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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Putting Things Into Perspective

In this issue our lead article offers a revealing portrait of an astrophysicist/theologian's search for personal meaning, and desire to think and act out of a Christian world view. Christopher B. Kaiser's "The Creationist Tradition in the History of Science" describes the origin of this tradition in the early Christian era and the ways in which it nurtured the rise of modern science. The themes of the comprehensibility of nature, the unity of all things, and the *relative* autonomy of nature were critical in the development of western science. The latter theme has been distorted by modernity's distancing of God from nature. Kaiser's final theme, the ministry of healing and restoration, still offers a means for differentiating between good and bad science.

In our second article, Kurt Wood examines a Muslim approach to understanding the relationship of science and scripture which closely parallels some evangelical approaches. Science plays an important role in modern Islamic apologetics, as seen in French surgeon Maurice Bucaille's *The Bible, the Qur'an and Science*, a Muslim best-seller since 1976. Wood demonstrates the Muslim proclivity toward eisegesis, a sin not unknown to evangelicals. His deft analysis of Muslim apologetics should cause us to examine anew our own traditions.

Altruism is an important topic this spring with conferences at the Evangelische Akademie at Loccum, Germany and St. Paul, MN. Colin Grant's "The Odds Against Altruism: The Sociobiology Agenda" focuses on the inadequacy of evolutionary-biological explanations to account for the fact that "there are individuals who apparently sacrifice themselves, and *a fortiori* the transmission of their genes, for the sake of others." He concludes "how different our present prospects might be, if sociobiologists were to relinquish their obsession with selfishness and give sufficient scope to the cooperation and apparent altruism that they themselves are constrained to mention."

In our first Communication, Robert Kaita provides a plasma physicist's view of the opportunities and obstacles for Christian witness in the scientific work place. Recent political and economic changes offer new chances to offer a cup of cold water to those in need. Kaita offers examples from his own recent experience.

"Recent creationists" have argued that the velocity of light (c) has diminished over a 10,000 year period from an infinitely large value at the point of the "big bang" to the current estimate of 299,792.4561 km/sec. Gene Pennello's Communication evaluates this assumption using the statistician's "sign test" to examine c values obtained over the last three centuries.

The Book Review section is headed by James Moore's essay review of John Brooke's pacesetting *Science and Religion: Some Historical Perspectives* (1991). This is one of those works that truly belongs in the library of every ASA member. There follows a large selection of book reviews on a diversity of topics related to the mission of the ASA.

Letters to the Editor provide a fitting close to a wide-ranging issue.

JWH

The Creationist Tradition in the History of Science

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The historical relationship between Christianity and the physical sciences is often construed in terms of the causes of the origin of modern Western science. My own context in the study of history leads me to ask the question in terms of the meaning of science and criteria for legitimate scientific work. In order to answer these questions, materials are derived from a survey of the early Jewish and Christian beliefs about creation and their implications for life and work — what has been termed the "creationist tradition." The historic creationist tradition is summarized here under four headings. Three of these pertain to our view of the world and give theological meaning to natural science. The fourth pertains to our ministry in the world and provides important social and ethical criteria.

In this paper, I want to share some of the questions and partial answers that led to my writing *Creation and the History of Science* (Eerdmans, 1991). But I would like to explain the motives and the process as much as the results of my work. Accordingly, I shall be more personal in the first part of this paper than I could be in the book itself.

I am an historian of Christian thought and life, and I am interested in the ways in which Christian belief has provided a context within which people over the centuries have understood themselves, their times, and their work. The most important thing to know about historians is they are not themselves above history. The questions they ask are contextual: they reflect the concerns of the times and places in which they live. But this contextuality makes their work interesting. It speaks to issues that concern all who share their culture.

The time, place, and culture I am assuming here is one dominated by late twentieth-century secular science and technology. I shall begin by describing the contemporary issues that I have felt the need to explore before I turn to the history of Christian thought itself.[1]

Motives for Seeking Theology in the History of Science

First and foremost, there is *the issue of meaning*. All of us are products of the modern world. We are products of a culture in which there are no universally held beliefs about a transcendent order of any kind. It is a secularized world in which there is no "sacred canopy" overarching life and work.[2] Our professions, our allegiances, and even our religious affiliations are largely determined by intramural standards that are generally assumed to stand on their own.

I grew up in an agnostic atmosphere. In my college years, during the early 1960s at Harvard University, I was exposed to a wide variety of belief systems. From my experience of family life and my observation of other people, I felt that there was an underlying meaning to it all, yet I had no explicit confession to articulate that meaning. I found myself in what psychologists would term a "double bind":

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I was not able to affirm any meaning in life, but I was not able entirely to deny it either.

It was in my study of physics that I found this double bind to be particularly strong. Physicists, like many other scientists and engineers, form a strong sense of identity with their profession and their community. They have professional values and a high degree of motivation. They celebrate the heroes and the great dramas of their discipline. Most remarkably, they contemplate an abstraction of the real world — an abstraction that is, at times, almost mystical — in full confidence that it may actually be applied to the real world. Yet, in my experience, physicists rarely discuss the supra-individual aspects of their community or the "mystical" aspects of their work. There is a marked discrepancy between what is experienced and what is verbalized.

This is the best explanation I can give for my own conversion from the study of natural science to historical theology. I needed to explore the values and beliefs that are implicit in physics and the other sciences — indeed, in modern Western culture as a whole — how they arose and how they related to the theological perspectives of earlier generations, like the doctrine of creation, in which the supra-individual and the mystical were explicitly recognized. In other words, my own progress has been from modern science to the creationist tradition, in order that I might understand how the historical progress came about in the other direction.

But there is a *second issue* that has troubled our time in a way that I as an historian must reflect. If the issue of meaning came out of the early 1960s, the contribution of the later '60s and early '70s was *the threat of science and technology* to various ecological and human values. Up until that time, many Christian apologists had proudly claimed that biblical faith was the basis of scientific development as though there were a one-to-one correspondence between Christianity and modern Western science.[3] As I went through seminary and graduate school, however, I and my fellow students became aware of issues that were new for us: we became aware of the needs and claims of non-Western cultures; we became sensitized to the social and ideological commitments of Western science and technology even within our own culture; and we began to see the threat of pollution and destruction that came with modern technology even in its more peaceful strains.

So in addition to the issue of meaning, there was for me *the need for criteria.* What are the real values that science and technology are supposed to fulfill? Can we learn anything helpful from the understanding of creation that inspired the rise of science in the first place? Can we go back to the theological tradition — back to belief in creation, in particular — and find any directives so implanted in the history of the tradition that we can require their fulfillment of all "good science"?

Of course, any one is free to criticize science and technology with whatever values they may choose. There is an entire field called "Science, Technology, and Society" (STS) devoted to such analysis and criticism. But are we *as representatives of the Judeo-Christian tradition* in a position to hold up to modern science an agenda out of which it has arisen and say, "These are the values that accompanied your birth and nurture. These are the values that brought you into being and sustained you in less hospitable times. These are the values that you will need if you are to fulfill your historic mandate and avoid being controlled entirely by external social and ideological factors."

Good historical writing is largely "objective," but the objectivity of history does not come from some kind of detachment from the stream of events. It comes from an ability to enter into that stream with a sense of bearings. It comes from an ability to articulate issues and value-conflicts that are implicit

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in the present situation in terms that transcend the present. History is a modern equivalent of the gift of prophesy. So would that all the Lord's people were historians! (Num. 11:29, adapted).

With this by way of introduction, let us now turn to the history of science itself.

The Spiritual Roots of Modern Science

Historians of science realize today that modern science had its origins not only as far back as the Renaissance and Reformation period, but farther back, in the medieval period itself. Catholic historians like Pierre Duhem and M. D. Chenu have documented the key developments of the twelfth, thirteenth, and fourteenth centuries.[4] More recently, historians of science like Richard Dales and Edward Grant have described what Dales has termed the "creationist tradition" of the Middle Ages as providing the background or matrix from which modern science arose.[5]

Even this brief introduction to the current discussion tells us two things. First, it tells us that debates about the reaction of the Catholic Church to Copernicus and Galileo and discussions of the religious convictions of Boyle and Newton are not decisive in determining either the issue of meaning or the issue of criteria. Figures of the sixteenth and seventeenth centuries, whether Catholic or Protestant, were working with ideas and problems that they held in common as a heritage from the Middle Ages. At the risk of offending other historians of the early modern period, I must say that the modern world is really the tail on the medieval dog, even when — especially when — it is reacting against its image of what constitutes the "medieval" or the "scholastic."

But we can press the matter further. The medieval period was both innovative and traditional at the same time. It was highly innovative in matters of technique and interpretation, but it was also very traditional in matters of faith. The "creationist tradition" that it passed on to the early modern world was itself an inheritance from the world of Late Antiquity. In fact, there is a remarkable degree of continuity all the way from the Hellenistic period (the third century BC and after) through the Middle Ages to the early modern period (sixteenth and seventeenth centuries).

So the work of recent historians tells us a second thing: we not only have to look back beyond the early modern world to the medieval, but we have also to look back beyond the medieval period to its roots in the period of Second Temple Judaism and the early church. In this way historians can look back to early belief in creation from the perspective of modern science.

But we must be careful here. One cannot treat ideas as constants over a period of two thousand years. Nor can one treat ideas of one tradition as if they existed in isolation from those of other traditions. The writers of the Hebrew Bible wrote in a cultural milieu dominated by the mythologies of Egypt, Canaan, Anatolia, Assyria, Babylon, and Persia. The writers of the New Testament and the early church also lived in an ecumenical period dominated by thought arising out of a variety of cultures, particularly the Hellenistic Greek, Egyptian, Syrian, and Iranian.

The interactions that took place from the third century BC to the third century AD were complex and are very difficult to disentangle. The work being done today on the Old Testament Pseudepigrapha, Gnostic writings, and the Hermetic corpus is helping us better to understand the cosmopolitan arena out of which Second Temple Jewish and early Christian thought emerged. In addition to the religious traditions of Canaanite culture and religious influences from Egypt and Persia, there were significant stimuli from Platonism, Stoicism, Cynicism, and the Hippocratic and Neopythagorean traditions.

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Out of all this, and in continuity with older traditions from the Hebrew Bible, came what Richard Dales has called the "creationist tradition" of the early Middle Ages.[6] My own work over the past twelve years has aimed at defining this tradition in the early Christian era and determining how it may have changed over the centuries in Western Europe in such a way as to lead to the basis of modern science in the late medieval and early modern periods.

My aim has been to develop a model of these developments in the Christian theology and history of science. Much more work needs to be done in the amplification, testing, and correction of this model. But let me share the results with you briefly

and then conclude by coming back to the issues of meaning and criteria for science with which I began.

I find it convenient to summarize the creationist tradition in four basic themes. These themes can be derived inductively from a study of Jewish and Christian literature of the Hellenistic era, the second century BC to the fourth century AD (from Ben Sirach to Basil of Caesarea).[7]

The Comprehensibility of the World

The first theme is the comprehensibility (some would say the "intelligibility") of the world: the belief that the physical world is actually open to human inquiry and comprehension. There are three aspects to this belief.

(A) There is a lawfulness or wisdom or logic (the Greek *logos*, not necessarily the same as ordinary human logic) to the natural world — even in its most complex and most remote aspects. This idea has roots in the mythic traditions of the ancient Near East and was clearly associated with the idea of creation in the Hebrew Bible and Second Temple Judaism.[8] The most cited text in the early and medieval church was from the deuterocanonical Wisdom of Solomon: "Thou hast arranged all things by measure and number and weight" (Wis. 11:20).

(B) The human mind is capable of discerning the logic of the natural world — even in its more complex and remote aspects — and of mapping it out with logical, conceptual models of its own devising. In the post-Darwinian era, this superadaptation of the human mind has been regarded as a great mystery, for instance, by Albert Einstein and Eugene Wigner.[9] The writings of the Hebrew Bible and Second Temple Judaism, however, attributed to humans a special endowment — an image of God or a spirit from God — which provided a possible link between the structures of the world (created by God) and those of the human mind.[10]

(C) Both the logic of nature and the creative reasoning of humans are rooted in a transcendent order, a divine Logos or Wisdom that creates and upholds all things.[11]

The crucial point here is belief in the linkage between the natural and human orders at levels beyond ordinary, everyday experience — belief in the transparency of the natural order, or the power of the human mind, or both. This belief is by no means universal. It is not shared by all religions or philosophies. It is not widely attested in Chinese Taoism,[12] for example, and it is directly contradicted in major texts of Vedanta.[13] In fact, there are times when we ourselves may be inclined to doubt the transparency of nature under the pressures of modern life and the inconsistencies of the artificial world we ourselves have constructed.

But the linkage between the depths of the human psyche and the depths of the cosmos was axiomatic in the Hebrew Bible and Second Temple Judaism[14] and in the Christian faith that sprang from them.[15] It meant that the natural world could be understood in principle, even if the resolution of many questions seemed to be impossible in practice in the absence of adequate technologies for exploration and experiment.

As new tools of observation became available in the European Renaissance, scientists like Johannes Kepler were guided by their faith in the comprehensibility of the world based on the creationist tradition. According to Kepler:

> ... God, who founded everything in the world according to the norm of quantity, also has endowed humanity with a mind which can comprehend these norms.[16]

> Those laws are within the grasp of the human mind. God wanted us to recognize them by creating us after his image so that we could share in his thoughts.[17]

The creationist tradition thus provided a faith in the comprehensibility of the world that gave meaning and hope to early modern scientists.

The Unity of Heaven and Earth

A second theme in the creationist tradition is the unity of heaven and earth — in other words, the unity of all things as created by one God and ruled by one Lord (Deut. 4:39; 1 Cor. 8:6). Like the first theme, this idea was not common to all traditions in the ancient world and so required special legitimation to establish it. Many ancient schools of thought drew a sharp line between the starry heavens and the terrestrial realm. Aristotle, for instance, developed two different kinds of physics for the two realms, one involving straight-line motions and the four ordinary elements, the other involving circular motions and a strange fifth element, the "quintessence," not found on earth.

