep divisions regarding the present and likely future status of the notion of rationality, whether scientific or not... I will suggest that the conference has shown how people who deeply disagree on fundamental philosophical issues can still remain colleagues and treasured friends over many years. (p. 246)

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

ON BEING A SCIENTIST by the Committee on the Conduct of Science, National Academy of Sciences. Washington, D.C.: National Academy Press, 1989. 22 pages. Paperback; $5.00.

On Being a Scientist aims to pass on to beginning researchers "A sense of the methods and norms of science." In its Preface, Frank Press expresses regret that the transmission of values is no longer assured by informal personal contact with experienced scientists, partly because research teams are getting bigger and the pace of research is speeding up. So, the National Academy of Sciences (NAS) Committee on the Conduct of Science, chaired by biologist Francisco Ayala, has laid out in this magazine-size booklet some important topics a busy mentor might skip over. Graduate students may be encouraged to see science treated as a genuinely human enterprise for a change, but may be sobered to see the prestigious NAS acknowledging that all is not well in the citadel of science.

Charges of publication errors, fraud, and misappropriation of credit in a few highly regarded laboratories have come to public attention. Since public support of research depends on science being done honestly, and on mistakes being routinely identified and corrected, each scientist must maintain ethical standards to safeguard the integrity of the whole enterprise. The NAS Council and President Press obviously intended the booklet not only to instruct young scientists but also to show congressional oversight committees that scientists can clean up our own act without outside interference, thank you.

The first major section (The Nature of Scientific Research) deals with methodology, treatment of data, relation between hypotheses and observations, risk of self-deception, limitations of methods, values in science, judging hypotheses, peer recognition, and priority of discovery. A second major section (Social Mechanisms in Science) discusses such aspects of scientific communication as human error and fraud, plagiarism, and the allocation of credit. A final exhortation (The Scientist in Society) and a brief but useful annotated Bibliography complete the booklet.

NAS has once more dealt with "Science and Something Else." (See the *Perspectives* communication of that title on how the 1984 NAS booklet *Science and Creationism* treated religious matters: June 1990, pp. 115-118.) In general *On Being a Scientist* does a good job, though some of its exhortation to personal and social responsibility may seem hesitant or hollow to Christians whose values are solidly grounded on biblical teaching. Readers who see themselves as human beings first, followers of Jesus second, and scientists third may smile at the admonition that "scientists can no longer abstract themselves from societal concerns." Christians in science have reasons for interacting with nonscientists that go much deeper than "countering misconceptions about the nature and aims of science."

Suggested guidelines for allocating credit, dealing with suspected fraud, and so on, are practical and sound. We should applaud NAS for going perhaps as far as it can go in recognizing the significance of extra-scientific factors in the conduct of science. The American Scientific Affiliation, which shares the responsibility to "explain and defend the scientific worldview," could go much fur-

ther, but nonetheless might use this booklet as a model.

This reviewer recommends *On Being a Scientist* to anyone beginning or even contemplating a career in science. National Academy Press (2101 Constitution Avenue NW, Washington, DC 20418) requests $2 s&h plus the single-copy price of $5; 2-9 copies, $4 each; 10 or more, $2.50 each.

Reviewed by Walter R. Hearn, editor, ASA/CSCA Newsletter, 762 Arlington Ave., Berkeley, CA 94707.

BIOLOGY THROUGH THE EYES OF FAITH by Richard T. Wright. San Francisco: Harper and Row, 1989. 298 pages. Softcover; $9.95.

This book has been produced by the Christian College Coalition in an eight-volume supplemental textbook series. An association of 77 evangelical Christian liberal arts colleges, the Coalition has conducted hundreds of seminars and conferences on curriculum, exploring more effective ways to relate biblical teachings to the academic disciplines. Books in this series, oriented toward entry-level students, parallel information covered by introductory textbooks. From a biblical worldview, each volume examines presuppositions and issues within its discipline. An advisory board, chaired by Yale professor Nicholas Wolterstorff, brings together a committee of scholars in each field. They interact with the author in the light of the manuscript's critique by dozens of faculty at the Coalition's national disciplinary conferences.

Richard T. Wright is professor of biology at Gordon College in Wenham, Massachusetts, with a special interest in ecology. In *Biology Through the Eyes of Faith,* Wright explores the biblical message of creation, relating it to our current understanding of origins and to human responsibility for stewardship of the earth. Brief and clear, each chapter ends with a page summarizing its main points.

The opening six chapters lay a foundation for discussion of biological issues within the framework of four major revolutions: Darwinian, biomedical, genetic and environmental. The concluding chapter spells out activities that should result from understanding biology through the eyes of Christian faith.

The book begins with a cogent treatment of biology in the context of worldview, "a guide to life, a basic set of values that we acquire primarily from our culture." Sketching several current worldviews, Wright shows how every person brings one to the study of science.

Two prevalent philosophies are naive positivism and New Age subjectivism. The former claims that science provides the only real knowledge and holds the key to solving all our problems. The latter, increasingly popular, links science with elements of eastern religions that stress human oneness with nature. The author notes that many scientists misuse science to promote their own philosophy; for example, Carl Sagan opened his popular TV science series with the pronouncement, "The Cosmos is all that is or ever was or ever will be."

Wright defines the biblical perspective on God and his world. God is the Creator and Governor of nature; he is constantly at work in what we call "natural laws,"—our explanation of the forces of nature. The scientific method with its concepts, theories and models, and their limitations are then sketched.

In "Perspectives on Genesis One," the author recognizes two different approaches to the natural world: scientific method and biblical description. He notes the purpose and limitations of each. Genesis One is God's word in nontechnical, nontheoretical language, the way things appear in everyday experience. The narrative, unlike science, is not concerned with means or mechanisms God used to create.

Four models relating Scripture and science are presented: Concordism, Substitutionism, Compartmentalism and Complementarism. Sensitive to faddism in biblical interpretation as well as in scientific theory, the author gives reasons for choosing the last. It would have been helpful, however, if he had made it clearer that any attempt to discover scientific data and explanations in the biblical records is fundamentally misguided. Six pages devoted to discussing variations of that approach could better show how Genesis One radically affirms monotheism versus every kind of false religion (polytheism, idolatry, animism, pantheism and syncretism); false philosophy (naturalism, ethical dualism, materialism and nihilism); and superstition (astrology and magic). When we import into a biblical text our own agenda, e.g., scientific questions, we muffle the *author's* message and its application to current issues.

After dealing with problems concerning the origin of life, the author sketches the Darwinian Revolution of the last century and its current status. In describing the Biomedical and Genetic Revolutions he outlines problems created by the success of research, and the components of ethical systems for the control of its use. Christian biologists need to work out biblical ethical guidelines in this area and apply them consistently. The Environmental Revolution, involving interdisciplinary study, raises two critical questions about the future of the earth: What needs to be done? Why should we do it? Christians need to discover and apply biblical truths regarding human responsibility toward the creation.

The final chapter offers a challenge to understand biology through the eyes of faith as more than an intellectual exercise. A Christian worldview, based on commitment to justice and peace, undertakes to reform the culture and care for the creation.

Reviewed by Charles E. Hummel, 17 Worcester Street, Grafton, MA 01519.

DISCIPLESHIP OF THE MIND by James W. Sire. Downers Grove, Illinois: InterVarsity Press, 1990. 200 pages, notes, bibliography, index. Paperback.

Jim Sire is campus lecturer for the InterVarsity Christian Fellowship, a senior editor for the InterVarsity Press, and the author of previous books, of which *The Universe Next Door* is of particular relevance for this new book. The jacket says,

> Christians who are serious about their faith want to love God with all that they are—heart and mind and strength. Books abound on the devotional life, on commitment, on evangelism and practical Christian living, but few take up what it means to love God with our minds. How do we learn to honor God in the ways we think?

The book is aimed particularly at college and university students, but its content has value for every Christian who has thought about this question, or who would like to begin thinking about it. It works from the realization of the importance of one's worldview and encourages the reader to think about a variety of issues "worldviewishly."

The book is organized around the answers to seven questions, whose answers require some thought.

1. What is prime reality—the really real?
2. What is the nature of external reality, that is, the world around us?
3. What is a human being?
4. What happens to a person at death?
5. Why is it possible to know anything at all?
6. How do we know what is right and wrong?
7. What is the meaning of human history?

Throughout the book the author provides suggestions and guidelines for the development of an appropriate attitude for truly living out a Christian life in the midst of adverse culture and surrounding. There are many practical issues that the book does not address at all, or deals with in ways that do not reveal some of the complexities or conflict in different views. What Sire gives here is a valuable way to think about thinking. It is not the end of the road, but the beginning.

Along the way Sire treats us to a review of worldviews; the interaction between individualism and community; a foundation for the possibility of human knowledge; the relationship between knowledge, belief, and obedience; a Christian basis for ethics; a detailed analysis of technology and a Christian response in a technology-dominated day; integration of Christian faith and academic disciplines; understanding culture through literature, television, newspapers and other print media; the significance of the full Gospel and the role of the Church in it. In an Appendix, Sire offers 18 suggestions for Christian students in a secular university.

As might be expected of any book of this scope, a few questionable remarks appear here and there in usually peripheral places. The father's answer to his son's question, "The law of gravity holds the world in place" (p. 37), is not a very good answer since physical laws are the *cause* of nothing. A remark linking pantheism and the defense of the lives of baby seals and whales (p. 46) might be interpreted as a criticism of the environmental movement. Care must be taken in describing the universe as "a uniformity of natural causes in an open system" (p. 50), or a "system in which God himself may act" (p. 142); it is a system that exists only because of God's continuous action. Although it is true that "The structure of the relationship between a falling body and the earth was not invented by Newton when he formulated the law of gravity" (p. 87), his description in terms of the law of gravity was his invention. Advice to students No. 18, "Don't worry about grades" (p. 199), may be easily misunderstood by students; there are educational environments in which grades are a reflection of genuine education.

But these are only aberrations on a stimulating text. Sire is at his best when he says,

> The *gospel* is not a stripped-down message of personal sin and salvation. It *announces the kingdom, the reign and the sovereignty of God over all nature, all nations and all human lives.* Jesus Christ is Lord over all. His kingdom values should permeate our political, social, educational, entertainment and business networks and systems. (p. 189)

I hope to use the book in teaching and recommend the same to you.

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

THE LIVING EARTH: The Coevolution of the Planet and Life by Jon Erickson. Blue Ridge Summit, PA: Tab Books, 1989. 200 pages, index. Paperback; $14.95.

The Living Earth is one of five books in the Discovering Earth Science Series written by geologist Jon Erickson. This book is a concise overview of earth science as it relates to the history of life on the earth.

The book begins with a brief discussion of the Big Bang Theory and the formation of galaxies, stars, the solar system, and the earth. The next five chapters describe the basic evolutionary scheme from primordial life through the emergence of humans. The remaining seven chapters are devoted to various topics such as the ice age, internal processes of the earth, and continental drift. One chapter gives a good summary of various theories of the extinction of dinosaurs and other organisms. In the final chapter the author discusses some environmental problems facing us today, such as acid rain, pollution, and the loss of rain forests.

The book was obviously written as a brief introduction for general readers. It is nontechnical and would

provide a good overview of the subject for a reader with some knowledge of science. The publisher has recently come out with a series of books for use in high school science courses and this book is written at about the same level.

A bibliography divided by chapters provides a source of additional reading for interested persons. Most of the listings are general books and more popular science journals and magazines.

Reviewed by Phillip Eichman, Ball State Univ., Muncie, IN 47304.

AHEAD OF THE CURVE: Shaping New Solutions to Environmental Problems by Robert E. Taylor. New York, N.Y.: Environmental Defense Fund, 1990. 111 pages. Paperback.

This little booklet, written primarily to provide public relations for the Environmental Defense Fund, is still an excellent brief summary of the major environmental problems and ways of dealing with them. The author is a veteran reporter for several major newspapers.

First, in very brief form, are summarized the nine areas of present concern, the goal for the decade, and ways for the individual to help. These areas are the Greenhouse effect, wildlife and habitat, ozone depletion, rainforests, acid rain, Antarctica, toxics, water, and recycling.

Each chapter of the book following this introduction gives an inside perspective on recent events in the environmental movement. The major topics covered include the birth of environmentalism, getting the lead out, catching shrimp without killing turtles, recycling, global warming, preservation of the rainforests, acid rain, air pollution, alternative energy sources, and water conservation.