The insistence on a single physics for both heaven and earth was injected into Western thought by a

long line of creationists. Athenagoras, Tertullian, Athanasius, Basil of Caesarea, John Philoponus, and John of Damascus established the idea in the early church and passed it on to later Islamic and medieval Christian thinkers. It was suppressed temporarily during the resurgence of Aristotelianism in Western Europe in the thirteenth century, but then was recovered by leading natural philosophers of the fourteenth century like Thomas Bradwardine, John Buridan, and Henry of Langenstein. Nicholas of Cusa formed the bridge over which the idea of the unity of heaven and earth reached the Renaissance and early modern science. And the nineteenth-century quest for a unification of electricity, magnetism, and optics, culminating in the work of James Clerk Maxwell, was still inspired by this theological ideal.[18]

Nowhere has faith in the unity of nature been more severely tried than in the paradoxes of relativity and quantum theory. The laws and properties of nature at high speeds, in intense gravitational fields, and at the quantum level are so different from those we experience in our everyday, "Newtonian" world that they appear to exist in different worlds altogether. As Niels Bohr has argued, however, the new physics seeks higher degrees of unity and harmony at the same time that it attempts to be more comprehensive in its scope.[19] Even though he was not a confessing Christian, Bohr clearly exhibited the creationist faith in the unity of nature, which he inherited from his model, James Clerk Maxwell.[20]

The Relative Autonomy of Nature

A third theme in the creationist tradition is the relative autonomy of nature. Literally, autonomy means "governed by its own laws of operation." From this ancient belief we get the modern idea of physical law, which is usually dated from the mechanical philosophy of Descartes.[21] Nature operates in accordance with principles that not only make it comprehensible and unified, but make it regular and predictable.[22]

The ancient Near Eastern background for this idea was the analogy between the cosmos and the state. Just as a ruler could issue an edict that would become a law for all people by virtue of its publication and would continue in force until amended or repealed, a god like Marduk could pronounce a divine decree with the same kind of effect for all creatures.[23] In the Hebrew Bible, the courses of the stars, the regularity of the seasons, and even the unruly elements were seen to exemplify the laws of the one true God.[24]

Jewish and Christian writers of the Hellenistic period heightened the sense of the relative autonomy of nature. The inherent dynamism of the heavens was captured by these lines from Jesus ben Sirach (Hebrew original, early second cent. BC):

> When the Lord created his works from the beginning,
> and, in making them determined their boundaries,
> he arranged his works in an eternal order,
> and their dominion for all generations.
> They neither hunger not grow weary,
> and they do not abandon their tasks.
> They do not crowd one another,
> and they never disobey his word. (Sir. 16:26-28)

Note that the autonomy of nature is viewed here as an expression of the power of God's word, not as its denial, as in modern Deism.

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In the mid-fourth century (c. 360), Basil of Caesarea adapted a popular Stoic idea and compared the cycles of nature to a spinning top which continues in motion after the initial twist. Referring to the decree of God in Genesis 1:11, "Let the earth put forth vegetation ...," he commented:

> It is this command which, still at this day, is imposed on the earth and, in the course of each year, displays all the strength of its power to produce herbs, seeds, and trees. Like tops, which after the first impulse continue their evolutions, turning upon themselves, when once fixed in their center; thus nature, receiving the impulse of this first command, follows without interruption the course of ages until the consummation of all things. (*Hexaemeron* V.10) [25]

This image of a spinning top or wheel was passed on to the Middle Ages by John Philoponus and various Syriac and Arab commentators as an example of what later became known as the conservation of momentum (in this case, angular momentum).

John Buridan was one of the first to expound the idea of momentum (or impetus) conservation in the Latin West (mid-fourteenth century). Significantly, Buridan used the same image and the same reasoning as Basil,[26] though we are not sure whether he came to his conclusions independently or not.[27] Then, of course, the idea was picked up by Galileo,

Descartes, and Newton and became the basis of our classical mechanics.

Now, if you put these first three themes together, you get something that looks very much like the thought-framework out of which early modern science arose. The comprehensibility of the world is the basis of our belief in the applicability of conceptual tools like mathematics to physical phenomena. The unity of heaven and earth supports the idea of a single set of laws for all natural phenomena. The idea of the relative autonomy of nature supports the belief that the same causes under the same conditions always produce the same effects.[28] Conversely, fundamental assumptions of science like the applicability of mathematics, the unity of nature, and the consistency of causation are historically grounded in the creationist tradition. Thus far, the meaning of scientific work is clarified by the theological assumptions upon which it was founded.

From the Meaningful to the Merely Mechanical

Before passing on to the fourth and final theme of the creationist tradition, however, I should point out a significant alteration that took place in the idea of relative autonomy during the Latin Middle Ages — a shift to autonomy in the mechanical sense. I have described the idea of the dynamism of nature as having its roots in Jewish and early Christian literature. But the biblical idea was one of only *relative* autonomy for nature, not the complete autonomy we have come to associate with the modern, mechanical clock.

For one thing, clocks never were autonomous in the ancient world, even in appearance. Both the water-clock and the sundial were rather variable in their rates of time-keeping. They required continual maintenance and recalibration to keep them functioning properly. It was not until the late-thirteenth and early-fourteenth centuries that mechanical clocks began to be developed, and not until the eighteenth century that they achieved the kind of regularity we associate with them today. So the kind of autonomy we now attribute to the cosmos is very much a projection of the kind of autonomy we are inclined to give to our modern machines. The autonomous "clockwork universe" that causes us such problems, both philosophical and practical, is really just a human artifact or "social construction."[29]

But there was also an independent shift in the very idea of autonomy through the Middle Ages. Beginning with the twelfth century, the operation of nature was viewed as *disjunctive with the direct operation of God*, the latter being confined to primary creation and what we would call "miracles." The early Christians had had a mystic sense of the physical law as the concrete expression of God's word. In medieval scholasticism this led to the idea of *potentia Dei ordinata*, the divine order in which nature operates in accordance with its God-given laws when God does not interfere in any way. When God did interfere in a "supernatural way," (say, in a miracle) God was exercising the divine prerogative of *potentia absoluta*, or absolute power over all things.

For one thing, clocks never were autonomous in the ancient world, even in appearance. Both the water-clock and the sundial were rather variable in their rates of time-keeping and required continual maintenance and recalibration ...

It is not the exact usage of technical terms like *potentia ordinata* and *potentia absoluta* that is important, so much as the fact that the sharp distinction between the two suggested that they were mutually exclusive (in principle, if not in historical fact). Aside from the origin of the cosmos and the occasional miracle (always bracketed in science), nature could be regarded as being autonomous for all practical purposes. Adelard of Bath clearly exhibited this tendency already in the early-twelfth century:

> Truly, whoever thinks to abolish the innate order within nature is mad .... For he who disposes is most wise and, consequently, is least of all either willing or even able to abolish the fundamental order in nature ... and, among [natural] philosophers, it is agreed that any upsetting of this order is least likely to occur. (*Natural Questions* IV)[30]

This separation made it possible to study nature in a more detached way and to exploit it more freely than would otherwise have been the case.

I want to emphasize the difference between the early Christian idea of the relative autonomy of nature and the later medieval idea of *potentia ordinata*. Many champions of modern ecology pointed to the Judeo-Christian tradition as the source of our Western tendency to exploit nature. Apart from a misreading of Genesis 1, this criticism is generally based on ideas like those of Francis Bacon, Robert Boyle,

and William Derham, which presuppose a greater degree of autonomy to nature than the biblical or early Christian writers would ever have allowed.[31] In fact, several intermediate steps have to be considered. For example:

(1) the shift from the Greek patristic outlook to Latin medieval culture, particularly with Augustine and Boethius;

(2) the desacralization of royal power associated with the investiture controversy of the late eleventh century;

(3) the incipient naturalism of Adelard, William of Conches, and others in the twelfth century;

(4) the impact of Aristotelian cosmology in the thirteenth century;

(5) the development of linear perspective and mechanical technologies in the fourteenth and fifteenth centuries; and

(6) the rise of the mechanical philosophy in the seventeenth century.

These factors have pressed the idea of the relative autonomy of nature into a very different mold than it originally had in its biblical context — and all before the eighteenth-century Enlightenment.

The Ministry of Healing and Restoration

The fourth theme in the creationist tradition, the ministry of healing and restoration, is the most practical of the four, and yet the least commonly recognized.[32] It concerns the lives, as well as the beliefs, of those who confess divine creation.

Of course, there are healing traditions in all civilizations and in all religions. No civilization could survive without one. But for the most part, nonbiblical traditions have seen the possibilities for healing as very limited when compared to the Judeo-Christian tradition that gave rise to early modern medicine. This limitation is related to differing views of creation. For many traditional religions and philosophies, creation took place out of a preexistent matter (whether the matter was independent of God or somehow alienated from God's own substance). The recalcitrant character of this matter placed constraints on the act of creation itself and made the possibility of recreation, especially in the case of the corruptible human body, very unlikely. For many nonbiblical traditions, in fact, the posssibility of recreation was not considered important.

The dynamic character of the early Christian communities, on the other hand, was deeply rooted in their belief in the totality of creation (including all matter) and the consequent possibility of recreation. Early Christians looked for the resurrection of the body, not just the liberation of the soul. In fact, the doctrine of creation *ex nihilo* (creation without preexistent matter) was directly related to belief in the resurrection of the body (e.g., 2 Macc. 7:28; Rom. 4:17-21).

The very Spirit who had hovered over the primordial waters of creation and who had raised Jesus from the dead was empowering the healing of broken bodies through the use of simple folk medicine and faith in Jesus as risen Lord.

We are dealing here with the very heart of Christianity. New Testament Christians believed that they had received the gift of the Spirit. The very Spirit who had hovered over the primordial waters of creation and who had raised Jesus from the dead, was empowering the healing of broken bodies through the use of simple folk medicine and faith in Jesus as risen Lord.[33] Closely associated with the ministry of healing was a calling to sacrificial service: the early Christians took Jesus as their model of preaching and healing for the benefit of others.

The ideas of creation, resurrection, and a life of service to others were the basis of the early Christian ministry of healing. Various accounts in the ante-Nicene literature show how early Christians performed healings and acts of charity as a demonstration of the truths of creation and resurrection.[34] Consider the following argument of Irenaeus against Gnostics who denied these basic beliefs:

> It is not possible to name the number of the gifts which the church, [scattered] throughout the whole world, has received from God in the name of Jesus Christ, who was crucified under Pontius Pilate, and which she exerts day by day for the benefit of the Gentiles, neither practicing deception upon any nor taking any reward from them.
>
> ... directing her prayers to the Lord, who made all things, in a pure, sincere, and straightforward spirit, and calling upon the name of our Lord Jesus Christ, she has been accustomed to work miracles [*virtues*] for the advantage of mankind, and not to lead them into error. (*Against Heresies* II.xxxii.4-5)[35]

The truth of the gospel was validated by Christians' ability (wisdom and power) to heal human illness and by their concern for the welfare of others in both body and in soul. Irenaeus assumed that these characteristics were so obvious that they would be recognized by his readers. Would that the same would be so evident in the church today!

In the early church, healing was a direct expression of the Christian belief in creation, whether it was accomplished by means of traditional medicine or by faith alone.

The history of the ministry of healing can be traced from the early church through the beginnings of the monastic movement and the founding of the earliest public hospitals down to the establishment of medical schools and hospitals in the Middle Ages. But, again, some attempt must be made to differentiate stages along the way.

In the early church, healing was a direct expression of the Christian belief in creation, whether it was accomplished by means of traditional medicine or by faith alone. This early work led to the institutionalized social and medical ministries of fourth-century fathers, which still had a strong theological grounding. A good example is Basil of Caesarea, who is credited with founding the first public hospital in Western history (early 370s). According to his associate, Gregory of Nazianzus, Basil was inspired by faith in the same God who had empowered Moses, Elijah, and Jesus, and patterned his work after the healing ministry of Christ:

> Others have had their cooks and splendid tables and the devices and dainties of confectioners and exquisite carriages and soft, flowing robes. Basil's care was for the sick and the relief of their wounds and the imitation of Christ, by cleansing leprosy, not by a [mere] word, but in deed. (*Oration* XLIII.63)[36]

Basil's belief in creation could be expressed through the use of institutional medicine and was not restricted to what we view as miraculous.

The relation between belief in creation and the ministry of healing was eloquently expressed by John Chrysostom, who was instrumental in the founding of two early hospitals in Constantinople. As Chrysostom reasoned with his parishioners in one of his sermons:

> In this way [by caring for the poor], we shall have God for our fellow-worker, and we ourselves shall be workers together with God. For God brought the poor from not being into being, and you will prevent them, after they have been brought into life and being, from perishing with hunger and other distress, by tending them and setting them upright.... (Homily on Romans XIV.11).[37]

For early theologians like Basil and Chrysostom, creationist faith was determinative even in what we might regard as secular medicine and social service.

During the early Middle Ages and the Renaissance, the ethic of medical care was gradually divorced from its theological moorings. This process was facilitated by some of the more pessimistic tendencies of the Augustinian tradition and by the twelfth-century dichotomization of natural and supernatural orders that we noted earlier. In spite of a theological renewal in the late Middle Ages and the Reformation, by the eighteenth century the art of medicine was almost entirely secular, as it has remained to this day — even for many of those who practice it in the context of Christian institutions.

Even so, the basic ideals underlying modern medicine are the same as those inherited from the creationist tradition: (a) that basic health care (if not perfect health) is an attainable ideal for all people; and (b) that the best criterion for all human arts and sciences is the amelioration of the human condition. Physicians for Social Responsibility and the Paris-based Doctors of the World are just two examples of medical associations that consciously exemplify these ideals.

The benefit of others ... is the criterion to which we must appeal even today in order to differentiate between good science and bad science from a theological perspective.

The benefit of others was the criterion that early Christians derived from the life and teachings of Jesus. It was the criterion they used to argue their case against irresponsible magical practices of their time (e.g., Matt. 7:21-23; Acts 13:6-10). It was the criterion that was picked up and publicized by early modern scientists like Francis Bacon (that science

should be pursued not for reputation or profit, but "for the glory of the Creator and the relief of man's estate")[38] and used to win for themselves a solid social and political backing. And it is the criterion to which we must appeal even today in order to differentiate between good science and bad science from a theological perspective.

In this paper, I have gone back to the idea of creation and exegeted its significance in the early church in order to trace its role in the development of modern science. Having begun by moving from science to creation, I have retraced my steps from the creationist tradition back to modern science. The point is not that Christian faith deserves some kind of recognition for its contributions to this history. Nor is it that the church deserves criticism for its failure to direct the process with more insight. The point is rather that we may find our own bearings, both in a sense of meaning in what we are doing today and in a set of criteria to guide us towards the future, by tracing our theological roots and contemplating the great theological beliefs that inspired the beginnings of the scientific tradition. If we are to see our civilization through the crises that lie ahead, we may need to discover the creationist tradition again. *

NOTES

[1]In my experience, the issues I address are more of interest to non-believing scientists that they are to believers who are not trained in the sciences. So they are quite different from those presupposed by Howard Van Till in his review of my book, "Can the Creationist Tradition Be Recovered? Reflections on *Creation and the History of Science*", *Perspectives* 44 (Sept. 1992), 178-85. It is this difference of context rather than any divergence in philosophy, I believe, that accounts for our differing emphases in evaluating the "creationist tradition."

[2]Peter Berger, *The Sacred Canopy: Elements of a Sociological Theory of Religion* (Garden City: Doubleday, 1967).

[3]E.g., Reijer Hooykaas, *Religion and the Rise of Modern Science*, (Grand Rapids: Eerdmans, 1972.)

[4]Pierre Duhem, *Le système du monde* (10 vols., Paris: Hermann, 1913-59), abridged ET entitled *Medieval Cosmology* (Chicago: Univ. of Chicago Press, 1985); M.-D. Chenu, *Nature, Man, and Society in the Twelfth Century* (French ed. 1957; ET Chicago: Univ. of Chicago Press, 1968).