It is the goal of the Environmental Defense fund to come up with innovative, practical and creative solutions to these problems, not merely to protest and complain. Christians ought to at least know something about these issues and be making changes in their lifestyles if that would become part of the solution.

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

VITALITY THERAPY by Dennis L. Gibson. Grand Rapids, Michigan: Baker Book House, 1989. 189 pages. Paperback.

Most of us have acquaintances and coworkers who periodically face crises in which we would very much like to offer meaningful assistance. Writing as a seasoned counselor, Dennis Gibson has provided us with an engaging and valuable resource. This book should appeal to a wide readership of concerned people who are educated and sensitive, but who lack specific training in counseling methods.

In one sense, the book is very focused. The author unapologetically endorses a cognitive approach to therapy, one which while widely used, is by no means the exclusive choice of experts. Further, he makes it clear that he is not speaking to professional colleagues. The fact that there are relatively few scholarly references in the book (the entire list of sources fits on a single page) suggests that this work will probably cover ground familiar to most therapists, having apparently grown out of the author's own training and experience. Rather, the book is directed to the concerned person wanting to assist someone grappling with moderately serious adjustment difficulties.

Given the audience to which he writes, the author has wisely incorporated many concrete examples of the techniques he discusses. This inclusion of a generous supply of illustrative applications, culminating in the final chapter of the book with a complete and annotated transcription of a typical counseling session, is a major strength of the book. It will enable those with little or no training in psychology to readily grasp the principles advanced and the reasons for their value. In small but effective ways, such lay counselors can begin to experiment with the simplest of these methods in daily interactions with people, and can thereby deepen their understanding of the techniques and sharpen their skill in applying them.

The author begins by presenting basic approaches such as building up the person's confidence and optimism through encouragement and communication of esteem, helping the person to identify a solution strategy already in use in another area of life, and expressing the problem in terms of a different and more positive verbal label. Later in the book he introduces more sophisticated techniques which would best be implemented by someone with considerable counseling experience. These include dealing with unfinished grief processes, challenging the illogical assumptions in back of a person's refusal to take appropriate action, and using visualization to facilitate healing. This last method is probably the most controversial of the techniques the author proposes, and it is also the one he takes the most trouble to defend. Along with making a good case for its legitimacy, however, he discretely acknowledges that not everyone will be comfortable with this approach. The reader is invited to make his or her own decision.

I have two reservations about this book. The first relates to the relative scarcity of references to the existing literature on counseling. While this is perhaps understandable given the intended audience, it leads me to question whether the author's unique experience (as portrayed in these insights) will prove valid for someone else. Secondly, while there are numerous references in

the book to passages of scripture, some of these seem to reflect an attempt to justify the technique under discussion to a Christian audience rather than to hammer out a uniquely biblical perspective on short-term counseling.

Having raised these concerns, I want to make it clear that I very much appreciate the author's tone. He comes across as someone simply desiring to share with another the methods he has found useful. Furthermore, the book's contents are highly practical and very clearly presented. As one lacking explicit counselor training, I have found it valuable, and would recommend it to any pastor or educated layperson who finds himself called upon to function in a counseling role, advising, encouraging, and confronting others during their times of difficulty. I fully expect that application of the insights presented will equip such people to more effectively serve the troubled individuals they encounter.

Reviewed by Harold Faw, Associate Professor of Psychology, Trinity Western University, Langley, B.C. V3A 6H4.

SLEEP, DREAMING, AND SLEEP DISORDERS by William H. Moorcroft. Lanham, MD: University Press of America, 1989. 369 pages. Softcover and Hardcover; $19.75, $37.50.

Moorcroft developed an interest in studying sleep in 1971 after attending an international meeting on the topic in Europe. Subsequently, he started a sleep research laboratory at Luther College where he is a professor of psychology. He has gained further knowledge about sleep by his association with the Sleep Research Society, the Association for the Study of Dreams, Rush Medical School, and Mayo Medical Center's Sleep Disorders Center.

In textbook fashion, Moorcroft presents the latest research and theories about sleep, dreaming, and sleep disorders. This book would be suitable for use by college students or by anyone who is curious about sleep and its ramifications. Subjects discussed include sleep labs, sleep phenomenon, animal sleep, dreams, dream theories, sleep disorders, and sleep's function. The book concludes with a helpful chapter of questions and answers, 23 pages of references, and a subject index. There is a lot of fascinating information in a readable style here. Omitted is a discussion on the relationship between sleep and religion. However, the way humans spend a third of their lives is thoroughly considered. I recommend this book for anyone who desires an excellent summary of current knowledge about sleep.

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

CITIES: MISSION'S NEW FRONTIER by Roger S. Greenway and Timothy M. Monsma. Grand Rapids: Baker Book House, 1989. 321 pages, Index. Softcover.

Both authors have exceptional backgrounds for writing this book. Greenway is professor of world missiology at Calvin Theological Seminary and has authored similar books. Monsma is executive director of the Institute of Global Urban Studies and has also written several books.

This book contains 20 chapters. At the end of each chapter there are discussion questions, most of them rather penetrating, and they should create a lot of interactions within a group. There is a 53-page bibliography, divided into sections: General, Africa, Asia, Latin America, and a comprehensive category including the United States, Canada, Europe, Australia, and New Zealand. Each has a subsection of two categories: mission perspective, and social science perspective. The bibliography is worth the price of the book! There are 11 illustrations and four tables.

"Students of missions will need to wrestle with urban issues if they are to be prepared for ministry in tomorrow's world." This is the premise of the book, and the authors strive to document the validity of the statement. They first offer a global view, and focus on new dimensions of ministry. These issues are explored as they apply to the countries noted in the bibliography. Often concern of the mission minded laymen for cities is limited to the immigrant population in our country. However, the authors go beyond this view, and provide stimulating thought for cities of the world.

The authors are not afraid to get into difficult topics. Research as tool for evangelism is covered, with some of the guidelines to do it. In the chapter on church-state relations, they suggest that the full-time worker should not run for office. Suggestions for conduct in political relationships are made. They also discuss the problem of bribery, which is a thorn for every missionary. Prostitution is also investigated, giving some of the reasons for women being involved.

In view of the rapid growth of cities in the third world, and the internationalization of cities in other countries, it "is no exaggeration to call cities the new frontier of Christian missions." The old concept of the pith helmet and walking shorts as being descriptive of the missionary is out of date. While the returned missionary often shows pictures of the unusual countryside and villages to create interest, he may now be required to wear suits, minister to the educated and the wealthy, as well as the poor and minimally clothed persons.

The entire book is too extensive to provide more coverage, and must be read to gain adequate understanding. One chapter relates to the overcoming of racial and ethnic barriers, using Luke as a guide. Antioch is used as a model for urban church development. The authors start with the naming of "Christians," as bond slaves of Christ. They point out that currently, minimal

growth is due to the lack of true discipleship and the inadequate continued sharing of Faith by teaching and example. "No honest and informed observer can deny that the supreme need of the church is a radical rediscovery of what it means to be a Christian."

But the Antiochians also had compassion for the poor. If we are to follow this model, there must be a concommitant care for the social aspects of people.

In a way, this is a disturbing book, but also is challenging to each of us, to pray, and use our efforts to aid this type of ministry. It would be especially useful in small group discussions and in classrooms, where the topics could be explored in greater detail.

Reviewed by Stanley Lindquist, Professor of Psychology Emeritus, California State University, Fresno, CA 3710, and President, Link Care Foundation.

SO GREAT SALVATION by Charles C. Ryrie. Wheaton, IL: Victor Books, 1989. 154 pages, glossary, Scripture and subject indices. Hardcover; $12.95.

Within American evangelicalism there is at present a potentially explosive discussion over the nature of saving faith. Commonly called the "Lordship salvation" debate because the central issue revolves around the question of whether one must surrender or commit to the Lordship of Jesus Christ in order to be saved, it seems thus far only to have produced works of varying degrees of estrangement among the three leading figures: John MacArthur, (Pastor of Grace Community Church in California and author of *The Gospel According to Jesus*) an advocate of "Lordship salvation," and his critics, Zane Hodges, former Professor of New Testament at Dallas Theological Seminary and author of *Absolutely Free*, and Charles C. Ryrie, (now retired Professor of Systematic Theology at Dallas Theological Seminary).

Of the three, Ryrie's book is the least polemical, a fact that could have been a strength, but which in this case reflected a general lack of vitality. This could have been the result of the very simple diction of the work (it is apparent that he was aiming at the broadest possible audience) but I suspect it is just Ryrie's style.

An early chapter called "Semantics Alert" sets out the basic agenda. Ryrie is disturbed by the great diversity of "expressions of the Gospel," i.e., instructions on "how to be saved" as set forth in the writing and preaching of contemporary (but unnamed) Christians. His concern (and purpose) is that "we sharpen our understanding of what the Gospel is about so that we can present it as clearly as possible, using the right words to herald the good news correctly" (p. 26). Most of the chapters that follow are discussions of some of the "crucial words" relative to salvation, among which are the Gospel, fruit(s) (of salvation), carnality, Jesus' Lordship, repentance, faith, justification, sanctification, and security. We shall look briefly at his treatment of the Gospel and faith, some of the most crucial issues in the debate.

Ryrie avoids the problem of the diversity of "expressions of the Gospel" in Scripture by several theological maneuvers. First, he follows the typical dispensational line that the "gospel" in the Gospels is generally "good news about the millennial kingdom" (p. 38). Thus, one must turn to Paul to find the "precise definition" of the Gospel for us today. Then within Paul, Ryrie singles out 1 Corinthians 15:3-8 as the text that contains the "complete Gospel." His justification for such narrowing is that "the [one and only?] issue in reference to the Gospel ... is, How can my sins be forgiven?" (p. 40).

We thus see that Ryrie's focus is not on the breadth of salvation, as his title might imply, but on only one aspect of it. While the forgiveness of sins is certainly an essential part of the Gospel message, it is clearly not the whole message. Based on a distinction made by Alister McGrath (in both *Iustitia Dei, Vol 1,* and *Justification by Faith*), it seems that Ryrie has confused the *concept* of justification (a single Pauline metaphor of salvation) with the *doctrine* of justification (the full picture of what God is doing to right the world). The result of conceiving the Gospel in such minimalistic terms, is that it requires only a minimal response: the only thing one must do in order to obtain the gift of eternal life is believe that Jesus died and rose again from the dead for our sins.

Does Ryrie believe that faith is (merely) intellectual assent, as his critics contend? I would say that he definitely leans toward such a view, but when he gets too close he draws back. For example, when he seeks to deflect his critics on this point, he presents their criticism in such a way that he can focus on the overstatement: "The Gospel is a sterile set of facts to which we need only give intellectual assent in order to be saved" (p. 29). As Ryrie notes, what makes this a "straw man" is the use of words like "sterile," "need only" and "intellectual assent." These excesses then allow him to define faith as "be convinced of something" or "to give credence to" (p. 30), both rather intellectually oriented definitions. However, in the next line he does say that faith involves " 'putting one's trust in' the Gospel," but unfortunately he never tells us here what he means by this.

He attempts such an explanation in a later chapter titled "It's Not Easy to Believe" when he describes the various aspects or dimensions of faith. He says first: "faith has an intellectual facet"—one must know the facts of the Gospel. "In addition, faith involves assent or agreement with the truth of those facts.... But faith also involves an act of the will, for we can decide either to obey or to reject God's command *to believe*" (p. 119, emphasis added). Ryrie believes he is following fairly standard theological distinctions here, and he cites Charles Hodge as a parallel example. What he fails to note is that Hodge clearly distinguished his third facet, trust or reliance on the facts of the gospel, from assent, something Ryrie did not do. However, in the discussion that follows, Ryrie does in-

SEARCH

Scientists Who Serve God

Biochemist Known for "Humanity, Scholarship, Research"

Gordon C. Mills is Emeritus Professor of Human Biological Chemistry and Genetics at the University of Texas Medical Branch (UTMB) at Galveston. Before "hanging up his lab coat" in 1989, Mills had published some 70 research papers, taught thousands of medical students, and guided a number of young biochemists toward their M.A. and Ph.D. degrees. In 1987 he received the annual John G. Sinclair Award of UTMB's chapter of Sigma Xi, a national organization promoting scientific research. The award honored Mills for his contributions to "Humanity, Scholarship, and Research."