[5]E.g., Richard C. Dales, "A Twelfth-Century Concept of the Natural Order," *Viator* 9 (1978), 179-92; Edward Grant, "The Condemnation of 1277, God's Absolute Power, and Physical Thought in the Late Middle Ages," *Viator* 10 (1979), 211-44.

[6]Dales, "A Twelfth-Century Concept," 191-2; *idem*, "The De-Animation of the Heavens in the Middle Ages," *Journal of the History of Ideas* 41 (Oct. 1980), 533-4.

[7]For greater detail, see my *Creation and the History of Science* (Grand Rapids: Eerdmans, 1991), ch. 1.

[8]E.g., Gen. 1; Job 28:25-26; Ps. 104; 148; Prov. 8:27-30; Isa. 40:12.

[9]Albert Einstein, *Ideas and Opinions* (London: Alvin Redman, 1954), 46, 52; Eugene P. Wigner, "The Unreasonable Effectiveness of Mathematics in the Natural Sciences," *Comm. in Pure and Applied Mathematics* 13 (Feb. 1960), reprinted in idem, *Symmetries and Reflections* (Cambridge MA: MIT Press, 1979), 222-37. See also John Barrow, *Theories of Everything* (Oxford: Clarendon Press, 1991), 8, 199-200; Paul Davies, *The Mind of God* (New York: Simon & Schuster, 1992), 20, 24, 108, 149, 152, 153, 155, 232.

[10]E.g., Gen. 1:26-28; Job 32:8; Wis. 7:15-22; 9:1-4; Sir. 17:1-11.

[11]E.g., Ps. 104:24; Prov. 3:19-20; 8:22; Jer. 10:12; 51:15; Sir. 1:9; 43:26; Wis. 1:7; 8:1; John 1:3; 1 Cor. 8:6; Col. 1:16-20; Heb. 1:2-3.

[12]Joseph Needham, *The Grand Titration* (London: Allen & Unwin, 1969), 35-37, 46, 322-7; Derk Bodde, *Chinese Thought, Society, and Science* (Honolulu: Univ. of Hawaii Press, 1991), 344.

[13]E.g., the *Khandanakhandakhadya*, attributed to Sri Harsha. According to an abstract of this important text, "The thesis upon which the entire work is based is that nothing can be explained, neither any factor or worldly phenomena.... All is inexplicable; no adequate explanation can be provided of anything" (*Indian Books Centre Newsletter*, Dec. 1989, p. 2a).

[14]E.g., Philo, *On the Creation* 77-78, 82. The imaginary explorations of the cosmos in apocalyptic literature also attest to this transparency.

[15]E.g., The Preaching of Peter, Athenagoras, Irenaeus, Clement of Alexandria, Origen, Athanasius, Ambrose, Augustine. Texts are available on request.

[16]Letter to Herwart von Hohenburg, 19 April 1597, quoted in Gerald Holton, *Thematic Origins of Scientific Thought* (Cambridge MA: Harvard Univ. Press, 1973), 84.

[17]Letter to Herwart von Hohenburg, 9 April 1599, quoted in A. C. Crombie, *Augustine to Galileo* (2nd ed., 2 vols. Cambridge MA: Harvard Univ. Press, 1961), 2:195. For more on this subject, Job Kozhamthadam, *The Discovery of Kepler's Laws: The Interaction of Science, Philosophy and Religion* (Notre Dame: Univ. of Notre Dame Press, 1993), should be most helpful.

[18]Kaiser, *Creation*, 90-93, 278-82, 298-99.

[19]Niels Bohr, "Newton's Principles and Modern Atomic Physics," in The Royal Society of Great Britain, *Newton Centenary Celebrations* (Cambridge: Cambridge Univ. Press, 1947), 57; Bohr, *Atomic Physics and Human Knowledge* (New York: Wiley, 1958), 82.

[20]Kaiser, *Creation*, 296-7, 301-3; cf. Bohr, "Newton's Principles," 61; idem, "Maxwell and Modern Theoretical Physics," *Nature* 128 (24 Oct. 1931), 691a.

[21]Edgar Zilsel, "The Genesis of the Concept of Physical Law," *Philosophical Review*, 3 (May 1942), 245-79.

[22]Howard Van Till focusses on this theme in his review of my book and offers the alternative heading, "functional integrity"; "Can the Creationist Tradition Be Recovered?", 179-80. Elsewhere I have also defended the idea of the "integrity of creation"; "The Integrity of Creation and the Social Nature of God," to be published in *Reclaiming the Covenant*, ed. Calvin DeWitt (Madison: A-R Editions, forthcoming).

[23]Henri Frankfort et al., *Before Philosophy* (Harmondsworth: Penguin, 1949), ch. 5.

[24]E.g., Ps. 148:1-12; Jer. 31:35-36; 33:20-21.

[25]*Nicene and Post-Nicene Fathers*, First Series, ed. Philip Schaff (14 vols., Buffalo and New York, 1886-90), 8:81b. Many historians see the idea of the clockwork universe as originating with the modern world and fail to note this earlier material; e.g., Colin A. Russell (*Cross-Currents: Interactions between Science and Faith* (Grand Rapids: Eerdmans, 1985), 56-58.

[26]Buridan, *Questions on the Heavens and the Earth* II.xii.6-7, quoted in R. C. Dales, *The Scientific Achievement of the Middle Ages* (Philadelphia: Univ. of Pennsylvania Press, 1973), 116-17.

[27]Some historians have argued that the medieval West did not have access to the relevant Arabic texts; e.g., A. C. Crombie, *Augustine to Galileo*, 2:66-74. But the idea could have been transmitted through al-Ghazali's *Intentions of the Philosophers*, which contained a summary of Avicenna's philosophy, which was based, in turn, on John Philoponus; Fritz Zimmermann, "Philoponus's Impetus Theory in the Arabic Tradition," in *Philoponus and the Rejection of Aristotelian Science*, ed. Richard Sorabji (Cornell: Cornell Univ. Press, 1987), 122-4, 129.

[28]See, e.g., Davies, *The Mind of God*, 195-8, on these basic presuppositions of scientific work.
[29]Peter Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise on the Sociology of Knowledge* (Harmondsworth: Penguin, 1967).
[30]Dales, *Scientific Achievement*, 40; idem, "Twelfth-Century Concept," 182-3.
[31]Kaiser, *Creation*, 137-8, 172-4, 199-200.
[32]In contrast to Howard Van Till, I regard this theme as the most needed message of the creationist tradition for us today (cf. note 22 above).
[33]Matt. 12:28; Acts 3:6, 16; 4:30-31; 8:12; 14:9-15.
[34]Kaiser, *Creation*, 37-40.
[35]*Ante-Nicene Fathers*, ed. A. Roberts and J. Donaldson (10 vols., Buffalo and New York, 1885-96), 1:409.
[36]*Nicene and Post-Nicene Fathers*, First Series, 7:416b; cf. *Oration* XLIII.35 (ibid., p. 407).
[37]*Nicene and Post-Nicene Fathers*, First Series, ed. Philip Schaff (14 vols., Buffalo and New York, 1886-90), 11:451.
[38]*On the Advancement of Learning* (1605); *Works of Francis Bacon*, ed. James Spedding et al. (14 vols., London, 1857-74), 6:134.

Perspectives on Science & Christian Faith *1992 Reader Survey Results*

In early 1992, a "reader survey questionnaire" was distributed to subscribers. Russell Heddendorf analyzed the returns and has prepared a detailed report from which this summary is taken. The full report is available on request.

Our readers indicate strong support for the general design, concerns, and suitability of the Journal. They tend *not* to pass it to others, perhaps because of its continuing value to them.

Most readers value the Journal less for professional benefit than for scholarly Christian interests. Heddendorf concludes that *Perspectives* is important for rounding interests in fields outside one's area of expertise. He suggests that the Journal could better meet this need by soliciting authoritative materials in areas of current debate and of general interest to readers who respect the kind of scientific expertise not found in other publications.

There is strong support for the Christian position of *Perspectives*. The responses suggest that it is not viewed as controversial — and is not expected to be. Apparently, the Journal is valued for the reliability of its information rather than for the aggressiveness of its opinions, a position one would expect from scientists.

Readers tell us that the major articles are the most important features. Book Reviews follow close behind with Communications a more distant third. Not unexpectedly, readers put more emphasis on the enduring value of the Journal than they do on a prompt reading of it.

Heddendorf concludes: "When evaluating the data in this questionnaire, it is probably wise to make a distinction between those responses which provide an evaluation of the Journal itself and responses which suggest its value to the reader .... With this approach it is clear that *Perspectives* is accepted as a suitable and important source of relevant scientific and Christian information .... There is little to suggest that any major changes should be made in the format or the content."

Perspectives is viewed as a reliable supplement to materials in specialized areas of interest, but not as a substitute for them. Heddendorf notes that a scientific readership values objective, readily comprehensible (but not trivial) information. Any proposed changes should reflect these preferences in readers and should be those sections of the Journal which are deemed less important.

The contribution of *Perspectives* to the Christian and scientific communities depends on the quality of writing, reviewing and editing that go into ASA's journalistic enterprise. We continue to value your suggestions and good will.

Russell Heddendorf
John W. Haas, Jr.

The Scientific Exegesis of The Qur'an: A Case Study in Relating Science and Scripture

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The "scientific exegesis" approach to the Qur'an, which is currently very popular in the Muslim world, has enough similarities to certain Christian approaches to the Bible that it can afford Christians insight into our own situation. In this paper the themes and theses of Qur'anic scientific exegesis are detailed, noting the apologetic motivations behind them. Next the problems with this approach, both on an exegetical and a philosophical level, are presented, highlighting especially the scientism underlying it. The article concludes that inward and outward apologetic concerns are poorly served by a scientific exegesis approach.

Those Christians who have, as I, lived for a time in the Muslim world know that few Muslims share the modern Western shyness about religion as a topic of conversation. Muslims are almost uniformly happy to talk about what they perceive as the superiority of Islam over all other religions, including, of course, Christianity. In modern Islamic apologetics, on a popular level, if not always in more scholarly works, science plays an important role. Perhaps the best known proponent of this kind of apologetic approach is the French surgeon Maurice Bucaille, a convert to Islam in his middle age, whose first book, *The Bible, the Qur'an and Science*,[1] has been translated into roughly a dozen languages and has been a longstanding best-seller in the Muslim world since its initial publication in 1976.

In this book Bucaille argues that, while the Bible is full of scientific and other errors, the Qur'an is replete with accurate scientific descriptions which were not known at the time of its writing (7th century A.D.), descriptions which prove its divine origin. Although this kind of approach is not particularly new in Islam,[2] the force of Bucaille's writings and perhaps his Western background have made him very popular in wide segments of the Muslim world, to the point that one magazine associated with resurgent Islam has called him a "renowned exegete" of the Qur'an,[3] while some Muslim detractors complain about "Bucaillism."[4]

One irony of Bucaille's approach is that in his analysis he uses exegetical methods quite different from those of classical Islam, methods which would probably in fact be destructive to Islam if applied systematically. For example, his discussion of the Bible draws heavily on modern Western anti-supernaturalist treatments of the Bible, based on evolutionary models of the development of religion. These models are at odds not only with Biblical teachings, but even more with Qur'anic teachings about revelation.[5] This higher critical approach, often used on the Bible, is (somewhat arbitrarily) not applied to the Qur'an. With regard to the Qur'an, Bucaille proposes new meanings for Qur'anic words to bring them into accord with modern scientific knowledge, without requiring any standard philological justification.[6] To Bucaille's many admirers, the apologetic ends evidently seem sufficient to justify the means used in this kind of "scientific exegesis."

In this paper I propose to take a broad look at the scientific exegesis of the Qur'an, in the hope that it will be instructive to evangelical Christians.

Being essentially a critique of a tradition other than our own, it is removed enough from us that we can look at it without much emotional involvement. At the same time, there are enough parallels with our own situation that we might hope to draw some practical lessons from the study.

Important Similarities and Differences Between the Traditions

As monotheistic religions, Islam and Christianity share a number of common features. For the purposes of this study, perhaps the most important similarities concern the relationship of God's Word and God's world. For both religions, at least according to traditional understandings, God has spoken in an authoritative Scripture. But this same God is also the Creator of the universe. Since God's written word and the created order have one Author, there ought to be some kind of compatibility between them.

The two traditions also have some parallel hermeneutical methods and challenges. Classical Islam and evangelical Christianity are both committed to interpreting their respective Scriptures according to similar grammatico-historical methods. Furthermore, in both traditions Scripture is set in a cultural setting (or settings, in the case of the Bible) very different from those of the 20th century. This leads to certain tensions both in understanding Scripture and in applying it to modern life. Though the precise situations vary from place to place, there is a universal necessity to continually interact with Scripture in the face of modern questions and concerns.

At the same time, there are also profound differences between the traditions. With regard to the doctrine of Scripture, for instance, the Muslim idea of inspiration is fundamentally different from the Biblical picture. This difference is illustrated by the fact that for Muslims, the "Logos," the eternally existent Word, is the Qur'an, while for Christians the Logos is the person of Jesus himself. While the Bible is understood by Christians to have both human and divine elements, the Qur'an is held to be purely divine, without any human element whatsoever. Thus Muslims hold to a sort of "dictation" theory of Scripture. This, incidentally, makes Muslim apologetics a somewhat more fragile enterprise than Christian apologetics — for to admit the Qur'an contains any human element automatically discredits it.

The Qur'an differs from the Bible in that it is set in a monocultural context, seventh-century Arabia, rather than in a variety of cultures, places and times. While the Qur'an has many stories about past prophets, including many biblical characters, its stories are essentially ahistorical, and it lacks the overall historical emphasis of the Bible. The Qur'an also does not have the range of literary genres within it that the Bible does.

Another important difference between the traditions is that Muslims believe deeply in the inherent rationality of true religion. This idea, which often underlies the Muslim discomfort with certain Christian doctrines such as the Trinity, follows naturally from the Muslim rejection of the idea of total depravity. For Muslims, man is naturally born Muslim (i.e. submissive to God), and his intellect is not fallen. In practice this conviction may lead Muslims to more optimism and less suspicion of human intellectual constructs than Christians might have.

Theses of the Scientific Exegetes — With Christian Parallels

1. **The "compatibility" thesis:** *There are no contradictions between God's Word and modern science.*

This is really a starting presupposition, rather than a demonstrable thesis. It is based on the conviction

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noted above that God is author of both the cosmos and His word. The main alternatives to this presupposition are "conflict" or "compartmental" approaches which would fail to take seriously either science or Scripture. Thus this compatibility thesis seems to be an eminently reasonable operating principle for the believer. It is voiced explicitly in many Muslim writings, although it is often, as in Bucaille's books, presented as a criterion for proving divine inspiration, or as a demonstrated thesis, rather than as a presupposition.[7]

One practical issue that arises from this presupposition is how apparent science-Scripture conflicts are to be handled. Are my understandings of *both* Scripture and science open to question and revision, or in practice is only one of these understandings open to change? Christian "scientific creationism" can be viewed as an approach where only the scientific understanding is questioned.[8] In Muslim writings, the issue is often resolved by reinterpreting the Qur'an to fit science. This is generally painless, since most Qur'anic references to natural phenomena are phenomenological descriptions, i.e. based on the appearances of things, aimed at reminding the believer of God's great power or some other attribute. Their "scientific" interpretation can freely change with changing scientific notions, since this is incidental to the purpose of the passage.[9] Furthermore, the Qur'anic passages are not as detailed as the Biblical creation and flood narratives, for instance, and do not tend to have doctrinal significance.

Practically, how are apparent science-Scripture conflicts to be handled? Are my understandings of* both *Scripture and science open to question and revision, or in practice is only one of these understandings open to change?

Because the compatibility thesis makes no reference to the amount of scientific information to be found in Scripture, it is not really a thesis of a full-fledged scientific exegesis — it does not go far enough. It is, however, consistent with a number of possible approaches to exegesis:

— a **compartmental** approach which completely decouples "spiritual" and "scientific" kinds of knowledge, limiting Scripture to the former;

— a **phenomenological** approach to the text which seeks to understand the Scriptural texts referring to natural phenomena in the context of the common knowledge bank of the original recipients of the word; and

— a **scientific exegesis** approach which seeks detailed scientific information in Scriptural texts.

The concordist approach, as I define it here, goes far beyond simply treating science and Scripture as compatible or complementary. It sees them, at least in some areas, teaching substantially the same thing.

2. The "concordist" thesis: *Scripture contains scientific teachings, in the 20th century Western sense.*

The concordist approach, as I define it here, goes far beyond simply treating science and Scripture as compatible or complementary. It sees them, at least in some areas, teaching substantially the same thing. Thus the references to natural phenomena in Scripture are regarded as scientific statements, in the modern sense of the word "scientific," rather than as merely phenomenological descriptions which have no scientific intent. That is, these passages are held to contain scientific *teachings* in addition to teachings about more "religious" subjects. In the case of passages about origins, the demarcation between the scientific and the religious is somewhat fuzzy, and it is not surprising that these passages are often approached in a concordist spirit. But some Muslims approach all Qur'anic passages referring to natural phenomena, even those which appeal to common things as examples of God's power or other attributes, in this way. For example, the Tunisian physicist Bashir Torki sees in the Qur'anic references to the "seven earths" an allusion to the seven Bravais crystal lattices,[10] while references to the succession of night and day and the earth are viewed by the Egyptian El Fandy as teaching the rotation of the earth on its axis and the flattening of the earth at the poles.[11] In one extreme example, even an explicitly symbolic passage likening God to a lamp

in a niche is seen as an allusion to an incandescent light bulb.[12]

The whole debate whether Genesis 1 teaches a "Gap theory" or seven 24 hour days or a "day-age" approach already presupposes a concordist approach to the text.

As an example of a more moderate concordist approach, the Moroccan paleontologist ElKbir Saaidi attempts a synthesis of scientific and Qur'anic teachings about human origins.[13] He is willing to allow a substantial amount of biological evolution, including for man, yet insists, based on Qur'anic passages, on a separate origin for man. Since the Qur'anic passages about the "fall" of Adam and Eve imply a literal fall from somewhere, he speculates that humanity was evolved on another planet, then was transported later by God to Earth (the fall), to join the rest of the plants and animals. Saaidi is moderate in the sense that he does not generally see detailed scientific descriptions in the Qur'anic passages, and seems to seek to minimize the amount of reinterpretation of both Scripture and science which is necessary to achieve harmony between the two. If there is apparent conflict, his tendency is to make science bend to fit his understanding of Scripture, rather than the other way around.

There are obvious parallels here with the scientific creationism movement in evangelical Christianity. What is perhaps useful to note is that the underlying concordist assumption, that the early chapters of Genesis provide a scientific description of the mechanism of creation, is shared by far more people than simply those holding to seven 24 hour days of creation. The whole debate whether Genesis 1 teaches a "Gap theory" or seven 24 hour days or a "day-age" approach already presupposes a concordist approach to the text.[14] The heat generated in some evangelical circles by those proposing a more literary or "framework" approach to the text indicates how deeply ingrained concordist assumptions run. This suggests that we have, to a larger extent than we might realize, bought into a scientistic way of thinking which holds that it is the scientific questions and descriptions which are the really important ones.

3. **The "veiled reference" thesis:** *Scripture contains references which can only fully be understood by modern science.*

We have all heard of Biblical verses predicting helicopters, nuclear weapons, and Christmas trees, and some Muslim writers have been able to find equally spectacular predictions in the Qur'an. Among the subjects found by some in certain Qur'anic verses are the incandescent light bulb, the atom bomb, the Sargasso sea, the Hubble expansion of the universe,[15] UFO's, the electronic structure of atoms,[16] special relativity,[17] airplanes, X-rays,[18] antimatter, and black holes.[19] In all these entertaining examples it is important to note that, whereas in the concordist approach to origins mentioned above science is often made to fit Scripture, here Scripture is being made to fit science. While both approaches share the concordist assumption that there is a great deal of scientific content in Scripture, in the veiled reference approach this implicit scientism is taken further in that modern science becomes indispensable for a full understanding of the "true" meaning of the text.

The more extreme of these Qur'anic "predictions" seem to embarrass even those who are more moderate practitioners of the art. Yet the popularity of this approach should not be underestimated. It seems to have been a major factor in the conversion of Maurice Bucaille to Islam, and he makes it one of the major theses of his best-selling book: "Modern scientific knowledge therefore allows us to understand certain verses of the Qur'an which, until now, it has been impossible to interpret."[20] Though Bucaille is relatively restrained in finding scientific predictions in the Qur'an, he nevertheless touches on human reproduction and embryology, the origin of life, the water cycle, the orbits of the sun and moon, space travel, protogalactic nebulae, and the physiology of digestion.

In the "veiled reference" approach, this implicit scientism is taken further in that modern science becomes indispensable for a full understanding of the "true" meaning of the text.

It is clear that the veiled reference approach, in its moderate form at least, is quite acceptable to most of the Muslim community — despite its tendency towards eisegesis, or reading into the text,

in violation of well-established rules for Qur'anic interpretation.[21] This can only be understood in the light of its perceived apologetic benefits. The veiled reference thesis therefore goes hand in hand with the last thesis, the "verification" thesis.

4. **The "verification" thesis:** *Modern science proves/verifies the divine origin of Scripture.*

This thesis, even when it is not made explicit, is the driving force for the "veiled reference" approach to Scripture. Bucaille, for one, states it plainly in his conclusion:[22]

> In view of the state of knowledge in Muhammad's day, it is inconceivable that many of the statements in the Qur'an which are connected with science could have been the work of a man. It is moreover, perfectly legitimate, not only to regard the Qur'an as the expression of a Revelation, but also to award it a very special place on account of the guarantee of authenticity it provides and the presence in it of scientific statements which, when studied today, appear as a challenge to human explanation.

Although Bucaille's works are given regularly to non-Muslims and ostensibly aim at convincing skeptics, the primary apologetic benefit seems to be derived by Muslims. Bucaille's fame as an Qur'anic exegete suggests that the Muslim community feels uneasy about the impact of Western science and technology on its way of life, both on an intellectual and a societal level. If Bucaille breaks some hermeneutical rules, the repercussions seem minor and on the whole the apologetic ends justify the means.

Critiques of Scientific Exegesis

Scientific exegesis suffers from serious problems both on hermeneutical and philosophical levels. On the hermeneutical level, i.e. in terms of the detailed process of interpreting particular texts, I have already noted a strong tendency toward eisegesis. At best, this is a sloppy habit which evidences a lack of respect for Scripture, a failure to take it seriously as God's word to us. At worst, the process can lead to all kinds of doctrinal error when it is applied to other passages, which is surely one reason why hermeneutics as a discipline was developed in both the Muslim and Christian traditions.

The products of the scientific exegesis process may also produce consequences other than those intended. Detailed harmonizations of science with particular passages may cause Scripture to be discredited if science changes. As one Muslim critic points out, "What if a particular theory, which is 'confirmed' by the Qur'an, is in vogue today but abandoned tomorrow for another theory which presents an opposite picture? Does that mean that the Qur'an is valid today but will not be valid tomorrow?"[23] Worse, perhaps, is the danger that we may miss the major teachings and thrusts of a key passage of Scripture by asking the wrong questions of it and focusing on relatively unimportant scientific details. A comparison of scientific creationist treatments of Genesis with more standard approaches would seem to bear this out.[24] The biblical doctrine of creation is truncated when we approach Scripture from a too narrowly scientific mindset.

Worse, perhaps, is the danger that we may miss the major teachings and thrusts of a key passage of Scripture by asking the wrong questions of it and focusing on relatively unimportant scientific details.

On a philosophical level, I have already mentioned that a deep-rooted scientism underlies the scientific exegesis approach. The questions asked of the text give science too much importance, and tend to set science up as a judge of Scripture rather than allowing Scripture to judge our scientism.[25] Furthermore the tentative and cultural components of science are generally not recognized, which ultimately does both science and Scripture a disservice.

A few perceptive Muslim thinkers have addressed the larger cultural issues facing the Muslim community in its love/hate relationship with Western science and technology. For Sayyed Hussein Nasr, for instance, Islam and the modern West have such fundamental differences in world view that attempting a straightforward fusion of Western science and Islam can only do violence to the latter:[26]

> Faced with the challenge of the modern sciences which are the fruit of a totally different conception of the world, the Muslims must bring into light the Islamic conception of the cosmos if they are to avoid the dangerous dichotomy which results from a superficial "harmony" between the Islamic perspective and the modern sciences to be seen so often in the writings of modern Muslim apologists. If the modern sciences are going to be anything other than an artificial "tail" grafted upon the body of Islam or even an alien element, the ingestion of which may endanger the very life of the Islamic world,

the Muslims must find the universal Islamic criteria in the light of which the validity of all the sciences must be judged.

Clearly Christians in the West face a similar dilemma, as we are called to think, speak, and act biblically in what is increasingly a post-Christian culture. While attempts at "superficial harmony" between a biblical world view and science may have a short-term popular appeal, in the end our inward and outward apologetic concerns are poorly served by this kind of approach. We who are both Christians and scientists need to ask God for grace to surmount the scientistic tendencies that affect everyone in our culture, and also to better get the word out as to options for dealing with these issues which are ultimately more faithful both to science and to biblical values. *

NOTES

[1] Maurice Bucaille, *La Bible, Le Coran, et la Science*, (Paris: Seghers, 1976); published in English as *The Bible, the Qur'an, and Science*, (Indianapolis, Indiana, USA: North American Trust Publishers, 1979); quotes are from the third, revised and expanded (English) edition (Paris: Seghers, no date). See also his *L'Homme — d'où Vient-il?* (Paris: Seghers, 1981; published in English as *What is the Origin of Man?* (Paris: Seghers, 1982).

[2] One of the first modern critics of scientific exegesis, Sheikh Amin al-Khuli, traces the origin of this kind of approach as far back as Al-Ghazali (11th century A.D.), and the first criticisms of it to Shataibi a few hundred years later ("L'Exegese scientifique du Coran d'apres le Cheikh Amin al-Kholi," *Melanges* de l'Institut Dominicain des Etudes Orientales (Cairo)), 4, 269 (1957). During this era the Muslim world was engaged in a much broader debate about the proper way to relate Islam and classical Greek philosophy and science; cf. books such as W. Montgomery Watt, *The Faith and Practice of al-Ghazali* (1953), G. F. Hourani, *Averroes on the Harmony of Religion and Philosophy* (1961), and S. H. Nasr, *Three Muslim Sages* (1964).

[3] The title given to Maurice Bucaille in a byline in the Islamic Press Agency's magazine *Arabia* (London), (32), (April 1984) p.77.

[4] Ziauddin Sardar, "Between Two Masters: Qur'an or Science?," *Inquiry* (London), (August 1985) p. 37.

[5] While there is a certain progressive character to Biblical revelation, the Qur'an teaches that there have been a long series of prophets, including Adam, Abraham, Moses, David, and Jesus, each of them proclaiming the *same* religion of Islam. Western approaches which question the historicity of these men, or which view Hebrew monotheism as something developed gradually out of polytheism, flatly contradict Qur'anic teachings.

[6] For example Qur'an 96:1,2 is usually translated something like "The Lord ... created man out of a clot of congealed blood" (all Qur'anic quotations, unless specified otherwise, are from Yusuf Ali's translation, *The Holy Qur'an, Translation and Commentary* (United States: American Trust Publications, 1977)). In Bucaille's book the word *ʿalaqa*, "a blood clot," is redefined to mean "something which clings" to bring the passage more in line with embryology (Bucaille, *The Bible, The Qur'an and Science*, p. 212, 217-218). Likewise the passage (16:66) saying milk "comes from between excretions and blood" (or, in other translations, "excrement and blood") is transformed to read "[milk comes from] a conjunction between the contents of the intestine and the blood" (Bucaille, p. 209-210).

[7] Bucaille (p.17) claims Augustine "formally established the principle ... [that] ... corroboration between the scriptures and science was a necessary element to the authenticity of the sacred text ... Islam has always assumed that the data contained in the Holy Scriptures were in agreement with scientific fact."

[8] Sometimes the doctrine of the "inerrancy" of Scripture is assumed to imply that only the scientific understandings are open to question. However, more thoughtful advocates of inerrancy, such as Moisés Silva (*Has the Church Misread the Bible?* (Grand Rapids, MI, Academie (Zondervan) 1987), p. 4, argue that our understandings of *both* science and Scripture need to be open to revision. Silva points out that the inerrancy of Scripture in no way implies the inerrancy of exegesis.

[9] For example, Qur'an 51:47, "With power and skill did we construct the firmament: For it is we who create the vastness of space" is translated as "The heaven, we have built it with power, verily we are expanding it," which is then taken as a reference to the Hubble expansion of the universe (Bucaille, p. 173). Likewise "Have we not made the earth an expanse and the mountains stakes" is said to refer to the thicker crust of the Earth underneath mountainous regions (Bucaille, p. 173).

[10] Bashir Torki, *L'Islam, la Réligion de la Science* (Tunis, 1979), pp 128-138.

[11] Muhammad Jamaluddin El-Fandy, *On Cosmic Verses in the Qur'an* (Cairo, Supreme Council for Islamic Affairs), pp. 73-74.

[12] Malek Bennabi, *Le Phénomène Coranique*, 2nd Ed., (Dar al-thuraya, n.d.), pp. 192ff.

[13] El Kbir Saaidi, *Le Coran, l'Evolution et L'Origine de l'Homme* (Rabat, Morocco: Al-Maarif Al-Jadida, 1985).