From Milking Cows in Nevada to a Ph.D. in Michigan

Born in 1924, Gordon Mills grew up on a farm his father had homesteaded near Fallon, Nevada. The 80 acres Percy Mills leveled and planted in alfalfa around 1920 were part of the first reclamation project to use irrigation water from the Sierra Nevada mountains. Both of Gordon's parental families had come from the east coast via the midwest, and, like earlier pioneers, brought with them strong family traditions. Gordon and his siblings heard a lot about education from his school teacher mother and aunt. The children absorbed a love of plants and animals from grandparents and other kinfolk. Gordon followed his older brother Al in work on the farm, in athletics, and then to the University of Nevada at Reno.

After his brother majored in chemistry at the university and liked it, Gordon chose chemistry too. A bad farm accident two days after high school graduation put Gordon in the hospital and into contact with interns and residents. He began to consider a medically oriented career, so he sandwiched some biology courses into his crowded chemistry curriculum. After receiving a B.A. in 1946, he began graduate work in biochemistry at the U. of Michigan, where he earned both M.S. and Ph.D. degrees.

The Human Side of a Scientific Career

Hard work on the family farm was good preparation for graduate school. Gordon assisted in the medical student laboratory (under fellow student Stanley Cohen, who later won a Nobel Prize), studied for qualifying exams in various branches of chemistry (plus French and German), took biochemistry graduate courses, and began his own studies of hemoglobin catabolism. After receiving his doctorate in 1951, he became a research associate at the U. of Tennessee Medical School in Memphis, where he stayed until joining the UTMB faculty in 1955.

Mills has always found time for outside activities. On his way to Michigan the professor who offered him a ride impressed him by reading a chapter from the Bible each night in the motel. Mills feels that participating in various Christian groups as a student contributed to his personal and spiritual growth. At the Michigan Christian Fellowship he met a charming young woman named Mary Jane Medlin. They married in June 1947, at a time when housing for married couples was extremely scarce in Ann Arbor in the post-WWII era. They moved to Memphis in 1950 with a 2-month-old son, and had another son and daughter by the time they moved to Galveston.

Besides raising a family, Gordon and Mary Jane have found time to teach Sunday school classes and to invite students into their home. It is fitting that Professor Mills has been honored not only for his scholarship and research but also for being a well-rounded human being. Ω

Scientific Investigation

Biochemical Studies of Disease

INFORMATION ON UTMB

In 1991 the University of Texas Medical Branch (UTMB) at Galveston celebrates its centennial year as the oldest state medical school in Texas. Texas now boasts a half-dozen medical schools, but in 1891 the university's sole "Medical Department" began with 13 faculty members and 23 students.

Today, its 64 acres house 71 buildings (including seven hospitals), with more than 2,000 students enrolled in UTMB's four schools and two institutes. With an annual budget in excess of $388 million, UTMB is the fourth largest public employer in the whole Houston-Galveston area (which includes NASA's Lyndon B. Johnson Space Center between the two cities).

Galveston, a barrier reef island discovered in 1528 by shipwrecked explorer Cabeza de Vaca, gets its name from Count Bernardo de Gálvez, Viceroy of Mexico in the 1700s. It is famous for sandy beaches, sea breezes, and history—from the days of pirate Jean LaFitte (who built a mansion there), the Civil War (which left some cannonade scars still visible), and a disastrous 1900 hurricane.

The city of Galveston is a busy port from which cotton, cereal grains, and sulfur are shipped around the world. From UTMB one can look out across the Strand toward the docks where trawlers of the Mosquito Fleet unload their daily catch of shrimp.

Blood is red because certain cells (erythrocytes) have an oxygen-carrying pigment called hemoglobin. When the protein "globin" part breaks down, the "heme" part is converted to bilirubin, a yellow pigment found in bile. As a graduate student, Gordon Mills searched for the enzymes that catalyze such reactions. He didn't find them, but he did find in red blood cells a protein called "EF" (for "erythrocyte factor") that could *prevent* the oxidative breakdown of hemoglobin. To carry out its protective action, EF required a small sulfur-containing tripeptide known as glutathione.

"Serendipity": Finding What You're Not Looking For

At Tennessee, Mills worked with John L. Wood on the fate of various "aromatic hydrocarbons" in the animal body, an important topic because some such compounds were known to cause cancer. Using radioactive sulfur (chemical symbol S), he traced the linkage of a particular aromatic compound to the S-containing amino acid cysteine. Later, other investigators found that the enzyme responsible for that reaction made use of Gordon's old friend, glutathione (which contains cysteine).

At UTMB Mills returned to his studies on EF with a grant from the National Institutes of Health. Discovering that EF was a unique enzyme catalyzing the reaction of glutathione with hydrogen peroxide, he renamed it glutathione peroxidase. Today (30 years later), several books and hundreds of papers have been written about that enzyme, which led to the study of other protective enzymes. To almost everyone's surprise, glutathione peroxidase was found to contain the element selenium (Se), the toxic principle of "loco weed" but now recognized as an "essential trace element" in nutrition.

Blood Chemistry and Genetic Disorders

In the 1960s and early '70s, Gordon Mills turned his attention to other metabolic processes in red blood cells. He separated and determined phosphate esters by chromatography on the newly available synthetic ion exchange resins. His studies contributed to better procedures for storing human blood, which had been based largely on trial and error before that time.

Working with UTMB hematologists, Mills studied erythrocytes from patients with a wide variety of genetic blood disorders. For example, a patient with a rare abnormal hemoglobin (Hb Sabine) suffered rapid erythrocyte breakdown. Patients with a deficiency of the enzyme glucose-6-phosphate dehydrogenase (G6PD) often showed hemolytic anemia on treatment with various medications, sometimes losing half of their red cells in a week. Mills was able to identify the abnormal enzyme in four new genetic variants of that disease. His earlier work on glutathione peroxidase helped him show that the anemias resulted from inability of G6PD-deficient erythrocytes to detoxify hydrogen peroxide. The peroxide was produced when the medications were oxidized.

Mills was also able to do metabolic studies on a number of children afflicted with severe combined immuno-deficiency (SCID), including David, the famous "Bubble Boy" in Houston, who was kept alive to age 13 in a sterile environment. Gordon Mills is glad to have contributed to the understanding of SCID, the first genetic disorder for which approval has recently been given for treatment by gene transplantation. Ω

Left: Entrance to the UTMB campus. **Right:** From the Medical Branch one can see the docks where Galveston's colorful Mosquito Fleet ties up.

Professor Mills sometimes jokes about how much has changed during his 34 years at the U. of Texas Medical Branch — including the name of his department (formerly Dept. of Biochemistry & Nutrition) and the names of its faculty. (He denies a rumor that Jean LaFitte was department head when he arrived.)

Faithfulness on the Job

Doing research in academia includes applying for funds from government agencies like N.I.H. or private agencies like the National Foundation-March of Dimes, both supporters of Gordon's work at one time or another. Grant funds must be accounted for and regular progress reports written. Scientists must keep up with the current literature to be sure they're using the best techniques and not needlessly duplicating the work of others. It takes time to advise grad students and guide them through the academic bureaucracy, then to write letters of reference when they're ready to move on.

Using an ion exchange column and fraction collector to separate metabolites from human erythrocytes.

Teaching means more than preparing lectures and lab sessions, and grading papers — though those are time-consuming tasks. Mills served on departmental committees dealing with curriculum, policy matters, selection of new faculty, promotion & tenure, faculty travel, safety, and what-have-you, besides some 30 individual graduate student committees. For the Medical Branch as a whole, he shared responsibilities for grading & promotion evaluation, animal care, and supervision of an interfunctional laboratory for teaching basic medical sciences to both med students and grad students. He also gave special lectures to interns and students in blood banking and other health-related curricula.

Faithfulness in Many Other Matters

Senior scientists serve their profession by refereeing manuscripts for publication, by reviewing technical books, and in other ways. Christians in science generally bear other responsibilities as well. For example, Mills has been a faculty advisor for chapters of the Baptist Student Union and Christian Medical & Dental Society at UTMB.

Gordon Mills has also brought his professional expertise to bear on some questions he cares about as a Christian. In *Perspectives on Science & Christian Faith* (formerly *Journal of the American Scientific Affiliation*), he has written about the evolutionary significance of species variation in cytochrome c structure (1968), the significance of the synthesis of biologically active DNA (1968), hemoglobin structure and the biogenesis of proteins (1975), chemical evolution (1979), and presuppositions of science as related to origins (1990).

In those papers, Mills contends that the whole macro-evolutionary scheme goes far beyond the evidence. He cites a statement about that scheme by Nobelist Hans Krebs: "It is based upon acceptance by faith of fundamental presuppositions." Krebs, the biochemist who worked out the famous metabolic cycle bearing his name, insisted that "Hypotheses must not move very far from the facts." Mills agrees.

In many passages, the New Testament encourages Christians to "hang in there," to be faithful and steadfast because "you know that in the Lord your labor is not in vain" (1 Corinthians 15:58). Gordon Mills has been a faithful servant to his institution, to his profession, and to his Lord. Ω

Theological Reflection

Hanging in There

INFORMATION ON DNA

At a conference on "Information Content of DNA" held in Tacoma, Washington, in 1988, and at the 1990 ASA Annual Meeting, Gordon Mills described the structural complexity of the widely occurring and relatively simple molecule, cytochrome c (like hemoglobin, a "heme"-containing protein), and hence of the DNA in any gene that "codes" for it. But for that structural information to be "translated" from DNA to the protein requires a far *more* complicated system of RNA molecules and some 200 other protein molecules — with exact structures which *also* must be encoded on DNA.

Species-specific variations in cytochrome c structure are frequently cited as evidence of evolutionary changes from a "primitive" cytochrome in a microorganism ancestral to both yeast and humans. Yet the system that produces cytochrome c seems to be no less intricate in "simple" yeast cells than in the human body.

Such amazing complexity in the most basic life processes has led Mills to take issue with the common mechanistic assumption that "Everything can be explained by natural processes." Many things *can* be explained that way, of course, as science has been doing for the past 300 years.

But for Gordon Mills, at present the bottom line is best expressed this way: "An intelligent cause was involved in cosmological and biological origins; nearly everything else can be explained in terms of natural processes."

One would never know from reading about Dr. Mills's accomplishments that he has any physical limitations. But at age 17 he suffered an injury that affected the course of his life. He was driving a farm wagon when something spooked the horses. Gordon was thrown from the seat and his back was broken.

At first Gordon was totally paralyzed from the waist down, but sensation returned in the upper parts of his legs. Five months after the accident, he began to walk shakily on crutches. Because the muscles below his knees atrophied, he was fitted with leg braces like those he still wears. Now he walks with a cane, adroitly hiding it from any but the fastest snapshot.

Camera catches Mills with his cane at a Galveston seafood restaurant.

Helping Others with Limitations

Gordon could no longer play basketball and tennis, which he loved. Without the protection of pain in his lower legs he must check for slight injuries that might become infected. Several burn scars on his legs show that he can't tell when a hot-water bottle is too hot.

Of advice to the handicapped that "You can do anything you put your mind to," Gordon says, "Bunk." During a summer job in his college years he went out on a lonely road and tried to jog. With no muscles to cushion them, his feet developed ulcers so severe that he had to leave his job. Better advice: "Develop the capacities and abilities you still have, to the maximum."

Gordon does not consider himself an activist for "rights" of the handicapped, but he's concerned about providing "opportunities" for others like himself. In 1979 he participated in a National Science Foundation conference at the U. of Maine on "The Physically Handicapped Person in the Sciences." Several scientific societies have developed programs to make study and employment in science more accessible to individuals with disabilities. The American Chemical Society's Committee on the Handicapped has produced a manual on teaching chemistry to physically handicapped students.

Receiving Help from Others

Initially, Gordon occasionally got depressed enough to ask, "Why me?" but because his accident happened in June 1941, that question was easily turned around. After Pearl Harbor, many of his classmates went overseas and some were killed or wounded. Then the question became, "Why them and not me?" With his braces, at least he never had to explain his 4-F draft classification.

Parents and relatives provided positive encouragement. Gordon knew that God had given him a good mind and expected him to use it, along with his remaining physical abilities. As a university student Gordon worked at a number of jobs, sometimes to the detriment of his studies. He learned from that experience that many people would be patient with him, and also that he might do better at science than in business.

Six years after the accident he married Mary Jane, who has been a great help, of course — but that works both ways. Gordon has supported her interests in ancient history and archaeology (she has an M.A. in history). Together they have raised three grown children: David, a lawyer; John, with advanced degrees in pharmacology and biophysics; and Melinda, an artist who works in a hospital public relations department.

Mary Jane and Gordon Mills. Mary Jane is holding Smoky, their 18-year-old Siamese. Gordon is standing in front of a montage of Galveston's Victorian architecture, presented by UTMB on his retirement in 1989.

Gordon Mills is grateful to God for the full life he has been able to lead. Ω

Thoughtful Worship

Overcoming Obstacles

SEARCH

This issue of SEARCH (No. 13) was prepared by Walter R. Hearn of Berkeley, California. Design by Nancy C. Hanger; layout by ASA managing editor Rebecca Petersen. Opinions expressed in SEARCH are those of individuals and may not be representative of the entire ASA membership. Scripture quotations are from the New Revised Standard Version (1989) unless otherwise noted.

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

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

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clude this aspect of faith. He approvingly quotes Louis Berkhof's comment that faith involves personal trust in Christ, and clearly says on his own: ". . . it is obvious that faith involves more than the knowledge of facts" (p. 121). He even says that it is possible for some people *to believe* and yet not be saved (e.g., King Agrippa) because they fail to trust the Savior for their personal salvation (p. 122, emphasis added). In the end, however, we are left unsure of Ryrie's exact position because he never comments on his different uses of the term "believe" in these different contexts. (His treatment of "repentance" raises even more doubts about his attainment of "semantic clarity." On one page [97] he says faith and repentance are synonymous, and on the next, he makes a clear distinction between them.)

Readers of a journal which explores the relationship between science and faith might be interested in a work which seeks to analyze the nature of faith, but I don't believe I could recommend this one. The main drawback for ASA readers is that the rather narrow focus allows for little application to issues of professional concern to scientists. But even if one is interested in knowing more about this debate, the book's value is still dubious. In addition to the problems mentioned above, the book also lacks originality. Though written after MacArthur's book, and thus apparently as a response to it, there was little if anything in Ryrie that was not simply a repetition of what MacArthur had already cited (and responded to) from other authors. Thus for more stimulating discussions of the issues in the "Lordship salvation" debate, read the works of MacArthur and Hodges. On the other hand, for a discussion of justification by faith which both demonstrates the greatness of salvation as well as suggests applications for the practice of science, read the book of that title by McGrath.

Reviewed by Donald L. Ketcham, Ph.D. candidate, Baylor University, writing his dissertation on the "Lordship salvation" debate, 7701 Fairway Road, Waco TX 76712.

GOD IN HISTORY: Shades of Freedom by Peter C. Hodgson. Nashville, TN: Abingdon Press, 1989. 251 pages, index. Hardcover; $21.95.

> This book is an attempt to reconstruct a theology of history in light of the challenges of postmodernism ... which have led to a widespread collapse of the classic framework of Christian faith known as "salvation history." The question of whether and in what sense we are able to speak anymore of God's redemptive presence in history poses one of the most difficult and inescapable theological dilemmas of our time.

So writes Hodgson of the Divinity School of Vanderbilt University. He then identifies himself not as a "postmodernist" for that would mean accepting the "atheological premises that many find to be required by the cultural and cognitive crisis of our time." Instead, the author offers "a 'revisionist' theological response to the challenge of postmodernism." This turns out to be another futile attempt at a Hegelian type synthesis of contradictory positions and ends up rejecting the Sovereign God of Scripture as the Lord of History.

Hodgson presents a fair-enough description of "the classic Judeo-Christian model" of Christian belief in God's sovereign control of history, especially of the coming of the Messiah to redeem His people. He agrees that through this belief "our individual lives are given coherence" and meaning (and, one might add, forgiveness and eternal life as well). The author gives the Enlightenment equal credence as a secularized form of "myth" or "theory of progress based solely on human accomplishment and ability to control our own destiny." Even Marxist-Leninism is merely a "version of salvation history."

The author wants us to face up to our "lack of objective certainty" as part of the human condition. One might think that this should drive us to God as an epistemological source since He alone has absolute objective certainty. But Hodgson believes "a way of thinking must be found that is noninterventionist, nonmiraculous, and noncausal in its understanding of divine providence, nonlinear in its teleology, and nonsuprahistorical in its eschatology"[!]. And if one could invent such a structure of thought, it would surely be unrealistic, unbiblical, and unsupernatural. It would beg the question and unnecessarily grant too much credence to those who reject the direct action of a sovereign, personal God in human history.

Acknowledging his debt to Hegel, Hodgson seems obsessed with a desire to synthesize opposites. He wants man to be liberated from "conventional categorial opposition (absolute vs. finite, divine vs. human, etc.) which is no longer especially helpful, no matter how highly qualified." Think God and maybe you'll become more deified. According to Hodgson and Hegel, God *needs* man for God to be God: "Without the world God is not God." One wonders what God was like in eternity past before Creation!

Hodgson wants "a deconstruction of all religious claims" because "Western critical consciousness" is relativized to destruction. "The very categories by which we have analyzed, distinguished, and constructed are said to be merely functions of this or that language game—and in the endless play of language everything seems to be dissolved: selves, thoughts, works, worlds, gods, history." How powerful are words and how feeble the material world and historical events! Surely if these things are merely "said to be," they can also be "said to be" what they have traditionally been understood to be. If they can "seem to be dissolved," they can "seem to be" real. Two can play the same word game. If the "postmodern" destroys reality and our very sanity with it, then the "traditional" Judeo-Christian understanding of reality which originally built Western Civilization has a much stronger argument in its favor.

Hodgson rejects "the fundamental affirmation of the

doctrine of providence: that God alone rules, a rule that is exercised through what is ordinary, lawful, necessary, and continuous, as well as through the extraordinary, novel, free, and discontinuous." Hodgson's "revisionist theology of history" turns out to be intellectual nihilism. If the reader manages to reach the last page of this erudite, contorted volume, he is asked this rhetorical question: "Is it too much to say that the world introduces historicality into the divine life? Of course we do not really know what it means to say this ...." and with that the reader agrees.

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

THE POLITICAL MEANING OF CHRISTIANITY: An Interpretation by Glenn Tinder. Baton Rouge: Louisiana State University Press, 1989. 257 pages, index. Hardcover; $29.95.

Central to this essay is a vision of political life—"the prophetic stance"—which its author characterizes as " ... ambiguous and, in a world of devastatingly unambiguous ideologies, unique: humane and engaged but also hesitant and critical." It is humane, for the center of its concern is the individual person, whose destiny is given by God; engaged, for our knowledge of this destiny makes possible our love of neighbor; hesitant, for understanding is by the grace of God; and critical, for it is sensitive to the reality of sin and the limits of human understanding. In brief outline, then, the Christian faith is not only relevant to politics but is the preeminent perspective by which to comprehend the realities of political life.

The prophetic stance brings into question all political orientations. In this respect, revolutionary ideologies and theologies of liberation are open to criticism along with those interpretations of Christianity that counsel a conservative response to calls for social transformation. The faith which demands this critical distance suggests that the life of the believer is marked less by certainties than by an appreciation of the ambiguities which attend all controversies in the public square. For the Christian, moral deliberation is joined with the spiritual life. It is this practice of faith which makes possible a critical perspective on politics in the absence of a particular program for action.

For Tinder, a prophetic stance on politics does not demand a sectarian stance. A polity informed by his vision of the faith will be characterized by toleration of dissenters as a reflection of the liberty it accords the individual person. Above all, it is a polity which is marked by civility and which makes possible communication and a common search for truth. And to this end, the democratic polity is sustained by the faith, hope, and love of its citizens.

It should be stated that this book is not a historical survey of Christian thought on politics or an exercise in biblical exegesis. It undertakes only to illumine general themes and common errors, without reference to particular controversies in the relevant scholarship. Yet by reason of its level of generality—and the author's special sensitivity to communicating the Christian faith—it commends itself to a wide public. Tinder, who is professor of political science in the University of Massachusetts at Boston, brings to these issues a mind versed in the classic texts of political philosophy but also familiar with the traditions of the Reformation. He is informed by the insights of others, yet his interpretation of the political dimension of the Christian faith is highly personal and, in terms of its clarity of vision and gentle eloquence, even original. Excerpts from this book have appeared in a recent issue of the *Atlantic Monthly;* let us hope that, in its entirety, it will reach an even wider public.

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

IN THE NAME OF JESUS by Henri J. M. Nouwen. New York: Crossroad, 1989. 81 pages, no index. $10.95.

This little devotional book has a special appeal. The author is a priest, sharing his life with mentally handicapped people who have given him a different perspective on life. He has written several books, including *Reaching Out, Wounded Healer,* and *Lifesigns,* and has taught at Notre Dame, Yale, and Harvard.

The book is divided into three sections, the titles of which give indication of the direction the author is going: I. From Relevance to Prayer; II. From Popularity to Ministry; III. From Leading to Being Led.

Nouwen states in the introduction that he asked himself, "What decisions have you been making lately and how are they a reflection of the way you sense the future?" He followed that up with the cogent question, "Did becoming older bring me closer to Jesus?" He woke one morning feeling he was living in a dark place, "burnout" being a convenient psychological translation for spiritual death. This thinking and the guidance of another led him to the L'Arche community for the mentally handicapped.

This book resulted from a complete change in his views. His new associates could not read his books, and their liking or disliking of him had nothing to do with the things he had done previously. "These broken, wounded, and completely unpretentious people forced me to let go of my relevant self—the self that can do things, show things, prove things, build things—and forced me to reclaim that unadorned self in which I am completely vulnerable, open to receive and give love regardless of any accomplishments" (p. 16).

Such mind-boggling experiences from one who dared

to become deeply involved in the lives of those with limited capacity, forced a change in attitude that is refreshing to read about. He makes the application to leadership. "The leader of the future will be the one who dares to claim his irrelevance in the contemporary world as a divine vocation that allows him or her to enter into a deep solidarity with the anguish underlying all the glitter of success and to bring the light of Jesus there" (p. 23).

In our society, we seem to feel that good leadership implies a distance from those we lead. Our professions offer models of service that are one way—serving and being served. But one cannot lay down his life for those without whom we have a deep personal relationship. He writes that we are not the healers, but God is. The leadership pattern we need to follow is that of the servant-leader, Jesus Christ, who gave His life for the salvation of many.

Nouwen concludes with a summary that Christian Leadership has the desire to be relevant, popular, and the desire for power. These are not vocations but temptations. Jesus calls us "to a life of prayer, from worries about popularity to communal and mutual ministry, and from a leadership built on power to a leadership in which we critically discern where God is leading us and our people."

This book is one that, if carefully, thoughtfully, and reflectively read, will shake up our complacent attitudes about our ultimate purpose here on earth. The communication style is so captivating that it is hard not to quote the whole book!

Reviewed by Stan Lindquist, Link Care Center, Fresno CA 93711

DISARMING THE SECULAR GODS by Peter C. Moore. Downers Grove, IL: InterVarsity Press, 1989. 228 pages. $8.95.

This well written text provides a unique apologetic for the Christian to confront such secular citizens as New Agers, Humanists, Relativists, Agnostics, Narcissists, Pragmatists and Hedonists.

Moore is the founder and former director of FOCUS, a ministry among private secondary schools and universities along the Eastern Seaboard. He is also the founding chairman of the board for Trinity Episcopal School for Ministry in Ambridge, Pennsylvania and is presently rector of Little Trinity Church in Toronto, Canada. He is abundantly qualified to write this book subtitled "How to talk so Skeptics will listen." His perspective and experience in ministry and training are evident in how he draws on a wide range of sources and personal testimonies to make his point.

This is not a book written from a Christian sanctuary or from an ivory tower but a book written by a mature believer who has been on the battle line. Obviously all the answers are not here, but this book will provide a meaningful, insightful look into the modern non-Christian world view.

Reviewed by Fred H. Walters, Department of Chemistry, University of Southwestern Louisiana, Lafayette, LA 70504.

BIBLICAL PRINCIPLES AND BUSINESS: The Foundations by Richard C. Chewning (ed.). Colorado Springs, CO: Navpress, 1989. 277 pages, notes. Paperback; $15.95.

This book is the first of a new series, *Christians in the Marketplace*, edited by Professor Richard Chewning, Chavanne Professor of Christian Ethics in Business, Baylor University. Chewning describes the objectives of the series as "(1) To encourage the development of a mature Christian world view..., (2) to demonstrate the application and integration of Scripture, and (3) to encourage a response to God's revealed will regarding business, economics and public policy, so that justice will be done in the marketplace."