[14] For another recent example, see "The Days of Creation: Hours or Eons?," *Perspectives on Science and Christian Faith*, v. 42 No.1, (March 1990) p. 15.

[15] Bennabi, *loc.cit.*

[16] Torki, *op.cit.*

[17] Zahir Ahmad, "Qur'an and Space Science," *Science and Technology in the Islamic World*, 4 (4), (Oct.-Dec. 1986) pp. 213-216.

[18] Muhammad Al Araby Al Azuzy, *Topical Concordance to Qur'an* (Beirut: 1956), English translation by A. Whitehouse (n.d.), pp. 32, 90.

[19] Safdar Jang Rajpoot, "Qur'an and Cosmology," *Science and Technology in the Islamic World*, **2** (2), (1984) p. 67.

[20] Maurice Bucaille, *The Bible, the Qur'an and Science*, p. 268.

[21] Yusuf Ali, in his introduction to the Qur'an (*op.cit.*, p. x), notes these principles. With respect to reading new meanings into Qur'anic words, he notes "the early commentators and philologists went into these matters with a very comprehensive grasp, and we must accept their conclusions .... we must not devise new verbal meanings."

[22] Maurice Bucaille, *The Bible, the Qur'an and Science*, p. 269.

[23] Ziauddin Sardar, *op.cit.*, p. 41.

[24] Compare, for instance, the content of Henry Morris' *Biblical Cosmology and Modern Science* (Nutley, N.J., Craig Press, 1970), which claims to summarize "the full scope of Biblical Cosmology," with more standard works on Creation such as James Houston, *I Believe in the Creator* (Grand Rapids, MI, Eerdmans, 1980); or books on Genesis, such as H. Blocher's *In the Beginning* (InterVarsity Press).

[25] In an intriguing article historian Mark Noll suggests that modern evangelical hermeneutics have been profoundly shaped by the "Baconianism" of such thinkers as Newton, Locke, and the Scottish realist philosophers of the 18th century. He sees the Baconian approach in Paley's natural theology, Charles Hodge's *Systematic Theology*, and Charles Finney's approach to evangelism. See Mark Noll, "Who Sets the Stage for Understanding Scripture?," *Christianity Today*, May 23, 1980, p. 14.

[26] Sayyed Hussein Nasr, *Introduction to Islamic Cosmological Doctrines*, (Cambridge, Mass.: Harvard University Press, 1962), p. xx.

The Odds Against Altruism: The Sociobiology Agenda

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The embarrassment created for natural selection by the persistence of altruism is resolved by sociobiology's concepts of inclusive fitness, kin and reciprocal altruism. This conceptual, more than empirical, case against altruism is inspired by the self-interest outlook of modern economics. Expectations of human altruism in total defiance of nature are romantic illusions that avoid reconsidering the basic metaphysical assumption of self-interest.

There is no shortage of evidence to suggest that we are fundamentally, and all but irreparably, characterized by selfishness. If reports of consumptive greed and callous disregard for the obvious distress of others does not clinch the point, the representations of science, particularly the portrayals of sociobiology, confirm that impression beyond any reasonable doubt. This emerging discipline endevers to show how altruism is fundamentally unnatural, an aberration that runs directly counter to the natural flow of life.

The Impossibility of Natural Altruism

For modern life sciences, altruism represents an anomaly that elicits drastic reactions.

The Biological Problem of Altruism

From a biological point of view, altruism should not exist. The Darwinian theory of natural selection holds that those organisms survive and reproduce which are best adapted to their environment. They are "selected" by the natural processes of geography, climate, food supplies, predation, etc. To that extent, any organism that devotes itself to the welfare of other organisms jeopardizes its own prospects for reproduction and enhances those of the recipient of the assistance. As that trend continues, the altruist strain would seem bound to be selected out of existence.

This line of reasoning has been intensified with the development of the more precise investigations of genetics in this century, especially as these have been incorporated in the new discipline of sociobiology. Here Darwin's general problem has been made more acute, for example, through the application of game theory by Maynard Smith. Smith deduces the conditions necessary to ensure what he calls an evolutionarily stable strategy, that is, the strategy for maintaining a population which "cannot be bettered by any deviant individual."[1]

The mathematical permutations required for this stability are given vivid expression in Richard Dawkins' depiction of the respective effects and fortunes of the three behavioral types that he designates as suckers, cheats, and grudgers.[2] These groups are the imaginary representatives of a species of bird that is preyed upon by an injurious and potentially lethal kind of parasitic tick. Each bird can rid itself of these parasites on most of its body, but it cannot reach the top of its own head, and so the only solution is for each bird to have its head ticks removed by another bird. And, of course, this is where the dif-

ferent strategies emerge. "Suckers" are those birds that will groom other birds indiscriminately. They are complete altruists. "Cheats" are those birds that accept this grooming, but never perform this service themselves.

Now the projections indicate that in a population of suckers, everyone will have their head ticks removed, but as soon as a cheat emerges, the situation changes. Cheat genes will begin to spread through the population and the sucker genes will be driven to extinction. For the more cheats there are, the more suckers will go ungroomed, dying from the parasitic infection, and thus having their genes removed from the collective gene pool. The cheats, for their part, thrive as long as there are enough suckers to help keep them tick-free. Of course, as the sucker population declines, the cheats will be affected, but never to the extent of the suckers themselves. "Therefore, as long as we consider only these two strategies, nothing can stop the extinction of the suckers, and very probably, the extinction of the whole population too."[3]

The third option, represented by the "grudger," involves grooming those who have groomed them. They never groom a cheat a second time. In a cheat population, grudgers would be almost as vulnerable as suckers. They would spend most of their time practicing unrequited grooming, and paying for this with their lives, to the detriment of their own genetic legacy. But when a significant number of grudgers emerges, they will groom each other to the detriment of the cheats, who will be driven to the brink of extinction, but not over, because the lower the population of cheats, the more chance each of these individuals will have of being groomed by grudgers they have not encountered before.

Common sense, and perhaps the lingering legacy of Christian sentiment, might suggest that the ideal evolutionarily stable strategy would be represented by a population consisting exclusively of suckers. This would assure that each bird would be groomed simply because they were in need of grooming. And this might well be the ideal situation. But it *is* ideal. In the real world, allowance must be made for grudgers and even cheats. But once this is done, as we have seen, the way of the sucker ceases to represent an evolutionarily stable strategy. On the contrary, the way of the grudger holds the most promise for maintaining itself against the interruption of cheats or suckers. The way of the cheat is also equally effective in achieving an evolutionarily stable strategy against grudgers and suckers, but the way of the cheat achieves this at the high price of courting extinction because cheats cannot groom each other. The conclusion to which we are led, then, is that neither pure altruism nor pure selfishness offer long-term prospects on their own. The most promising course is the calculative reciprocity of the grudger. This strategy is effective against both cheats and suckers. But as long as there are cheats and suckers as well as grudgers, the cheats are next in order of stability, with suckers coming in a distant third. Their strategy invites exploitation by cheats and receives only marginal support from grudgers.

Thus from the biological point of view, especially as this is sharpened through the genetic focus of sociobiology, the prospects for serious altruism are particularly bleak. The situation cannot be described more succinctly than it is by Dawkins himself.

> Even in the group of altruists, there will almost certainly be a dissenting minority who refuse to make any sacrifice. If there is just one selfish rebel, prepared to exploit the altruism of the rest, then he, by definition, is more likely than they are to survive and have children. Each of these children will tend to inherit his selfish traits. After several generations of natural selection, "the altruistic group" will be overrun by selfish individuals, and will be indistinguishable from the selfish group. Even if we grant the improbable chance existence initially of pure altruistic groups without any rebels, it is very difficult to see what is to stop selfish individuals migrating in from neighboring selfish

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groups, and, by intermarriage, contaminating the purity of the altruistic group.[4]

This biological bias against altruism is in accord with the contemporary experience. It is no wonder that self-interest should be the prevailing strategy. We have inherited a genetic bias in this direction. Any inclination toward concern for others that might have been present has been diminished by the genetic triumph of the drive toward self-preservation and self-enhancement. And yet altruism continues to exist. There are individuals who apparently sacrifice themselves, and *a fortiori* the transmission of their genes, for the sake of others.

Why is it that altruism has not been eliminated entirely? This represents what the leading pioneer of sociobiology, E.O. Wilson, calls "the central theoretical problem of sociobiology: how can altruism, which by definition reduces personal fitness, possibly evolve by natural selection?"[5] Indeed, the problem is even more acute than this. For the reality is almost contrary to the picture we have considered in abstract terms. The truth is that in the broad scope of nature, far from altruism having been diminished, the reverse would seem to be true. It is in the most developed species, namely humans, that altruism has attained its most striking expression, evoking what Wilson has called the "culminating mystery of all biology."[6] On the premise of modern biology, especially as this is sharpened by sociobiology, altruism should not exist at all, much less have evolved through the process.

Sociobiological Explanations for Altruism

The biological problem of altruism is at least as old as Darwin's theory of natural selection. Indeed, even for Darwin himself it constituted the "one special difficulty, which at first appeared to me insuperable, and actually fatal to the whole theory."[7] The altruism that Darwin found so threatening was that of social insects. Worker castes devote their lives to work to the total exclusion of reproduction, and yet these sterile castes reemerge generation after generation. How? Why does such apparent total altruism not result in its own destruction through the lack of offspring? A possible answer is in terms of group selection. Then workers continue to be reproduced because, in these instances, selection takes place at the level of the colony. Workers are an integral part of the colony, and thus contribute to the fitness of the whole group, so that their own lack of reproductive ability is compensated for at the group level. They do not have to reproduce themselves because their lineage is provided for in the reproductive mechanisms of the group.

The significance of these degrees of relatedness for sociobiology is that they provide a basis for explaining altruism that is directed to an individual's immediate kin.

This identification of a group level as the focus of the selection process represents something of a minority report in modern biology. V.C. Wynne-Edwards contends that its day has come,[8] but even to allow for group selection as a counterpart to the dominant assumptions of individual selection is a concession that does not appear to be forthcoming in any significant measure. To the novice, Wynne-Edwards' claim for group selection can appear to offer a credible way of accounting for the continued appearance of non-reproductive worker castes. "In group selection theory there is no problem about sacrificing the fitness of some individuals if it benefits the fitness of a group as a whole to do so; and this applies not only to vertebrates in changeable habitats but to the special-duty sterile castes of insects as well."[9] Sensible though this might appear to sociobiologically untutored common sense, it does not find favor with sociobiologists. They maintain their focus on individual selection through the concept of kin selection, which might sound like a variation on group selection, but is intended precisely to avoid any compromise of the individual focus.

In a series of articles in the 1960s and early '70s, W.D. Hamilton worked out a theory of kin selection in precise mathematical terms.[10] Because each parent contributes ½ the genes that make up their offspring, there is a 50% chance that a parent and his or her offspring will share any particular gene. Thus the ratio in the genetic relationship between parent and child is ½. Roughly the same ratio holds between siblings, because they share the same parents. For more distant relations, the calculation is more complicated, but the results, genetically speaking, are that there is ½ of ourselves in our parents, our offspring, and our siblings; ¼ in our uncles, aunts, nephews and nieces, and in our grandparents and grandchildren; ⅛ in our first cousins, our great grandparents and great grandchildren.

The significance of these degrees of relatedness for sociobiology is that they provide a basis for explaining altruism that is directed to an individual's

immediate kin. Thus a bird risks attracting a predator to ensure the safety of a flock or of her own brood, as birds often do. She may feign a broken wing to lead a fox away from a nest, leaping into the air at the last possible moment to escape the fox's jaws,[11] or warn a whole flock with an alarm call when a flying predator such as a hawk is spotted.[12] This has all the appearance of dangerous, sacrificial, altruistic behavior, but from the genetic point of view, it is entirely explicable in terms of gene ratios. A mother bird is not risking anything if her diversionary behavior saves two of her chicks because together they are likely to possess 100% of her genes. Similarly, the bird raising the alarm call is also protecting its own genes if it has a couple of siblings in the flock, or four nieces or nephews or eight first cousins.

Dawkins: "We are survival machines — robot vehicles blindly programmed to preserve the selfish molecules known as genes."

It is not that a bird calculates these odds, or even deliberately acts in this seemingly altruistic fashion. The level of agency is not the bird but the genes that constitute it, and every other living being, including ourselves. Genes are the ultimate subjects. "They are in you and me; they created us, body and mind; and their preservation is the ultimate rationale for our existence."[13] All plants and animals exist as vehicles for the replication of genes. "We are survival machines — robot vehicles blindly programmed to preserve the selfish molecules known as genes."[14] Thus apparent altruism at the level of the phenotype is seen to be an expression of consummate selfishness at the more primary level of the genotype.

If this explanation is accepted for now, it only accounts for altruism among close relatives. This is probably satisfactory for most behavior in the world of nature that might be construed as altruistic. However, it does not cover the more wide-ranging altruistic behavior that can sometimes characterize human actions in particular. The difficulty with human altruism is that there may be no apparent relationship between the altruist and his or her beneficiary, and so no apparent rationale for the action other than the altruistic one of actually benefitting the other person. Saving a drowning person who is unknown and unrelated to me can hardly be attributed to an ulterior strategy promoted by the genetic drive for replication. And yet this unlikely situation is also encompassed by the sociobiological explanation of altruism. The mechanism that accounts for this is known as "reciprocal altruism." Although the immediate act may appear purely altruistic, in a larger perspective, it can be seen to represent a relatively minor risk to the benefactor, with the prospect that should they find themselves in any similar life-threatening situation, they will be more likely to receive the aid they require. Thus ironically, Wilson suggests that reciprocal altruism "is less purely altruistic than acts evolving out of interdemic and kin selection."[15] Again, of course, the point is not the survival of the particular individual, but of the genes they bear.

The sociobiological repertoire has other strategies, but these three represent the main mechanisms by which any appearance of altruism is exposed for the self-interested activity it really is. On the most primary level, behavior generally is self-interested, especially in the form of genetic self-interest. Beyond this, most altruistic behavior among insects, birds and animals can be explained by the mechanism of kin selection. Finally, wider versions of apparently altruistic behavior, most evident among humans, can be more accurately understood as reciprocal altruism, engaged in with the expectation, at least genetically speaking, of receiving a return in the future, should occasion require it. Thus sociobiology demonstrates the totally illusory nature of the whole notion of altruism. What appears to be altruism is really always genetically sophisticated selfishness.

Problems With the Explanations

The total scope of sociobiological explanations of altruism may actually betray a fundamental weakness in this whole approach. Perhaps the explanations are simply too good. This is the charge of the Sociobiology Study Group, which says, "There exists no imaginable situation that cannot be explained; it is necessarily confirmed by every observation."[16] Any putative case of altruistic behavior that is not susceptible to the calculations of kin selection is almost certainly bound to succumb to the drift net of reciprocal altruism.