The book is a collection of articles written by theologians, philosophers and historians for an audience Chewning describes as "contemplative Christian businesspeople." It is organized into six sections, with each section delineating the thinking of two authors on how a Scriptural principle translates into principles for the conduct of business. Each section contains a chapter by each author with introductory and summary comments by Chewning. The chapters were written specifically for the book, with the authors consulting among themselves and with Chewning.

In some sections such as *Section B: ETHICS OF THE COVENANTS: Does the New Covenant Supersede the Old?*, the differences in authors' positions are differences of emphasis and perspective. In this section Myron Augsberger claims that the New Covenant does supersede the Old, while Walter Kaiser argues that the New Covenant only refines concepts which can be found in the Old. In *Section D: SCRIPTURAL LAW AND NATURAL LAW: The Bases of an Ethical Appeal in the Marketplace?*, the differences between the two authors' positions are quite sharp. In this section Richard B. Gaffin, Jr. argues that while the natural man may recognize a standard of behavior like natural law or even Scriptural law, he recognizes it only for his personal convenience, since the natural man is totally depraved. Thus there is no reliable common ethical ground between the Christian and the nonbeliever. Norman Geisler counters that the natural man recognizes natural law because it is "written on his heart," and thus natural law is an area of common ground between the Christian and the world. In the final pair of chapters, William S. Barker and John Jerredson Davis compare the influences of premillenial and postmillenial eschatology

on business decisions and conduct. Topics covered in other sections include the creation mandates and the Great Commission, absolutes in a situational environment, and the distribution of wealth.

This is not light reading. Nevertheless, it is not esoteric reading. Theological jargon has been minimized, and the chapters are generally very readable. None are excessively long, and Chewning's introductions, summaries and reflections help to crystalize the important points made by each author. Understanding the implications of each author's position for business, and the differences between authors' positions is not always easy, but that is due to the difficulty of distilling Scriptural principles into principles for real-world situations which can be printed in a book, rather than to any shortcoming of the authors or the editor. While the book is targeted at businesspeople, it should be of interest to anyone who is interested in how the theological issues discussed influence relations between Christians and the larger community.

Reviewed by William E. Hamilton, Jr., Staff Research Engineer, General Motors Research Laboratories, Warren, MI 48090-9055.

THE CANCER INDUSTRY: Unraveling the Politics by Ralph W. Moss. New York: Paragon House, 1989. 502 pages, 27 black-and-white photographs, appendices, references, index. Hardcover; $21.95.

Moss was formerly assistant director of public affairs at Memorial Sloan-Kettering Cancer Center in New York. He received his doctorate from Stanford University and currently teaches science writing at the New School for Social Research in New York City. This book is a completely revised and updated edition of his previous book, *The Cancer Syndrome,* which was published in 1980 after he was fired from Memorial Sloan-Kettering Cancer Center due to a laetrile controversy. He recorded this episode fully in this book.

This book has four parts: part one is "Proven Methods (That Often Don't Work)," part two is "Unproven Methods," part three is "Prevention," and part four is "The Cancer Business." Moss sets out to expose the flaws of the entire cancer industry and to show why America is losing the war on cancer, what went wrong, and where we go from here.

In part one, Moss summarizes the current status of three proven methods: surgery, radiation therapy, and chemotherapy. He claims that they don't work well and produce too much profit for the cancer industry, including pharmaceutical companies, treatment centers, and cancer physicians. He also quotes a study which showed the age-adjusted cancer mortality figures increased 8.7 percent in the 20-year period between 1962 and 1982 and concludes that the U.S. is losing the war on cancer. However, he does not discuss the possibility of competing risks in explaining the increase of cancer mortality. Cardiovascular disease is the number one killer in the United States. It is gradually coming under control. Those people who used to die of heart disease are now dying of cancer. The increase in the cancer mortality rate is not due to a lack of improvement in cancer treatment. Regarding the high cost of cancer treatment, this is generally true of all medical care in the U.S. Solving this problem depends on legislation and possibly a revamping of health insurance systems.

In the second part, Moss presents cases for several unproven methods including Coley's toxins, laetrile, hydrazine sulfate, vitamin C and other nutrition supplements, Burton's immuno-augmentative therapy, Livingstone's immunization, and Burzynski's antineoplastons. Here he gathers all the preclinical and early clinical data to show that these innovative treatments are good, and argues that, even if they are not good, patients should have their right to choose.

To this reviewer, Moss ignores the established scientific method of clinical research. In order to prove a medical treatment is useful, scientists have to do animal studies to look for activity and long-term safety, then do human clinical trials to determine a safe dose and preliminary effect, and finally do at least two randomized controlled clinical trials to show that the new treatment is better than a placebo or equivalent to an active control. A medical treatment has to go through these rigorous tests in order to qualify as "proven." All the treatments discussed by the author are either too new to judge their effectiveness or have been proved ineffective by randomized controlled clinical trials. Admittedly some of these innovative approaches did break ground for new avenues of research, and some compounds are still under active research (e.g., hydrazine sulfate, vitamin A). However, the way some mavericks charge large sums of money for their unproven methods is unethical. As to the patient's right to choose, recent developments have led to easier access to experimental medicine for AIDS patients. However, freer access might interfere with the formal research of proving the efficacy of a new drug. Its long-term effect still remains to be seen.

In part three, Moss charges that the American Cancer Society, the National Cancer Institute, and the Food and Drug Administration have not done enough to promote cancer prevention. However, preventive measures need to have support from good research data. Prevention research depends on long-term follow-up and is still full of methodologic problems. Nevertheless, Moss agrees that the effort to prevent cancer has increased in recent years.

The author makes his major thesis clear in part four, that the suppression of unproven methods, although it takes place mainly at an objective level, is an outgrowth of underlying economic and social trends. This point of view seems to be consistent with the popular theory about the history of science, that scientific development is not very objective, but is influenced by cultural background and subjective factors. This reviewer still thinks that science is quite objective, and in the long run the social-

economical factors only play a small part in discovering what is true.

As a whole, this book provides some interesting information about both orthodox and unorthodox elements of the total cancer research enterprise. The reader should beware of the author's bias due to his unfortunate experience at Memorial Sloan-Kettering.

Reviewed by T. Timothy Chen, National Cancer Institute, Bethesda, MD 20892.

THE VOICE FROM THE WHIRLWIND: The Problem of Evil and the Modern World by Stephen J. Vicchio. Westminster, Maryland: Christian Classics, 1989. 239 pages, bibliography, index. Paperback; $19.95.

The author is Professor of Philosophy at the College of Notre Dame in Baltimore, Maryland, and this book is based upon his Ph.D. thesis. He tackles the ancient question of how moral and natural evil can exist in a world created by a God who is omniscient, omnipotent, and omnibenevolent. He is clear at the beginning to state that he provides no simple answer.

A major portion of the book is taken up with critiques of traditional answers that have been already offered. He offers three major criteria for an acceptable response to the problem: (1) it "must be true to the tradition from which the problem originates," (2) it "should be one that is logically consistent," and (3) it "must take the individual sufferer seriously." One of the purposes of the writing is to show how difficult it is to find any position that is consistent with all three criteria.

The book is often hard reading on a hard subject, but it appears to be extremely thorough. Bearing the marks of being a Ph.D. thesis, every chapter ends with notes, giving a grand total for the book of over 400, the bibliography included at the end is 23 pages long, and the style of the presentation involves extensive quotes (over 200 of them, many a full page in length) from other authors. Since the argument is detailed, intricate and complex, the reader would be helped immeasurably by a more ordered structure of presentation, rather than simply a complicated set of cross-references between disagreeing authors. The book has five chapters: the first describes various forms of theodicy, the second produces a clarification of terms, the third analyzes traditional theodicies, the fourth deals with seeing God as the answer to the problem of suffering, and the last proposes a "prolegomena" to Christian theodicy.

The flavor of the book, as well as an excellent summary of much of its content is best given in the following extended quote:

> In chapter three we attempted to make a distinction between theodicies prohibited by reason and those allowed by reason. We have discovered that in the first group we find the punishment and warning theodicies: retributive justice and the free will defense; the unreality of evil theodicies: the amount of evil is insufficient to create a problem, evil is an illusion, and evil is privation of good; and the evil is logically necessary theodicies: certain versions of the free will defense and the contrast perspective. Because of one or more logical flaws, all of these responses fail as logically consistent answers to the problem of evil.
>
> Those theodicies that are allowed by reason include both the classical Hindu and Hinayana Buddhist versions of monism, the dualistic responses to the problem of evil offered by Plato, Zoroastrianism, process thought, and limited God theories such as that offered by J.S. Mill and the various possibilities suggested by David Hume in the *Dialogues Concerning Natural Religion*. We have also seen that despite some logical problems, John Hick's version of the teleological theodicies can be numbered among those responses to the problem of evil that are allowed by reason. All of the members of this second group are logically consistent and therefore possible candidates for the job of answering the question: "Why does evil exist?" p. 208.

These have all been discussed only with respect to the second criterion of logical consistency; they must yet be tested by the first and third criteria.

In chapter 4 of the book, the author takes a detailed look at the *Book of Job* in order to lay a foundation for the proposal that he is to advance in the final chapter. He concludes that "Job is not left with particulars of a philosophical theodicy. In the end, what he does have is trust that God does have a teleological view by which evil will be overcome" (p. 199). Such a position is found to be consistent with the three criteria.

In chapter 5 he starts with the fundamental Christian assumption "that our teleological theodicy is somehow bound up with the incarnation and atonement of Jesus Christ. These are certainly not empirical propositions. But they are foundational principles on which the Christian faith is based" (p. 267). Then he becomes more specific, saying, "That God had to die on the cross becomes for the Christian *the* problem of evil, and this realization totally recasts the way in which the victim approaches theodicy" (p. 279).

What, then is Vicchio's conclusion?

> The experience of "seeing God" leads the victim not in the direction of a theoretical theodicy that answers all our questions about natural and moral evil, but rather it sets the sufferer in a new life and provides the basis for a practical response to the problem of evil. As Forsyth puts it, the Christian theodicy he is advocating is "not really an answer to a riddle but a victory in a battle." (pp. 279, 280)
>
> At the heart of the Christian message we must find a God who identifies himself so thoroughly with his creatures that he becomes one of them. ...We must trust that at bottom level the *prima facie* Christian paradox of evil is merely apparent. (p. 281)

This is clearly a book for detailed and careful study, with much taking of notes, cross-checking of conclusions,

and discussion among committed Christians. The quest for an acceptable theodicy may seem hyperscholastic at times, but for those whom God has called to delve into the truth in faith, it could have consequences of benefit to many.

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

THE EVANGELICAL MOVEMENT: Growth, Impact, Controversy, Dialogue by Mark Ellingsen. Minneapolis, MN: Augsburg Publishing House, 1988. 496 pages, indexes. Hardcover.

Ellingsen is an evangelical Lutheran and associate professor at the Institute for Ecumenical Research, Strasbourg, France. In this opus he continues his specialized interest in theology to the end that Evangelicals may come to grips with the need for dialogue with mainline denominations. His previous book, *Doctrine and the Word*, anticipated this present effort. He has also written numerous articles in this vein for professional journals.

In what I see as a *magnum opus*, Ellingsen divides his material into parts. He fleshes out major issues with in-depth, at times almost an encyclopedic wealth of information derived from recognized scholars who have followed (in my case, for nearly five decades) the discussions about Fundamentalism, Evangelicalism, Orthodoxy, Liberalism, Secularism, and related schools of though. Thus, in his brief history of the Evangelical movement, he defines Evangelicalism; he finds its American roots in Fundamentalism, with the rise, fall, and revitalization of that religious phenomenon; he traces events and thinking leading to the emergence of Evangelicalism, with its features outside North America, and the coalition with the "glue" that holds it constituents together in spite of diversity.

Appropriately, Ellingsen applies his definition and historical development of Evangelicalism in Part II to a comprehensive review of the Movement's presence across the formidable spectrum of churches—Reformed, Mainline Pietist, Holiness, Pentecostal, Restorationist, Dispensationalist, Radical Reformationalist, Free Church Traditionalist, Lutherans, and other mainline churches. But that is not all. To him Evangelicalism is linked with educational institutions, parachurch and mission agencies, and cooperative groups.

As in any scholarly work which seeks to maintain orthodox Christianity in the contemporary world, Ellingsen finds that "Evangelical Themes" maintain orthodoxy in "Modern Dress." That is, the reader discovers that recent, external forms of basic Scriptural principles maintain these theological tenets of Christian faith. He finds a continuation of faithfulness to the Word of God in Evangelical Theology, in Scriptural and Theological methodology, in reference to traditional Creeds, in views on the "Work of Christ," in "Justification" and Christian lifestyle, in the Church and its ministry, in "Social Ethics," and the witness within ecumenical movements to present the "Gospel in Contemporary Society."

Hence, in summarizing Evangelicalism today, Ellingsen envisions the "Essence of Conservative Evangelicalism" to be comprised of seven components shared among Protestants who:

(1) assume a critical viewpoint towards Roman Catholicism and the ecumenical movement;

(2) insist on or at least remain in dialogue with the concepts of plenary inspiration, verbal inerrancy, and the Scripture's propositional character;

(3) affirm the Bible's importance for Christian life;

(4) prioritize the experiential dimensions of becoming and being a Christian (conversion and Sanctification) over the sacraments (which we Baptists insist are "ordinances"), the ministry, and ecclesiastical structures;

(5) emphasize evangelism and foreign missions;

(6) understand Christian ethics in terms of law rather than situationally; and

(7) resist formal institutional ties with persons or churches not sharing the preceding commitments.

Having succinctly summarized components of Evangelicalism, the author is "tempted" to add yet two more, which are:

(8) the expectation of Christ's imminent return, realistically interpreted; and

(9) a stress on the personal appropriation of the atonement understood in some way as a substitutionary sacrifice.

For those of us who have lived through acrimonious days with harsh accusations and counter charges of a Fundamentalism contra "liberalism" at its apex between World War I and World War II, with the "evolution" controversy often generating much more heat than light, it is a pleasure—nay, delight—to find someone with erudite articulation and conservative presuppositions in theology to compile what I think is a rare and vitally needed examination with reasonable i.e., (Biblically justifiable) statement of what we conservatives can and should believe.

For us in the American Scientific Affiliation, here is a must book to which I think we will turn again and again (at least I will) to consult the array of competent scholars—names like Carl Henry, Orlando Costas, James Orr, Peter Beyerhaus, John Stott, Jacques Ellul, Abraham Kuyper, Francis Schaeffer, Harold Lindsell, Bernard Ramm, John Warwick Montgomery, Donald W. Dayton, J. Gresham Machen, et al—who have given profound thought for us evangelical scientists to consult as we probe inherent theological and ecclesiastical issues bearing on our assumptions in fields of science, whether natural or social.

This is indeed a balanced study, though at times it has to be almost encyclopedic to encompass all relevant views by numerous scholars, for evangelical-ecumenical dialogue; it is basic to recognize our stance within the larger field of Evangelicalism. Although some mainline

denominational scholars will chafe under—even reject—Ellingsen's conclusions about evangelism, sanctification, and Biblical revelation, I think it will serve as shock treatment so needed in theological therapy to rekindle smoldering fires of apathy and "business-as-usual" lethargy.

In my continuing research in cultural/psychological anthropology, I will repeatedly consult this book from an accessible shelf in my library. For what? For reliable reference about critical issues intrinsic to ecumenical positions shared among my conservative colleagues. I heartily recommend this thorough and even-handed presentation.

In format, binding, print, and related features, the book is in keeping with Augsburg's excellent publishing tradition of scholarly books meant to last through long usage and frequent consultation.

Reviewed by George Jennings, Professor Emeritus of Anthropology (Geneva College), P.O. Box 632, Le Mars, IA 51031.

A NEW AGENDA FOR MEDICAL MISSIONS by D. Merrill Ewert (ed.). Brunswick, GA: MAP International, 1990. 135 pages. Paperback; $6.95.

In his introduction, the editor of this book says (p. 2): "This is a book for practitioners, written by practitioners." However, I am a nonpractitioner, and as I read this book I quickly became convinced that this is a book that should be of interest to every Christian who has any interest in missions, in Third World health, or in the need to reassess our medical technologies in terms of justice and compassion. Consequently, I would recommend this book to every *PSCF* journal reader with concern for the interaction of science and faith in the area of the ethics and the methods of health care.

After the introductory chapter by the editor there are four chapters outlining the "Conceptual Framework." The main emphases here are that: 1. in contrast to the thinking of much of Western medical technology, health is more than the absence of disease; 2. health care should be more than the sophisticated offering of health as a commodity in large, urban medical centers (and hence more and more limited to the rich); 3. health care should be community-based with local, nonprofessionals as the primary agents for health education, immunizations, water and sanitation, and other parameters of health that do not require the high technology of the modern medical center; and 4. such community-based health care is much more intimately related to evangelism as the local Christian workers share their knowledge of good health and the gospel.

These chapters are followed by seven chapters of case studies in Asia, Africa, and South America. The seven reports illustrate the challenges and the advantages of working in the local communities and training the people to see the problems and to work out *their* solutions to these problems. Lest we think that such concepts are only for the "Third World," one of these chapters describes a similar successful program in rural Mississippi, U.S.A.!

The concluding three chapters summarize and re-emphasize the basic principles: community-based health care, the congregation as a healing community, the concern for justice in health care, and the need for a comprehensive, holistic approach to health. There are also reasons to consider that the principles discussed are not only applicable to "foreign missions," but they need to be considered in the developed world where our health care has become almost completely dependent upon health professionals, hospitals, and medicines. This is supported by a comment from the U.S. Surgeon General who reports "that eight percent of illness and death is due to what people eat, smoke, and drink; they are preventable" (p. 121). At the same time: "There ensued both a popular and professional fixation on institution-centered health care which offered 'a pill for every problem' or a 'needle for every need.' It raised the expectation that medicine could solve every health problem" (p. 42).

This is a book to remind us of the health challenges in the world today, especially that our sophisticated medical technology is not the answer to most of our health problems. Christians in the sciences should find this a challenging area in which to relate their science and their Christian faith. As an aid to developing such a relationship, each chapter closes with a series of "Questions for Reflection." In short, this is a book for practitioners *and* for nonpractitioners.

Reviewed by Wilbur L. Bullock, Professor Emeritus of Zoology, University of New Hampshire, Durham, NH 03824.

TAKING SIDES: Clashing Views on Controversial Psychological Issues by Joseph Rubinstein and Brent Slife. Guilford, CT: Dushkin Publishing Group, 1990. 376 pages. Softcover.

This is a nifty book. Just the thing the doctor ordered to stimulate the mind, arouse the emotions, and activate the will. Using a debate-style format, the editors have assembled 18 controversial topics with an article supporting both sides of each issue. The liveliness and substance of each viewpoint makes for rousing good reading. The debate framework is guaranteed to inform the naive layperson who thought psychologists agreed on most things and to entertain the sophisticated professional who knows better.

The presentations distill the arguments of psychologists and commentators on a variety of interesting subjects. Many of the questions which are discussed will appeal to readers of *PSCF*. These include: should animals be used in experiments; is behavior determined primarily by biological factors; can suicide be rational; is

psychotherapy effective; has science discredited ESP; and is pornography harmful. The last question is answered in the affirmative by Christian psychologist James Dobson who served on the Attorney General's Commission on Pornography. Other authors whose names will be recognized in this volume include Stanley Milgram who argues that deception in research can be justified, Herbert Fingarette who argues that alcoholism is a disease, Arthur Jensen who argues that intelligence cannot be increased, and Thomas Szasz who argues that involuntary commitment to mental hospitals cannot be justified.

This is an ideal collection of articles to challenge students to analyze well-argued opposing views. Each issue contains enough unresolved ideas to provoke further examination. Critical thinking skills can emerge as a result of looking closely at the pros and cons of these important subjects. For those who do not find psychology their cup of tea, 13 other *Taking Sides* volumes are available on a variety of subjects. Of interest to readers of this journal are the volumes on controversial bioethical issues, environmental issues, moral issues, and social issues.

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

INERRANT WISDOM: Science and Inerrancy in Biblical Perspective by Paul H. Seely. Portland, OR: Evangelical Reform, Inc., 1989. 216 pages, index. Paperback.

Paul Seely, graduate of Westminster Theological Seminary and ardent student of the Bible and the milieu in which it was written, presents a well-argued case for holding the Bible to be "inerrantly wise." He deftly and sometimes ruthlessly dismantles the hard-line case for inerrancy. Seely examines science and revelation and their encounter in the life of Jesus including exegesis of gospel texts dealing with the authority of Scripture (Matthew 5:18, John 10:35). He then looks at the epistles which are purported to teach strict inerrancy before applying both logical and empirical analysis to find the "doctrine of classical inerrancy" false. Seely then goes on to sum up points he has made earlier to establish a view of Scripture more in line with Scripture's own self-attestation. Moreover, this more modest view of inerrant *wisdom* still enables Christians to dwell within the house of biblical authority—as against the Scripture deniers within liberal theology—and ensures that dwelling to be a fruitful abode as well.

A classical or strict formulation of inerrancy holds that all details of the original text yield true information not only in matters of faith but also in terms of science (broadly construed to include biology, astronomy, historiography, hermeneutics...). Theologians such as Clark Pinnock—upon considering all the biblical data fairly—have moved away from this to more modest formulations of inerrancy as espoused by the Chicago Statement and other evangelical theologians (Bloesch and Erickson). The author does not intend to overthrow the authority of the Bible in order to be free to develop a new "Christian" theology (Bultmann), but to defend the reliability of the Bible in its primary function—to enable us to trust God and grow in faith and love. Thus, one honestly deals with difficulties and refrains from a docetic tendency to claim a higher view of Scripture than its own text attests to.

Furthermore, Seely provocatively explores the consequences of a rationalistic inerrantist deity who could not deliver words of (spiritual) life because of the necessity of explaining facts or delivering absolute immutable propositions. Thus, the parable of the mustard seed would involve digressions into smaller seeds or distracting disclaimers in order to proceed to the point actually intended. Or God would promote further rebellion and social chaos by outlawing divorce for the heart-hardened Israelites Moses led out of Egypt. Seeling asks the pointed question, "Why should God bother telling us mundane facts?", when we can discover them for ourselves. Why can't a God who created a historical world and saves us within history temper truth with love? Wouldn't our own peculiar post-Enlightenment technical concerns overshadow the real purpose of God's revelation: that He is a God of love and mercy seeking to save the lost and perfect the found? Furthermore, the timeless spiritual message in the story of how God works in history would become enigmatic to peoples who have not developed the requisite scientific knowledge to understand the text (including the original authors and audience!).

A bulk of the book consists of a two-fold process: exegesis to show that inerrancy is not taught in Scripture (as many inerrantists themselves admit) and details of the text which contain "errors" (albeit irrelevant to the point or "divine intention"). Seely examines these "errors" in historical details, scientific claims and presuppositions, and also within religious and ethical domains. He points out Matthew's confusion of the two Zechariahs, Jesus' overturning of Moses' law on divorce, the abolition of cleanliness laws, cud-chewing hares in Leviticus, Jacob's bed/staff in Hebrews, anachronisms and more. Gleason Archer wrote *An Encyclopedia of Biblical Difficulties* to "explain" or solve these puzzles or errors but unfortunately he would need to expand his work by many volumes to cope with the data. Seely's proposal is much simpler; simply abandon the effort.

Seely concludes his book by dismantling the syllogisms and other arguments said to require strict inerrancy from an understanding of God's character and the inspiration of Scripture. Seely does not spend much time defending his own proposal from critical attacks on the authority of Scripture (see Pinnock's *Scripture Principle* for this) but is content to demolish the logical and exegetical grounds for strict inerrancy. Along the way he makes helpful comments about the roles of science and biblical revelation which will receive a welcome ear among ASA readers.

Reviewed by Marvin Kuehn, Hamilton, ON L8S 1M9, Canada.

EVOLUTION: The Great Debate by Vernon Blackmore and Andrew Page. Batavia, IL: Lion Publishing Corporation, 1989. 192 pages. Paperback; $19.98.

This looks like a coffee-table book: thick, glossy paper; many brilliant color photographs, some chosen more for their appearance than for their relevance to the text; numerous supplemental essays boxed apart from the main text in a second color. To my surprise, the book turned out to be the fairest treatment of the evolution question that I have found.

The book deals with evolution historically, inserting scientific discussion where required to understand the historical debate. We meet all the major contributors to the debate, from Linnaeus to Richard Dawkings, and the authors are careful to present the cultural and philosophical climate within which each scientist worked. Fairness and understanding sympathy characterize the entire discussion.