Even such a comprehensive program as the sociobiological explanation of altruism does have awkward instances to contend with, though, as its more forthright exponents admit. Dawkins points to the phenomenon of female herd animals adopting orphaned offspring that bear no particular relation to them, thus investing their care in individuals that hold no prospect of perpetuating their own genetic

legacy. The only explanation he can provide for this is that it represents a mistake of nature. "It is presumably a mistake which happens too seldom for natural selection to have 'bothered' to change the rule by making the maternal instinct more selective."[17] A more difficult example, and one which Dawkins concedes might well be taken as evidence against this whole genetic explanation of altruism, is the practice of bereaved monkey mothers who steal a baby from another female, and look after it. This is really a double mistake, from the perspective of the genetic account, because, as Dawkins observes, the adopting mother not only invests her time and care in someone else's child rather than getting on with producing further offspring of her own, but she also thereby frees the stolen child's mother to do precisely that herself, to the benefit of that mother's genes and the detriment of those of the adoptive mother. This behavior, then, constitutes a direct contradiction of what the sociobiological account should lead us to expect.

Yet even these obvious exceptions to sociobiology's central thesis are accommodated by its more imaginative proponents. So D.D. Barash explains the apparent altruism of adoption of non-relatives on the human level as a holdover from the past when humanity lived in small groups, so that there was likely to be a significant genetic relationship between adopter and adoptee.[18] If this extreme explanation does not represent the snapping of this highly elastic theory, other more empirical difficulties almost certainly do. We saw how Darwin was particularly troubled by the apparent altruism of social insects. He wondered how workers which did not reproduce themselves had ever evolved. We also noted the consideration that the answer in this case might lie at the group level. Their altruism is in the interest of the group, and so they are reproduced by the reproductive members.

... Darwin was particularly troubled by the apparent altruism of social insects. He wondered how workers which did not reproduce themselves had ever evolved.

We also saw that this deviation from the individual version of natural selection was not favored by sociobiologists. In fact, the explanation sociobiology has developed for this apparent altruism of the worker castes of social insects not only reaffirms individual selection but is regarded by Dawkins as "one of the most spectacular triumphs of the selfish gene theory."[19] The triumphal account focuses on the means of reproduction in these insects, which leads to the recognition of a closer relation between the reproductive queen and her sterile sister workers than the normal ½ genetic relationship that generally prevails between siblings. A queen bee, for example, makes one mating flight, storing up the sperm for rationing out during the rest of her reproductive life. The sperm is released as required to fertilize the eggs that will develop into females. Males develop from eggs that are not fertilized at all. Whether a female develops into a worker or a queen is due to environment, rather than to genetic make-up, the principal factor being the food she receives. Thus queen and worker are full sisters. But because males develop from unfertilized eggs, they contain only their mother's genes, a single set rather than the double set that generally characterize a species propagated by sexual reproduction. This means that the male will pass on the same genes to all offspring. Thus any two females will receive ½ of their mother's genes and all of their father's genes, with the result that the relationship between full sisters will not be ½ but ¾, because each will receive the same genes from their common father.

This increase in relatedness goes a long way toward explaining the apparently altruistic behavior of worker castes among social insects.

This increase in relatedness goes a long way toward explaining the apparently altruistic behavior of worker castes among social insects. For in relinquishing their reproductive capacity to the queen, the worker bees, for example, are actually ensuring the replication of approximately 75% of their own genes in each of her offspring, whereas direct reproduction would pass on only 50% of their own genes. This is the major triumph achieved by this sociobiological theory in this area that presented particular problems for Darwin. Unfortunately, however, there is a major impediment to this explanation. This arises from the fact that on her mating flight the queen must copulate with several males, a honey bee queen up to 12 times, in order to store enough sperm for the rest of her life. "Hence workers very often rear *half* sisters with whom they share only 25% of their genes — whereas they would pass on 50% of their genes through their own daughters."[20] Dawkins acknowledges this difficulty at the conclusion of his explanation of this spectacular triumph

of sociobiology, but the best response he can offer is: "My head is now spinning, and it is high time to bring this topic to a close."[21] This closure might well be fatal to the sociobiological explanation of altruism, if it depends on our not recognizing that in this final paragraph of this triumphal explanation for altruism in social insects, Dawkins glosses over a crucial fact which runs directly counter to what sociobiological theory should expect.

The Rationale for the Impossibility of Natural Altruism

The determination and depth of the case against altruism mounted by sociobiology suggests that there must be a profound and conclusive basis for this stance.

Biological Altruism and Selfishness

In this analysis of the treatment of altruism and selfishness in sociobiology, it is possible that we have forgotten one crucial fact. That fact is that the altruism and selfishness under consideration are *biological*. It is a matter of genes rather than of intentions. "None of the definitions of altruism in biology refers to the altruistic animal's motives, and it is in this way that they differ from the concept of altruism in human behavior."[22] It is a mistake to read into these terms the usual moral connotations they have in their every day usage. The biological meaning is measured by a scale of prospects for reproduction rather than by any kind of value judgment about the quality of particular modes of behavior. As E.O. Wilson puts it: "Altruism is the surrender of personal genetic fitness for the enhancement of personal genetic fitness in others."[23] To say that an animal acts altruistically is not to imply that it cares about other animals, but rather to affirm that it is endangering the replication of its own genes in a form of behavior that enhances the reproductive success of other individuals.

The restricted scope of this biological sense of "altruism" suggests a much more modest agenda than we have been attributing to sociobiology. If we were to go back over the evidence we have considered with this chastened reminder of the true biological meaning of the term, things might appear quite differently. The issue is not whether the worker caste in social insects, the sentry bird or the stotting gazelle, leaping for the apparent purpose of warning the herd of a predator, are intentionally sacrificing themselves for the sake of others, in the ordinary sense of "altruism." The point is that these forms of behavior do appear to entail genetic sacrifice.

The worker caste forgoes reproduction completely, while the sentry bird with its alarm call and the stotting gazelle with its exaggerated leaps not only appear to risk their lives by issuing their warnings, but in so doing would foreclose all prospects for ensuring the reproduction of their own genes. This is the altruism that sociobiology seeks to explain, and indeed *must* explain to salvage its own theory. And explain it it does. The principal explanation is that these forms of behavior do not entail genetic sacrifice at all, but, on the contrary, are genetically calculated to ensure the safety of these identical genetic strains in the close kin who are served or warned. The explanation then amounts to explaining away altruism, even at this minimal biological level. "In short, when one speaks of 'animal altruism' one is simply speaking of instinctive behaviors, selected because their possessors thereby maximize their gene-transmission capacities."[24] It is the genes, and not the insect or animal, that are the fundamental agent. Individuals do not sacrifice themselves. They may be sacrificed by their genes, but this is only because those genes are present in other individuals and their perpetration through those individuals will be enhanced by the sacrifice. Thus from the genetic perspective, altruism is impossible, rather than even voluntary, much less morally laudable, and is ultimately an expression of the opposite of altruism, the pure self-interest of genetic manipulation.

Sociobiologists also extend this elimination of altruism from the level of genetic explanation to that of the phenotype.

In genetic terms, there is no such thing as altruism. But here again we are encountering the totalitarian tendency of this doctrine. For it is not adequate to explain the risks of apparent genetic altruism by theories such as kin selection, which assure the perpetuation of the same genes. Sociobiologists also feel constrained to extend this elimination of altruism from the level of genetic explanation to that of the phenotype. So sociobiology not only claims that the actual behavior of individual animals is not altruistic in the *genetic* sense, (that is, in not actually endangering the genes that they share with close kin who are saved by their apparent altruism) but also seems to have a compulsion to explain away any connotation of altruism attaching to the *behavior itself*. Thus sentry birds are not only assuring the preservation of their genetic strains in their close kin — they are

actually ensuring their own individual safety by silencing the flock or summoning them to fly up into the trees in the safety of numbers. Stotting gazelles are not only serving the interests of the genes they share with other members of the herd — because their exaggerated leaps (that seem to be warnings to the herd of the presence of a predator) are actually advertisements of the health and vitality of the stotting individual, and are intended to divert the predator to more vulnerable members of the herd,[25] regardless of how closely they may be related.

This compulsion to explain away every semblance of altruistic behavior suggests that the restrictions of the biological sense of altruism have been left behind. The point is not the preservation of genetic strains, or even the reproductive prospects of the apparently altruistic individual, but the nature of the behavior itself. The behavior that appears altruistic is really fundamentally an expression of self-interest. The explanation for genetic altruism expands to take in the more conventional sense of the term. The point is made succinctly by Wilson. "The theory of kin selection has taken most of the good will out of altruism. When altruism is conceived of as the mechanism by which DNA multiplies itself through a network of relatives, spirituality becomes just one more Darwinian enabling device."[26]

Wilson: "The theory of kin selection has taken most of the good will out of altruism."

The pursuit of this sociobiological explanation of altruism thus involves what Philip Hefner calls "reverse reductionism."[27] Rather than a direct equation of altruism with the biological version of genetic processes, the explanation at that level, (which rules out altruism by definition)[28] expands to absorb the usual sense of the term. Or, perhaps more realistically, the ordinary sense of the term has been present all along. The resulting scheme, which attempts to explain away all altruism through the device of kin selection and reciprocal altruism, is the logical result.

Repeated warnings that talk of altruism is metaphorical[29] may begin to sound hollow in light of this crusade against all forms of altruism, but this ploy is even less credible when applied to the other side of the picture, the ascription of selfishness. There can be no question that, far from representing a metaphoric shorthand for alluding to impersonal genetic processes, the processes themselves are understood under these essentially selfish terms. If selfishness was a metaphor for an impersonal genetic process, there would be no reason to attribute that same orientation to the level of the phenotype.

In fact, if organisms are essentially vehicles for the propagation of "selfish" genes, then the organisms themselves are, almost by definition, unselfish, if not actually altruistic.

In fact, the reverse would seem to be implied. If organisms are essentially vehicles for the propagation of "selfish" genes, then the organisms themselves are, almost by definition, unselfish, if not actually altruistic. One would expect to find a treatment at the level of the phenotype along the lines suggested by Michael Ruse. "To talk of selfish genes is to talk metaphorically, and the whole point is that the phenotypes they promote are anything but selfish."[30] But this is not what happens.

As we have seen, the supposedly metaphorical talk of selfishness at the gene level continues to apply at the level of the phenotype. Apart from the particular examples considered, this is also evident in sociobiology's insistence on the individual, as opposed to the group, version of natural selection. Granted that genetic variations occur at the individual level, it is the species, and not the individual, that is ultimately modified. Why then should the focus fall so exclusively on the individual?

The obvious answer is that the assumption of the pivotal significance of selfishness that is taken to characterize the gene level continues to be affirmed on up the scale. "Opposing individual selection to group selection as egoism is different from altruism, biologists represent the scientific content of the first [as] opposition [to] the folk concept of the second."[31] The contrast between egoism and altruism provides the horizon within which biological processes themselves are understood. Thus it is perhaps not extravagant of Mary Midgley to suggest that sociobiologists are fixated on selfishness.[32] The tenacity with which this theory is held and the comprehensive scope of its influence suggest that what is involved is something much broader than sociobiology or even than modern biology as a whole.

The precariousness of those claiming to be operating with a peculiar biological and genetic sense of altruism is betrayed by sociobiology's enthusiastic vendetta against any and every semblance of altru-

ism. M.T. Ghiselin is under no illusions that this explanation is confined to the genetic level.

> Where it is in his own interest, every organism may reasonably be expected to aid his fellows. Where he has no alternative, he submits to the yoke of servitude. Yet, given a full chance to act in his own interest, nothing but expediency will restrain him from brutalizing, from maiming, from murdering — his brother, his mate, his parent, or his child. Scratch an "altruist" and watch a "hypocrite" bleed.[33]

D.D. Barash attempts to explain the apparent altruism of Kamikaze pilots by contending that their families would enjoy enhanced social status, an explanation that hardly seems to eliminate altruism. It might be a sense of the inadequacy of this explanation that leads him to the further desperate expedient of suggesting that these pilots might have received "sexual privileges" as inducements for their sacrifices.[34] E.O. Wilson himself even goes to the extent of impugning the integrity of Mother Theresa. "Mother Theresa is an extraordinary person, but it should not be forgotten that she is secure in the service of Christ and the knowledge of her Church's immortality."[35]

The comprehensive scope of the attack on any semblance of altruism not only far exceeds the level of genetic explanation, but, as Mary Midgley suggests, it even results in blatant self-contradiction. For example, the indiscriminate and total attack on altruism described by Barash finds parents attacking their own genetic legacy, as represented by their children. Midgley points out that genetic selfishness, which is supposedly the focus for sociobiology, appears in parental behavior in the form of care for offspring. To describe parents as inherently selfishly disposed against their children is a direct contradiction of this genetic version.[36] When everyday selfishness is promoted to the direct detriment of the supposedly pristine sociobiological version of selfishness, we have a very clear indication that something much more fundamental than biological theory is at stake.

The Source of Opposition to Altruism

The tenacious dedication to the principle of self-interest, and corresponding opposition to all appearances that suggest any tinge of altruism, despite the apparent contradiction of this in significant aspects of animal behavior, is indicative of a prior foundational vision. The most obvious candidate for the source of that vision is the pervasive culture which shapes the wider background against which sociobiology has developed. "What is inscribed in the theory of sociobiology is the entrenched ideology of western society: the assurance of its naturalness, and the claim of its inevitability."[37] That ideology centers particularly on this assumption of the primacy of self-interest, whether in the intellectual vision since Descartes, in the political theory of democratic individualism or in the economic version of *laissez-faire*, free market capitalism. This latter form seems to be particularly influential for sociobiology.

Ghiselin: "Scratch an 'altruist' and watch a 'hypocrite' bleed."

The presentation is made most vividly by Richard Dawkins. He applies the calculations for kin selection, which represent a sophisticated exercise in economic theory in their own right, to the situation of a mother bird attempting to determine her optimum clutch size.[38] The strategy proposed is for her to lay one more egg than she "thinks" likely to be the true optimum. If there is sufficient food supply, she can raise all the children. "If not, she can cut her losses." She would do this by feeding the runt of the litter last, making sure that it got less than it required so it would die off, leaving enough food for the others. Then she is only out her "initial investment of egg yolk or equivalent."

Sahlins, the Chicago anthropologist who is perhaps the most prominent individual proponent of this cultural critique of sociobiology, points out that this focus on optimization or maximization stands in direct contrast to the fundamental opportunism of classical natural selection theory.[39] He suggests that the likely source of this shift is the marketplace ideology, which gives such prominence to this notion of optimization, that is, the most for the least.

In fact, a great deal of the genetic strategy outlined by Dawkins can be read as straightforward cost-benefit analysis. The bird seeking to "optimize" her clutch size might also face the challenge of assuring that her mate accepts his share of responsibility in the raising of the young when they do arrive. One possible strategy would be to spurn the male's amorous advances until the nest is built, on the theory that having invested in the nest building, the male will have too much at stake to abandon his family for new prospects.

Although this line of reasoning appealed to fellow sociobiologist Robert Trivers, Dawkins challenges it. The challenge, however, is based on economics, not on biology. "This is fallacious economics,"[40] Dawkins charges. The prudent business person

"should always ask whether it would pay him *in the future*, to cut his losses, and abandon the project now, even though he has already invested heavily in it."[41] It is no wonder that we have to remind ourselves sometimes that it is biology, and not economics, that we are reading. "After listening to the discussions of the Dahlem workshop on Animal and Human Mind for a couple of days, American sociologist Henry Gleitman asked whether all biologists were economists."[42] It is certainly impossible to imagine sociobiology shorn of the outlook and apparatus of economics.

So integral to the central theses of sociobiology is this perspective of economics that it is difficult to refute the charges of people like Sahlins and the Sociobiology Study Group when they contend that economics contributes to the substance, and not simply to the articulation, of sociobiology. So the Study Group contends that sociobiologists like Wilson impose human institutions, especially those of the free market economic system, on animals. "Then, having imposed human traits upon animals by metaphor, he rederives the human institution as a special case of the more general phenomenon 'discovered' in nature."[43] This is how radical selfishness is "discovered" in nature. The discovery is actually imposed from the assumptions of the prevailing economic culture. Or, as Sahlins puts it: where Hobbes reduced human beings to an animal level and helped provide the rationale for the modern free-for-all view of economics, whereby "man was seen as a wolf to man," sociobiology extends this assumption to the whole animal kingdom, rendering animals as conniving and calculating as robber barons or single-minded executives (remember Dawkins' "calculating" birds) so that "the wolf is a man to other wolves."[44]

Contrary to the usual understanding that sees the pure economic ideal of modern business as a reflection of the "law of the jungle," the "law of the jungle" might well be more a reflection of modern business ideals.

Therefore, contrary to the usual understanding that sees the pure economic ideal of modern business as a reflection of the "law of the jungle," the "law of the jungle" might well be more a reflection of modern business ideals. To recognize this "contribution" of economics to sociobiology is not to deny that nature includes viciousness and selfish behavior. There is no need to romanticize natural processes. But the uncompromising insistence that nature represents nothing but this, so that every hint of altruism must be explained away, must be challenged. How much of that picture truly reflects what goes on in the natural order, and how much of it reflects the imposition on that order of this particular reading of life developed in modern economics?

The Legacy of the Opposition to Altruism

The explicit cost-benefit calculations of animal behavior presented by sociobiologists are only a more detailed version of the fundamental orientation of modern biology generally. "Evolution is basically a selfish doctrine, preaching that the individual that maximizes its own welfare and reproduction relative to others will gain the selective edge — by leaving more descendants who, themselves, carry the same behavioral traits."[45]

The parallel with the modern economic vision is unmistakable, but the dynamics of the parallel are even more revealing. I have noticed the suggestion that this modern economic reading crept in through the influence of social Darwinism. Thus Sahlins concludes that "Darwinism, at first appropriated to society as 'social Darwinism,' has returned to biology as a genetic capitalism."[46] On this reading, Darwin's biological vision was applied to human society through "social Darwinism" and then, in turn, this free enterprise social vision was read back into nature with the result that, as Sahlins suggests, the wolf comes to be seen in light of the acquisitive behavior associated with the aggressive human entrepreneur. It may be, however, that in spite of the sharpness of Sahlins' attack on the genetic capitalism developed by sociobiology, his historical reading of Darwinism itself is really too conservative.

At the very least, there is a reciprocal relationship between natural and social Darwinism in their origins, and not simply in their long-term development. "The social Darwinian description of nature, with its emphasis on the survival of the fittest and a claw-and-fang mode of natural selection, precisely reflected the relations that prevailed in the 19th century marketplace. The fit is almost perfect, and it is hard to say whether natural Darwinism produced social Darwinism or the very reverse."[47] Thus it is not the case that natural Darwinism developed as a biological theory in pristine isolation, and then received social application. The theory itself reflects the outlook of the age in which it developed.

Ashley Montagu points out that though Darwin himself was by nature a gentle person, he grew up in a world torn by repeated warfare, with the industrial revolution at its height in England and well under way elsewhere.[48] This climate provided the perspective from which Darwin viewed nature. "It was not that the human struggle was seen as a part of the struggle of nature, but rather that nature was interpreted in terms of the struggle for existence of men living and attempting to live in a ruthless industrial society in which the fittest alone survive."[49] Thus the origins and development of Darwinism are, in fact, the reverse of what they are generally taken to be. Rather than representing a natural biological theory applied to human society, the theory itself, in its natural as well as its social versions, reflects the way *human* life appeared in the first half of the 19th century.[50]

It is not the case that natural Darwinism developed as a biological theory in pristine isolation, and then received social application. The theory itself reflects the outlook of the age in which it developed.

Evidence of the origin of Darwin's theory in human circumstances is found in his starting point in Malthusian speculations about the fate of human populations occupying an industrial society.[51] This assumed background becomes even more specified, however, when account is taken of the significance of Adam Smith, the patriarch of modern free market economics, to Darwin. Smith's notion of individuals pursuing their own interests somehow contributing to overall prosperity and harmony through an invisible hand becomes, in Darwin, individual random mutations resulting in new species through the invisible agency of natural selection.[52]

But more important than this theoretical parallel is the parallel in fundamental vision. Darwin accepts Smith's assumption of the primacy of the individual and its corollary, that the whole is simply the sum of the parts. Life builds up from individual units to form aggregates. There is no wider unity beyond this aggregation itself. That not only a biologist, but one who developed what is almost certainly the most influential organic vision of life ever known, could disown this requisite recognition of the intimate interrelatedness of life in preference for a mechanistic individualism demands explanation. None is more obvious than the direct acceptance of the *laissez-faire* economic vision that was molding the fabric of his own society. It is hardly an exaggeration then, when Stephen J. Gould suggests that "Darwin grafted Adam Smith upon nature to establish his theory of natural selection."[53] It is not surprising, therefore, that sociobiology should corroborate this origin by refining the Darwinian direction in explicit economic cost-benefit calculations. That this reflects an adequate understanding of either the natural or the human order, however, is another question.

The Implausibility of Non-Natural Altruism

The disassociation of altruism from nature does not entail the total abandonment of altruism. On the contrary, this natural ban can be accompanied by a plea for, and an expectation of, full blown moral altruism.

The Unnaturalness of Altruism

Even though it is altruism itself that is the target of sociobiology, and not simply the biological anomaly of reproductive altruism, according to some critics, this extravagance could be alleviated if only sociobiologists would recognize the uniquely human quality of altruism.

> The uneasiness with the "atmosphere" of sociobiology can, in my view, be reduced to one central question: sociobiology does not take notice of the fact that man — and only man — can identify with any conspecific and feel sympathy with him; and that this can be a source of emotions that cannot be explained or even dealt with within a system of genetic cost-benefit relations.[54]

If sociobiologists would only recognize the distinctiveness of altruism as a capacity peculiar to human beings, the assault on natural altruism would not be particularly significant, because genuine altruism is really cultural — not biological. "The conclusion seems to me inevitable that man can have achieved his social-insect-like degree of complex social interactions only through his social and cultural evolution, through the historical selection and cumulation of educational systems, intragroup sanctions, supernatural (superpersonal, superfamilial) purposes, etc."[55]

On the surface, social insects and human beings both seem to act with a significant degree of altruism. Beneath the surface, however, it becomes evident

that the apparent altruism of insects is genetically programmed. Human beings are unique in having developed altruism as a cultural phenomenon.

An immediate difficulty with this neat division between humans and other animals is that the more the distinctiveness of the human is emphasized, the more the organic unity of the evolutionary process appears to be threatened. The nature of biological science itself is at stake in this type of contrast. This might help to account for the ambiguity among sociobiologists over this matter of human distinctiveness. Even within the writings of a single sociobiologist, the ambiguity is apparent. In what has become the Bible of sociobiology, Wilson contends that sharing is rare among non-human primates, with rudimentary forms occurring in chimpanzees and perhaps in a few Old World monkeys and apes. "But in man it is one of the strongest social traits, reaching levels that match the intense trophallactic exchanges of termites and ants. As a result, only man has an economy."[56]

However, we seem to have arrived at a complete repudiation of the solemn assurance of the preface: "We are ... robot vehicles blindly programmed to preserve the selfish molecules known as genes."

But elsewhere, Wilson explicitly denies that economics is peculiarly human. "The point is that human economics is not really general economics, but rather the description of economic behavior in one mammalian species with a limited range of the biological state variables."[57] Such explicit self-contradiction, added to the basic ambiguity over biological and everyday meanings of altruism, makes the sociobiological position on the naturalness of altruism even more difficult to pin down. Are human beings peculiar in their capacity for sharing, and so able to enter into the exchanges that constitute economics in a way that other species cannot approximate, or is human economics only one version of a more general phenomenon? The salient issue, of course, is the distinctiveness or commonality of human altruism.

Even if this ambivalence can be overcome, it is not clear which direction would constitute the preferred resolution. Recognition of the distinctiveness of the human might well silence those critics of sociobiology who perceive its threat to consist in subjecting the human to biological reductionism. However, it will hardly answer the concerns of those who contend that the fundamental direction of sociobiology, and indeed of modern biology generally, is determined by a particular vision derived from the modern understanding of the human fabricated under the influence of *laissez-faire* economic culture.

Indeed, from the perspective of this concern, any emphasis on the distinctiveness of the human, far from representing a concession in the reductionistic tendencies of sociobiology, may really only represent a further expression of the self-assertion taken over from the modern economic managerial mandate. At the end of Dawkin's book, which is dedicated to extolling the absolute primacy and authority of selfish genes, we are confronted with the concept of the "meme"[58] (an abbreviation of the Greek *mimeme*, "imitation," to achieve a parallel to "gene"), as a term for units of cultural evolution. This can appear to be an abrupt modification of the thesis affirming the determinative significance of genes. However, when we are told that even these memes are at our disposal, we seem to have arrived at a complete repudiation of the solemn assurance of the preface: "We are survival machines — robot vehicles blindly programmed to preserve the selfish molecules known as genes."[59]

Now we are assured that we can leave all this evolutionary legacy behind. "We have the power to defy the selfish genes of our birth and, if necessary, the selfish memes of our indoctrination. We can even discuss ways of deliberately cultivating and nurturing a pure, disinterested altruism — something that has no place in nature, something that has never existed before in the whole history of the world."[60] The prospects for such an unprecedented phenomenon do not appear great. However, of more immediate consequence for this whole position is the high cost at which even this prospect is achieved — the apparent repudiation of the central conviction of the position itself, that genes are the determinative agents of life.

The Artificiality of This Unnaturalness

In spite of the apparently total about-face represented by this assurance that "we are built as gene machines and nurtured as meme machines, but we have the power to turn against our creators,"[61] this does not necessarily mean a complete repudiation of the detailed delineation of genetic strategies. It can rather entail drawing on the knowledge of these strategies as the means for the rebellion against them. So, as Peter Singer observes, "the better we under-

stand evolution, the better we can outfox it."[62] Then rather than a direct repudiation of the selfish gene reading of life, the promotion of an unprecedented altruism *requires* precisely this knowledge of the endemic selfishness at the heart of nature as a measure of the odds against which any prospect for genuine altruism must contend.

Human beings are unique in having developed altruism as a cultural phenomenon.

As a revolt, the suggestion of an unprecedented altruism is more credible than it would be as a direct repudiation of the genetic theory that led up to the reversal. The odds may still be very high against genuine altruism, but at least these odds are recognized. It is not as if sociobiologists like Dawkins are saying "forget the genetic base, and act altruistically." The point is rather that if there is going to be genuine altruistic behavior, it is going to have to be in defiance of the predilection for selfishness characteristic of the genetic base. Whether this actually harmonizes the major premise that we are born survival machines for selfishly replicating genes with the conclusion that we have the power to rebel against these same genes, however, is another matter.

The crucial question is: is this reversal itself independent of any genetic base? "What could it mean to transcend our genes, turn against them, or be freed from slavery to them — particularly since the organism that turns against [them] is thoroughly dependent on genetic evolution?"[63] Conversely, if the fundamental thrust of life is as uncompromisingly selfish as Dawkins claims, how does the vision of altruism ever arise? "For what reason does Dawkins *wish* to build a society in which individuals co-operate generously and unselfishly towards a common good', if it is true that such a desire is in contradiction to his inborn human nature?"[64] The chasm remains between a supposedly inescapable genetic endowment and an equally independent human initiative, lending credence to R.W. Burhoe's characterization of Dawkins' conclusion as offering "an admittedly lame hope for any explanation of human altruism."[65] The unrelenting insistence on the utterly selfish orientation of the most formative life forces is bound to render arbitrary any account of altruism from within this kind of sociobiological perspective.

The only plausible source of Dawkins' abrupt interest in altruism in the final chapter of a book dedicated to its extermination is the same cultural milieu that nurtured that very drive to extinguish every spark of altruism from the natural order. Paradoxical though this may appear at first sight, on reflection it can be seen to be so perfectly consistent that we might wonder why the apparent reversal of the final chapter seemed so surprising.

The appeal to a heroic, unnatural altruism is completely consistent with modern western self-centeredness, and can very readily accompany a reading of the natural order as genetically programmed for selfishness. The only device that is needed to effect this otherwise unlikely amalgam is one that has developed and flourished in the self-centered managerial mentality of the modern West, the fact/value dichotomy. The genetic explanations then represent a factual account of the order of nature, in contrast to which the call to altruism represents a volitional value judgment that we are free to make, and can only make, independently of the factual situation.

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Indeed, this promotion of non-natural altruism illustrates not only the perspective of the fact/value dichotomy, but also a very prominent reading of that dichotomy, focusing on what has become known as "the naturalistic fallacy." The essence of this fallacy is the attempt to derive what "ought to be" from an examination of "what is." To avoid the naturalistic fallacy, then, in this context, we must recognize that "sociobiology can *not* be used to make value judgments on what an organism 'should' do."[66] This provides an opening to say that just because the genetic predisposition favors the unflinching pursuit of self-interest does not mean that the pursuit of that self-interest is right. The *value* of that direction is a question beyond establishing that that is the actual situation.

We have seen that this supposedly factual account of the natural order really reflects the "values" of modern economic self-interest applied to nature. The total selfishness of natural processes is read into at

least as much as it is read out of the biological evidence, as the extreme contortions required to abolish every hint of altruism demonstrate. But if the supposedly factual descriptions of nature involve valuational perspectives, as the recognition of the determinative significance of the economic outlook for sociobiology suggests, should we not expect that the reverse will also hold? Then valuation can be expected to have some reference to the way things are seen to be.