The authors shun the "warfare" metaphor in discussing the dialog between religion and science on the evolution question. They emphasize that many scientists involved in the debate were deeply religious, and that many churchmen were early champions of evolution as God's means for creating the diversity of life. And when they come to scientists who speak out of a non-Christian or even anti-Christian framework, the authors make this clear as well.

Blackmore and Page maintained a balanced, neutral stance so well that I kept wondering throughout where they stood. Only in the last few pages do they reveal their personal statement of faith. They affirm that Christian faith is grounded primarily on God's addressing us historically and personally, and not on questions of scientific truth. Most Christians believe that God is Creator, whatever the means or time scale, because they know God through Jesus Christ, whom God raised from the dead. Thus, the evolution controversy can never be central to the truth of Christianity.

I am occasionally asked to recommend a book for the scientific layman that introduces the evolution question. Blackmore and Page will be my recommendation in the future.

Reviewed by J.R. Cogdell, Department of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712.

FREE SPEECH OR PROPAGANDA? HOW THE MEDIA DISTORTS THE TRUTH by Marlin Maddoux. Nashville: Thomas Nelson Publishers, 1990. 224 pages, footnotes. Paperback.

This ECT thrust at the media reminds me of Ord Morrow's (Back to the Bible Radio) comment about talk shows: "They are the pooling of ignorance."

"I don't think most Americans have fully grasped the awesome power of persuasion held by the people who skillfully use television. Nor do they understand that this power is being systematically used to undermine the religious faith of the people of our country" (p. 45). So writes Maddoux in a sample quotation to be reiterated in various terms for different topics throughout his documented critique and challenge to the media's distortion of the "truth."

Maddoux's radio talk show, "Point of View," began in 1976 with this thesis, "If no one else [?] will counter the bias of the national news, I will give it my best shot." His program began on a single Dallas radio outlet and developed into the U.S.A. Radio Network with a claimed audience of four million listeners. The book is the author's first effort to write what has been basic to his talk show through the years.

The opus has major divisions into: "Part One: The Newspeak for America," wherein are three chapters viewing the media as a "Big Show" in Barnum and Bailey tradition; an "open line" by radio for "disenfranchised Americans"; and an expose of today's cartoon "funnies."

"Part Two: News Reporting," follows with chapters four through eight scrutinizing TV anchor people: "The Millionaire Evening Stars"; media bias due to "the Dominant Culture"; fantasies of "Fairy Tales About Abortion"; other fantasies about "Woodstock, AIDS, and School Textbooks"; and "Retelling" to correct distorted news reports about Nicaragua.

In "Part Three: Interpreting Communism," Maddoux spends three chapters (9-11) to emphasize that the Cold War was a skewed "War of Words"; that we buy media's idea to "Rescue the Evil Empire—Again"; and in economy we have a "Madison Avenue Marxist."

His last "Part Four: Windows on the World," is chapter twelve, "News from Another Perspective." He wants us to see (Maddoux's) "truth" about reported/analyzed events with his perspective garnered from eminent people as guests on his talk show, and from an agitated listening audience in their plea for "truth" about what is going on in the world.

Surely the reader cannot fault the author for writing a very readable book. While he deals with issues well within our concern in the American Scientific Affiliation, he avoids undue jargon that on occasion makes some of our writing dull at best and obscure at worst as we delve into issues facing the world today. On the other hand, Maddoux's journalistic style ensnares him into glibness with facile opinions about distressing issues that demand careful and precise terms to escape inept generalizations and sloppy conclusions.

For the most part, I agree that the basic issues Maddoux explores need our attention, but his journalistic flare vitiates much of his argument. What he writes should

have circulation among Americans across our land, including us with Christian stance for scientific endeavors and ends. There can be no underlying argument against the author's thesis and his probes as suggested in a summary of the book's "parts" and chapters in a worthwhile book that has a place in my library.

Does Maddoux achieve his goals? I believe he has alerted us with thrusts that demand attention. Yet I am troubled when he offers windows with cleaner glass panes, but his panes are besmirched by assertions smacking of what he condemns. Thus he writes, "We have to be extremely careful the way we write and broadcast the news. It's impossible, you see, to translate raw data through any human agency without its being interpreted by that individual's worldview" (p. 203). Granted that, but isn't he assuming undue omniscience when he asks his readers to install his window frames and panes? Are his views ex cathedra from *the* pontificate of talk shows?

Despite my negativism in respect to Maddoux, the book is recommended for further serious study of the media by us in the ASA, and it can be assigned as collateral reading for students provided we introduce it with caveats that I have in part suggested. The book will be beneficial for us seeking to understand a remarkable phenomenon in American culture that is ill-served by the media's simplistic and biased reports and analyses.

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RELIGIOUS POSTURES: Essays on Modern Christian Apologists and Religious Problems by G.A. Wells. La-Salle, IL: Open Court Publishing Company, 1988. 269 pages, index and notes. Hardback, $28.95; paperback, $14.95.

The author here develops a thesis which he began in his previous books: that the Old and New Testaments are untrustworthy. In this work he focuses on the methods that believers in general use to defend a religious world view. Quoting extensively the work of theologians whom he concludes have destroyed the "credibility of much in the Old and New Testaments," he claims that "the fundamentalist position [is] untenable, although this is not appreciated even by many educated persons today." The author also critically evaluates the evidence for the existence of God, finding it wanting. He concludes that a primary means to demonstrate God is to show that the universe has both design and purpose, and science has shown it has neither. A second major difficulty of the God belief is the enormous amount of evil and unhappiness in the world which, he concludes, is difficult to explain from a religious position.

The writer begins his critique with the group he believes manifests the most extreme fundamentalist mentality, the Jehovah's Witnesses. If they were merely a fringe minority, they could be ignored—but they are a powerful, worldwide movement which is rapidly becoming one of the largest religions in the world. The Witnesses, Wells concludes, provide a good example of what is wrong with religion in general. Their success is partially due to their requiring strict separation from the "world." They are discouraged from associating with *any* non-Witnesses except as necessary in the daily transactions of life. Their already strong *esprit de corps* is strengthened by the enormous persecution that they have suffered in both totalitarian and democratic countries, including both the United States and Canada. In the latter they were once banned and during World War II many were put in Canadian and American concentration camps.

Although much discussion is on science and religion conflicts, the main orientation of the book is philosophical. Among the many creative hypotheses discussed is the following: the reason for the enormous level of evil is to satisfy God's perverse pleasure. Humans flock to movies that are filled with great tragedies, and we are very attracted to reading about, or watching the pain of others on television. Thus, God has likewise created his personal show by producing a situation in which most of us are sure to spend much time suffering. Regardless of our life situation, it is full of sorrow, and the final frustration for all is the cessation of life. The purpose of life on earth, this philosophy says, is to satisfy a sick God who delights in watching evil just as His children on earth do.

Wells also concludes that religious teachings often do not correlate with moral behavior, and that religion often produces hatred against those not part of the religious orientation of the hater. Those who subscribe to a religious world view may try to rationalize the conflicts, wars, and hatred engendered by religious beliefs, but they cannot deny the enormity of this problem. It does not take a great deal of knowledge of history or current events to realize the enormous role of religion in motivating foul deeds. Wells also reviews the historical and modern persecution of individuals who have questioned various aspects of Christian faith and belief.

The author states that he is writing more for those who have not yet made their minds up and realizes that he will not convince many true believers. A semi-militant agnostic, he concludes that many major problems in our world stem from religion, and that the religious world view is at best unnecessary, and at worst harmful and should be openly opposed. Most of his arguments are familiar to those who have read agnostic and theistic literature. This work does not objectively examine the evidence, but uses the logical fallacy of stacking the cards to argue against the validity of the Christian canon. Nonetheless, much useful information is included and Wells clearly displays much knowledge of both the scriptural record and contemporary biblical criticism.

The author argues that wide acceptance of the New and Old Testament by many highly informed, intelligent

people parallels the acceptance of the William Tell legend. He concludes that both are historical fiction but were accepted as historical fact close to the time that the events allegedly happened. Wells then documents that it takes enormous long-term efforts to discredit popular fiction, even when the evidence is against it. This, of course, is true not only in religion, but also in science and other fields. On the other hand, one must be cautious about too quickly surrendering the historically tried and tested. If an idea is found valid in practice, the *why* it works is often a secondary concern.

As the author notes, the flimsiest of beliefs can be linked to the strongest of emotions. This applies not only to those with a religious orientation: as Wells himself shows, atheists are often as emotional as religionists and as determined to defend their view and insure that it becomes public policy.

The author also argues strenuously against miracles, concluding all such claims do not stand up to scrutiny. He concludes that science has shown that all life is a result of the outworking of natural law, chance, time and a number of fortuitous, but unlikely conditions. From this he concludes that life has no purpose except that which we give it and no absolute meaning except that which we believe it has. It is futile to search for absolute truth because "truth" is never final, always subject to revision. The limitations of humans are such that the best they can do in many knowledge areas is to guess from tenuous and limited evidence.

Wells' discussion of many issues which relate to biblical Christianity is a useful summary and integration of existing literature from a wide variety of areas to show why the author concludes that Christianity is not a credible world view. Wells usually maintains a fairly rational dialogue, descending to name-calling primarily in discussing Jehovah's Witnesses and Fundamentalists. He illustrates well the incredible, capricious selectiveness that many religious groups use to bolster their own belief structure, proving the old cliche that the Bible is like an old fiddle on which one can play any old tune. To understand its message is no easy task. Once a religious view is internalized, one tends to emphasize certain scriptures to prove one's point, explaining away or ignoring the passages that contradict it.

The author is also critical of the liberal theological position, concluding that they accept the modern biblical research that he quotes, yet "try to rescue something from the ruins." To Wells, the proper response is to reject the ruins and move on to the *scientism* world view. The author concludes that an ethical system can properly develop *only* from an atheistic world view and that modern intellectual scholarship must replace the illusions and palliative emotion of theism. He noted with approval that his view is increasingly being presented as the only valid one in school textbooks from the earliest levels through college.

Reviewed by Jerry Bergman, Instructor of Biology, Chemistry and Physics at Northwest Technical College, Archbold, OH 43502.

TERMINAL CHOICES: Euthanasia, Suicide, and the Right to Die by Robert N. Wennberg. Grand Rapids, MI: Eerdmans Publishing Co., 1989. 229 pages, bibliography, index. Paperback; $13.95.

Wennberg is Professor of Philosophy and Department Chair at Westmont College in Santa Barbara, California. His insightful analysis of ethical problems is already well known from his earlier book, *Life in the Balance: Exploring the Abortion Controversy* (Eerdmans, 1985). The present book is a worthy complement, as the author carefully explores the many different facets of the ethical issues surrounding suicide, and active and passive euthanasia.

He recognizes that such issues as the possibility of mercy killing, the use of painkilling drugs that incidentally accelerate dying, or the decision to terminate life-extending treatment "force us deeply into the very heart of our Christian faith as few issues do." The book is written "from the perspective of the patient, not from the perspective of the physician or health-care professional." The questions asked concern "What should the patient do or have done?" Only voluntary euthanasia is considered to be even morally debatable. While recognizing that there are many and diverse problems for the Christian with euthanasia issues, Wennberg is sensitive to the fact that "the fundamental appeal on behalf of euthanasia is an appeal to mercy and compassion."

The book is divided into seven major chapters: Euthanasia: An introduction, Suicide: What Is It?, The Morality of Suicide, Surcease Suicide and Voluntary Active Euthanasia, Passive Euthanasia and the Refusal of Life-Extending Treatment, The Permanently Unconscious Patient, and Legalizing Voluntary Active Euthanasia.

Anyone who seriously tackles a Christian approach to ethical issues soon discovers that a major part of the communication problem lies in the area of semantics: what do specific words mean and how do people use them? Wennberg recognizes this fact and is careful to be specific in definitions throughout the book. In the case of "suicide," for example, he proposes that the term be used only if death is intended, not if death is foreseen but not intended, and taking account of the possibility that death may be desired without being intended. The complexity of the issues is illustrated by his proposal "that rejecting life-extending treatment should not be called suicide when one is irreversibly dying, even though one intends death" (p. 30), and by his observation that in the Bible "nowhere is there a direct prohibition of suicide, nor is the issue of suicide even broached" (p. 45).

Wennberg is sensitive to the issues raised by the development of modern medical technology. "Such technology has enabled the physician to prolong the dying process, on occasion actually increasing the suffering that the patient has to undergo; it has also enabled the physician to keep the patient biologically alive even when he or she is not capable of rational existence and is functioning only at a vegetative level" (p. 109). He sees withholding and withdrawing treatment as morally equivalent (p. 116), endorses neo-cortical death as a valid concept of

death for the Christian (p. 175), and opposes the legalization of voluntary active euthanasia (p. 222).

The reader may wish that certain aspects of the book could be rethought and perhaps re-emphasized. In dealing with arguments related to suicide, Wennberg simply assumes the falsity of the "pacifist position." In another place he simply assumes the correctness of the "just war" position and hence finds no moral problem with taking innocent life if a military target is involved in warfare.

There also seems in general to be a neglect of the possibilities inherent in interpreting the moral acceptability of acts of suicide that fall into the category of "laying down one's life for one's friends," presumably a central consideration for Christians. These possibilities are mentioned briefly in later sections of the book, but are not given the prominence they seem to deserve. Voluntary ending of one's own life under conditions of terminal illness and suffering may be motivated primarily not by concern for one's own sufferings, but for the sufferings and financial exhaustion visited upon one's loved ones. At the very end of the book, Wennberg summarizes by saying, "To end one's life in order to further overall human welfare may seem noble, even Christian—but in fact it is not consistent with the Christian perspective on human existence" (p. 227). "Suicide therefore, would rarely be a legitimate expression of love for one's neighbor (which is not to say that it could *never* be)" (p. 228). One could wish for the opportunity to explore this further, perhaps even citing the significance of John 10:17,18, "For this reason the Father loves me, because I lay down my life, that I may take it again. No one takes it from me, but I lay it down of my own accord. I have power to lay it down, and I have power to take it again; this charge I have received from my Father."

Anyone concerned with thinking through the many intricate issues related to the topics treated in this book will want to have a copy for personal study and group discussion. Wennberg has provided another valuable service to the Christian community in carrying out this study.

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

THE TREE OF HEALING: Psychological & Biblical Foundations for Counseling & Pastoral Care by Roger F. Hurding. Grand Rapids, MI: Ministry Resources Library, Zondervan Publishing House, 1988, ©1985. 463 pages, indexes. Hardcover; $18.95.

Hurding effectively illustrates the confusing tangle of theories and unifies his book with a simile of the "trees" of pastoral care, secular psychology, and other therapies forming a dark and seemingly impenetrable forest. Obviously, the uninitiated needs a guide, and he sets the following pathfinding goals in his preface: 1) to determine the validity of the "bewildering range of approaches to counseling psychotherapy" for Christians (p. 9) and 2) to "explore Christian reaction, assimilation and dialogue in relation to secular modes of caring for the needy" (p. 10).

The second goal is accomplished; he does a very commendable job of systematically covering the range of psychological therapies and the Christian therapies that react to them or employ them in one form or another. Given the necessity of being selective in the coverage, he has done a good job of representing the "Christian reaction, assimilation, and dialogue."

Unfortunately, the first goal is left unmet; he assumes the validity of psychotherapy rather than verifying it. The early copyright date of 1985, even the 1988 date of the edition under review, precludes his consideration of the prominent, recent challenges to the whole enterprise of psychotherapy raised by such popular books as *Psychoheresy* by Martin and Deidre Bobran and the writings of Dave Hunt. However, he does raise the issue, himself, by citing the similar opinions of such counselors as Martin Bobran (p. 291). Also, he acknowledges the criticism that psychoanalysis is not scientific (e.g., pp. 100-103) but fails to meet the attacks head on. This is a pity because the issue needs to be addressed and Hurding's training, practice, and conservative theological stance puts him in an excellent position to do so.

I fear that his aim, "where possible, to find a common bond with the views of others," while very commendable, comes in conflict with his goal of assessing the validity of psychotherapy for Christians. Science and scholarship certainly have the task of finding common ground and synthesizing general principles from apparently disparate data. However, they also have the task of analyzing and separating entities that are essentially different in spite of all their apparent similarities: a whale is not a fish, a bat is not a bird. In short, does psychotherapy's atheistic, occult, and Eastern religious roots, acknowledged by Hurding in his discussions of the various theories, so fatally flaw the very foundations of psychotherapy that Christians cannot use its methodology and must develop their own system? For those who do not believe in the reality of the spiritual world and who doubt the existence of Satan and the demons, there may not be a great dilemma. However, Hurding does appear to recognize the basic problem that a great many Christians insist must be answered. At various places in his book, he tacitly or explicitly accepts the concept of demonic influence, e.g., speaking of "strange bed-fellows" of "psychic phenomena, yoga, Oriental religions" (p. 174). He then warns that the "dangers of opening up ourselves to 'the powers of this dark world' and 'the spiritual forces of evil in the heavenly realms' (Ephesians 6:12) are well documented" (p. 175), but he does not address them. A book that purports to guide us through the tangled thicket of the counseling and pastoral care forest is doing us a disservice if it does not insure that we start on the right path.

This is not to denigrate the very real value of the book. He draws on a thorough background in psychology and a career as counselor, educator, and author (*Restoring the*

Image and *As Trees Walking*) to bring us a clear, orderly, and comprehensive survey of the field. Part one covers "the rise of the secular psychologies," in the areas of behaviorism, psychoanalysis, personalism, and transpersonalism. Part two covers the "Christian reaction and response" in the areas of biblical counseling, relationship counseling, inner journey, and healing the past. He traces the development of each theory and, depending on the material to be covered, discusses each therapist's assumptions, aims, and methods, and then he critiques the therapy.

There are extensive end notes to assist the reader in going deeper into the scholarly literature for any area, an Index of Biblical References, and an excellent General Index. Anyone looking for an introduction to the broad range of psychotherapy and formal philosophies of Christian counseling would be well served by this book.

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

Letters

Donald MacKay and Semi-materialism

William Dembski, in his article "Converting Matter into Mind" in the December 1990 issue of the journal, I think fundamentally misunderstands the position of the late Donald MacKay when he charges him with being a semi-materialist. He quotes him as saying, "No change can take place in the conscious experience reported in a higher-level story without some corresponding change in the stories to be told at the lower level (though again not conversely)." He then goes on to say, "The phrase 'not conversely' is decisive: it demonstrates that he takes the lower level as fixing the upper level. This is supervenience."

He has earlier described supervenience in terms of "there is no difference without a physical difference." This Dr. Dembski says means that man's soul and spirit "are not only inseparable from the body, but actually derived from the body." Now it seems to me that his logic is at fault. If, as MacKay says, you cannot make the changes at a higher level without some corresponding change at the lower level (though not conversely), then his point surely is precisely the opposite of what Dembski concludes. It is that you can have changes at the lower level which do not affect changes at the higher level. You can lose part of your brain without it having any detectable effect on your mind and psychological and spiritual powers. On the other hand, every change in your mind has some effect in the brain corresponding to it. This is the opposite of supervenience and I do not understand how Dr. Dembski charges MacKay and those who think like him, with semi-materialism.

Surely the position is that the higher level realities are in this life "embodied" in the physical framework. That does not mean that they are fixed by the physical framework. MacKay certainly held that even if the physical framework were perfectly describable in scientific and mechanistic terms, there would still be freedom of choice (see several articles on "The Logical Indeterminacy of a Free Choice.")

Dr. Dembski seems to me to try to give us two alternatives. Having demolished the one he says we must accept a sophisticated version of the God-of-the-gaps. It is good to have someone defending that position, and he is not alone, but MacKay was constantly arguing for a third alternative that is neither semi-materialism nor God-of-the-gaps, but thought in terms of complimentary aspects of reality, each in principle complete on their own level and integrated in ways which he discussed, but in which the lower level descriptions neither determine nor explain in full the higher level realities.

Dr. Dembski seems to think that all who work in cognitive science are trying to debunk the existence of other realities. MacKay, who worked in this field, and was an international expert in it, did not hold that view, but rather that we should make every effort to explain what we can in terms of scientific categories while recognizing the limitations of science if it should try to describe the spiritual realities which inter-penetrate the lower level realities in a way somewhat analogous to that in which a computer programme relates to the hardware. It was MacKay who coined the phrase "nothing buttery" to attack the very position of which he is here accused. The higher level realities are not merely the sum of their parts and cannot be adquately described in those terms, but that does not allow a sort of detached "supernatural" realm in which the human spirit can function without any relation to physical reality — at least not in this life.

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Scriptural Physics

I would like to add a comment to my article "A Christian Perspective on Time" (September 90). In that article I suggested that God created space and time for the pur-

pose of depicting "separateness" and that there is a scriptural and factual basis for believing that space and time are each three-dimensional and that both progress or expand at the speed of light. I suggested that this would lead to common-sense explanations for the constancy of the speed of light and for what has been termed the Einstein-Podolsky-Rosen ("EPR") paradox.

I noted that locations in coordinate time have no corresponding positional component in a spatial reference system. Photons originating from a distinct source in a temporal system would map into a spatial system in a purely random fashion and would therefore appear as diffuse background radiation in the spatial system. I suggested that the microwave background radiation might represent this sort of phenomena but felt that X-ray and gamma ray photons must also be included.

I did not know at the time I wrote the article that the existence of an X-ray background has been known for decades:

> Even the most contentious people usually agree that the night sky is dark. Don't try arguing the point with an astronomer, however. In 1962 researchers discovered that when seen through instruments sensitive to X-rays, the sky glows with a bright and oddly uniform intensity. This pervasive radiation, rather unpoetically known as the diffuse X-ray background, has eluded easy explanation. Roughly 25 to 30 percent of the background has been attributed to quasars. . . . The origin of the rest has been a persistent mystery. . . . The spectrum of the X-ray background closely resembles that of a thin, hot gas. (*Scientific American*, March, 1991, p. 26, "X-ray Riddle: Cosmic background is still unexplained." See also *Astronomy*, April 1991, p. 22, "X-rays Light Up Philadelphia").

Again, I believe that the pursuit of "scriptural physics" will lead to new insights into such puzzling phenomena.

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Swallowing Absolutism

Whether the subject is science or religion, I find myself cringing when I hear a positivist or absolutist exposition on a particular theme. (Or should I say dogma?) And indeed I did find myself cringing when I read Roy A. Clouser's "Genesis on the Origin of the Human Race" (*PSCF*, March 1991). In this particular case one could recognize two dogmas going head to head. At stake was whether the book of Genesis was on the side of the Biblicist or the Scientist.

At stake in this particular article is how precisely we can understand the mind of the author. I agree with Clouser that "Scripture must be understood as having an essentially *religious* character" (p. 4, original emphasis). Where I differ is to what extent we can use this as an absolute interpretive guide. For instance, based on the above understanding, Clouser makes the following claim:

> Viewed as prologue to the covenant(s), the main purpose of the first part of the creation account is plainly to identify the covenant-maker. It distinguishes the God of Israel from the gods of Paganism by proclaiming Him to be the creator of everything other than Himself. It does not intend to tell us what we would have seen could we have been there to observe the universe in its early stages (p. 5).

Such a statement assumes that the writer of Genesis 1 shared an essentially similar world-view to our own. Can we be certain that the writer did not intend to set forth a cosmology? Can we be certain that the writer did not have certain "encyclopedic intentions" as he formulated this drama? I suspect that Clouser's assumptions are correct, but his absolutist approach to the problem sounds far too much like his literalistic, creationist counterparts.

At the heart of the issue is the failure to distinguish between the issues addressed in the text and the issues which we desire the text to address. (This latter desire is certainly not bad, but it comes under the purview of application, not interpretation.) This failure to distinguish between the original and intepretive horizons can be clearly seen on p. 10:

> Because of the essentially religious focus of the text, and the essentially religious nature of humans, I find the biblical account to be giving us an account of the intial appearance of religious consciousness in creatures.

As if the author of Genesis was concerned about some modern definition of "the initial appearance of religious consciousness"! It's not absolutely impossible, I suppose, but I find it a bit much to swallow that the "facts" are that apparent.

Recent events in the Middle East have demonstrated once again the tremendous hermeneutical gap which exists between different cultures. (Was the Gulf War in response to the rise of a "second Hitler," or yet another "Christian Crusade"?) When one adds a distance of several thousand years, one must approach these questions with great humility indeed.

Clouser's argument certainly is worthy of some consideration, but in his effort to answer the creationists it would appear that he has fallen into the same epistemological and hermeneutical traps.

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LOCAL SECTIONS

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