We might formulate this expectation as a counter-fallacy. Just as it is fallacious to seek to derive any kind of moral prescription from a purely factual description, so too it must surely be tenuous to the point of absurdity to think that we can affirm values in complete disregard of the way things are. We might call this "the valuational fallacy." But absurd though it may be, this fallacy represents a bed-rock assumption in the modern western mentality. The natural order awaits our manipulation, pure raw material for the imposition of our designs. Thus the plea for a totally unnatural altruism in defiance of the totally selfish determinations of the natural order is not finally a repudiation of the modern self-centered perspective, but a further instance of it. It is our prerogative to assert whatever values we choose over this alien realm of nature.

The Natural Basis of Non-Natural Altruism

Flattering though the confinement of altruism to our species might be, it is ultimately self-defeating because it requires a fundamental gulf between biological and cultural evolution. The idea that something could emerge at the cultural level that not only does not draw on the biological base, but actually stands in fundamental contradiction to it, is an incredible doctrine from the point of view of biology itself. It is even tenuous from a humanistic perspective, precisely because it is so unequivocally anthropocentric.

No doubt, there is a uniqueness to human altruism. It is entirely plausible that it involves a capacity for identifying with the plight of others which is not matched in other species.[67] But to regard this as totally discontinuous with the behavior of animals and birds is much more readily attributable to the anthropocentric perspective of modernity than to generalization from observations of nature. Parental care, alarm calls, and adoption of orphaned animals all suggest approximations to what we know as altruism in the human sphere. The rejection of this link is indicative of theoretical requirements of a vision which cannot countenance this possibility.

The vision of cardinal self-interest has no place for what Laurence Thomas calls "transparent" love.[68] In contrast to opaque love, which depends on the object which elicits it, transparent love, in Thomas' usage, is a love which is independent of the qualities of the object of the love. The contrast is parallel to the one Christian theologians draw between *eros* as the love of attraction and *agape* as the care and concern that may be lavished on the most undeserving recipient.

Sociobiology views parenthood as a matter of genetic calculation. In contrast, Thomas sees it more generally as an instance of transparent love, and, as such, it represents a dominant element of biological reality.

Sociobiology views parenthood as a matter of genetic calculation. In contrast, Thomas sees it more generally as an instance of transparent love, and, as such, it represents a dominant element of biological reality. "Now, may we not suppose that [much of the] continuum comes in the wake of the capacity for parental love and, therefore, that if human beings (or, for that matter, any creatures) are biologically endowed with the former capacity, then they are biologically endowed with the latter, unless the latter is specifically selected against?"[69] This entirely plausible reading represents the only basis for any serious prospect for genuine altruism. Far from an anomaly invented by humans, human altruism rather represents a refinement of a tendency evident to some extent in the wider natural order.

The arbitrariness of the attempt to salvage altruism as an invention of human culture is not relieved by attributing a special role in this cultural evolution to religious sensibility. No doubt, just as the human capacity for imaginative identification gives human altruism a scope that distinguishes it from approximations in animal behavior, it is also true that, as R.W. Burhoe notes, religion has played a particular role in providing motivation and rationale for serious altruism.[70] To attribute altruism to religion as a cultural phenomenon, however, would only magnify the inadequacy of the cultural explanation as such. For not only is this still subject to the suspect anthropocentrism of the modern outlook, but it also implies a theological perspective that amounts to what might be called an inverse deism.

While deism locates God back at the beginning as a designer who set the universe in motion and sent it on its largely independent way, the confinement of altruism to our own species, and the particular identification of it with religious sensibility, has the effect of implying that God, understood along altruistic lines as in Christian theology, is located almost exclusively on *this end* of the process. The difficulty with this is that from within the religious perspective itself, God must be seen to encompass the whole process, past, present, and future. If God is characterized by *agape*, by transparent love, as the Christian gospel claims, then that reality must be expected to permeate life, rather than being confined to a latter day development peculiar to our own species. And the evidence for this is at least as compelling as the evidence for unmitigated selfishness apart from the supposed altruistic breakthrough of our own species.

... the confinement of altruism to our own species has the effect of implying that God is located almost exclusively on* this end *of the process.

Further, in both cases, what is involved is not simply a matter of evidence but of a formative vision of life through which the evidence is read, and, as we have seen, in the interests of which the evidence may well be contorted or ignored.

It would represent a considerable advance if even this were to be recognized, so that the aura of pure scientific factuality might be dispelled and the importance of fundamental visions appreciated. Then, rather than assuming that the depiction of endemic selfishness is pure scientific description and that any hint of authentic altruism is simply religious romanticism, there might be some hope of recognizing the comprehensive visions of life that are at stake, and perhaps even opening up the contrary possibility that it is this so-called scientific account of altruism that is romantic, in expecting altruism to materialize out of thin air in utter defiance of a diametrically opposed selfish genetic base.

The prospects for such recognition, however, are not good. The assumption of selfishness is so pervasive and pivotal in the modern outlook that it represents a serious breach of conventional wisdom to contend that there might be something natural about altruism. Sociobiology itself deserves some of the credit for confirming and refining this perspective. In spite of its own indebtedness to this cardinal modern direction in general, and to its economic instantiation in particular, it has, in turn, provided an aura of scientific respectability to this vision of life. It thus not only reflects this wider cultural influence, rather than simply constituting a direct factual reading of natural phenomenon, but also contributes to the promotion of this vision with its requisite anticipation of selfishness and corresponding dismissal of any serious expectation of altruism in others or motivation for it in ourselves. The result can only serve to discourage any prospects for altruism that people might entertain. "It can only mean that their feeble efforts to behave more decently are futile, that their condition will amount to the same whatever they do, that their own and other people's apparently more decent feelings are false and hypocritical."[71] Thus, in contrast to the neutral position that it claims to represent, sociobiology not only draws on a particular cultural era for its primary inspiration, but also enforces that vision through the very aura of neutrality that it enjoys as science.

If God is characterized by* agape, *by transparent love, then that reality must be expected to permeate life, rather than being confined to a latter day development peculiar to our own species.

The point of this conclusion is not to reject the scientific ideal of factuality. Indeed, this critique of sociobiology presupposes that ideal. The problem is precisely that sociobiology does *not* recognize the apparent altruism that exists in the natural order. How different modern life, and not simply biological science, might be if Darwin had not been consumed by the vision of competition, and had been able to acknowledge the cooperation that is also evident in the natural order![72] How different our present prospects might be, if sociobiologists were to relinquish their obsession with selfishness and give sufficient scope to the cooperation and apparent altruism that they themselves are constrained to mention! A more balanced agenda in sociobiology might even penetrate the omnipresent contemporary commercial culture, whence it derives its present perspective, and at least prompt some questioning of this incessantly insistent endorsement of the self-centered vision of life. *

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Communications

Obstacles And Opportunities In Science For Christian Witness

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The topic "Obstacles and Opportunities in Science for Christian Witness" is overwhelming, to say the least, so to keep the scope manageable, I should state at the outset that there will not be much discussion of apologetics as such in this paper. Instead, I will focus on the venues for witnessing themselves, the new opportunities that recent events have created, for example, in areas of the world formerly closed to Christian witness. We also need go no further than our own scientific institutions, where optimism and confidence are giving way to disillusionment, especially among younger researchers.

It is obvious that even this subject cannot be possibly covered comprehensively in the space of a single article, so my remarks will have to be personal and anecdotal. This will be true especially as they concern the second part of the title, the obstacles to witness. There are the external kind, the hostility and discrimination that has been the lot of the believer, in one form or another, from the earliest of times. Christians must be aware of them and respond accordingly, but there are also the internal obstacles, the apprehensions all believers experience as we try to witness. I'll give an example of the latter, at once personal but also related to new global realities. It's painful to recall the circumstances, but I thought it might be helpful to share them in light of God's ultimate sovereignty and our role as His instruments. I will then conclude with a lesson from the Bible about witnessing, a perhaps commonplace but important reminder that its truth is eternal in these rapidly changing times.

Let me proceed with a very brief description of what I do for a living. I am an experimental physicist doing fusion energy research at the Plasma Physics Laboratory of Princeton University. The most promising approach for realizing controlled thermonuclear fusion as an energy source involves the "tokamak" concept. The word itself is a Russian acronym for "doughnut-shaped device," and the Tokamak Fusion Test Reactor at Princeton is the largest facility of its kind in the United States. Magnetic field coils create a magnetic "bottle" that contains a hot, ionized hydrogen gas, or plasma. Large particle beams, like those in atom smashers, are used to heat the plasma to temperatures high enough for fusion to occur. So-called "scientific break-even" experiments, where the power output from the fusion reactions equals the power input from these beams and other plasma heating methods, are scheduled for 1993-94.

I spend most of my time on a smaller machine, the Princeton Beta Experiment-Modification (PBX-M). We're using it to see how large we can make a parameter called "beta." This is the ratio of the amount of plasma we can contain to the strength of the magnetic confining field, so the higher the beta, the cheaper a fusion reactor is going to be. In PBX-M, we are able to make discharges with cross sections that look like kidney beans or other odd shapes needed to keep the plasmas stable in low magnetic fields.

The point of all of this is that the former Soviet Union was, until recently, very much in the forefront of fusion research. Not only was the term "tokamak" of Russian origin, as mentioned earlier, but their most recent device, T-15, was in the same class as the largest American, European, or Japanese machines.

The present condition of science in the former Soviet Union, unfortunately, is reflected rather dramatically in the title of an article in a recent issue of *Physics Today*.[1] Entitled "SOS! Save our Science!," it was written by Roald Sagdeev, former director of the Institute for Space Research in the former Soviet Union, and now a professor at the University of Maryland. He goes on to state that "Western nations should not regard aid to science and scientists in the former Soviet Union as charity."[2] Instead, this assistance "will return benefits in the form of technology and knowledge, and it will help make democratic changes irreversible."[3] The United States has indeed responded, as reflected in the front page *New York Times* headline "U. S. to Offer Plan to Keep Scientists at Work in Russia" that appeared in early 1992.[4] There were two articles underneath it, with the titles, "Agency Seeking Soviet Advances for Star Wars" and "Fears on Weapons: Project's Aim is to Keep Nuclear Experts from Selling Knowledge."[5] As they suggest, there is more than a hint of enlightened self-interest.

When I attended a physics conference in the former Soviet Union in mid-1990, the problems for the scientists there were just beginning, but there was already anxiety about their futures. I must confess that I am not one who is comfortable smuggling Bibles. When I learned that there were no longer any restrictions to the dissemination of Christian literature, however, I did bring some New Testaments along. They were provided by Christian Leadership Ministries of Campus Crusade for Christ, so the "four spiritual laws" were also included.[6]

Because typical responses to the Gospel here in America range from lack of interest to outright hostility, the reactions to it that I observed in the former Soviet Union were a new experience for me. I timidly offered the Bibles to my colleagues there, as gifts in appreciation of their hospitality as much as for their spiritual content. Much to my surprise, their reactions ranged from great gratitude, since Bibles were very expensive there, to a remark that the "soul" of their country was taken from them during the last seventy years, and now they could read the book that could give it back to them.

These attitudes reflect opportunities, indeed, for Christian witness, and clearly not only among scientists. For example, the *Moscow News* is a weekly journal published in Russia, and its issue around Easter time featured the reflections of a minister on his faith in Christ and his resurrection.[7] It was under a front-page headline "Christ has Risen," and such articles would certainly not have been a commonplace there a few short years ago. A short paragraph in a recent issue of *Time*, however, provides us with a cautionary note. It describes the "newly renovated L. Ron Hubbard Reading Room" at the Moscow State University, and mentions Scientology's plans to start a college of their own in the summer of 1992.[8] We should thus all pray with humility that our listeners will be drawn not to novelty from the representatives of a rich nation, but to Christ himself.

In keeping with the global theme of this paper, I'll next describe my experiences in the People's Republic of China. My wife's parents left the mainland before she was born, and except for her immediate family, all of her relatives are still living there. Since she had never met any of them, we decided to visit the country about six years ago, in 1986. It also turned out that the director of the Institute of Plasma Physics at the Academia Sinica in Beijing is an alumnus of our graduate program, so I was able to lecture there and see their facilities.

We brought Christian materials along with us, but here again I made sure that their dissemination was no longer restricted. We found interest in the Bible, but unlike in the former Soviet Union, it wasn't clear whether this was more due to a general curiosity about western things than to its spiritual message. Because my visit was by official invitation, admittedly expedited by my wife's uncle in the Ministry of Foreign Trade, we had an official guide and interpreter. His training was in English literature, and like others with whom I spoke, he was quick to emphasize the need to study the Bible to understand his field in particular and western culture in general. He was reluctant, however, to say much more.

In fairness, I could understand my guide's circumspection, since although there was much evidence for economic reform, signs of the kind of political change that has swept eastern Europe were not so obvious. As we drove by Tienanmen Square in Beijing, my guide pointed out that huge rallies were orchestrated there during the Great Cultural Revolution, with each person assigned a position inscribed in a square on the pavement. With almost a sense of embarrassment, he took great pains to note that such events were a thing of the past. When I asked him if he thought something like the Cultural Revolution could happen again, his formerly gregarious disposition became very subdued, and he answered quietly that he could only hope not. The prescience suggested by his remarks came back to me in a poignant way in June, 1989, as I watched videotapes of tanks driving along the same streets we had driven only a few years before.

The events of 1989 notwithstanding, the leadership of the People's Republic of China recognizes the importance of contact with the West for its continued economic development. The result is an ever increasing number of scholarly exchanges involving the United States and other western countries, especially in science and engineering. American personal computers were in plain sight in Beijing when I was there, and a recent Chinese visitor who spent a year in my laboratory came with a knowledge of VAX/VMS, the operating system for a series of computers manufactured by the Digital Equipment Corporation in Massachusetts. Christians can exploit the contacts they can now make with Chinese colleagues in their areas of expertise, and simple expressions of hospitality can provide rich opportunities for witness.

After a bit of globe-trotting, as it were, we need to examine the plight of the scientific community within the United States. As attractive as this country appears to be relative to other parts of the world, there is a growing sense among many scientists that the future isn't so rosy. An article in *Physics Today*[9] in 1991 describes a recent survey by the American Physical Society, and it "reveals that many of our brightest young physicists are struggling in a research climate that they regard as dismal." Many leading scientists are fond of predicting a "shortage" of scientists, but to young researchers now looking for permanent jobs, such pronouncements about future prospects are a cruel joke. As a personal aside, I heard Proverbs 29:18, "Where there is no vision, the people perish," quoted by then U. S. Secretary of Energy, James Watkins, as he tried to inspire the participants of the 1990 International Atomic Energy Agency conference on nuclear fusion research in Washington. With all due respect to Secretary Watkins' good intentions, many of my younger colleagues might be tempted to add that where there is no funding, people also perish — professionally.

To date, the primary effect of such a grim picture has been to discourage many gifted young people from entering the profession. Concurrently, however, there is a growing concern over ethics and social responsibility in the sciences, and the combination might ultimately bring about the kind of re-examination of values and priorities that would foster an increased receptiveness to the claims of Christ. A few years ago at Princeton, for example, I participated in a conference on Science, Technology, and Responsibility in Society, or STARS. It was wholly run by students, and I was asked to be a panelist by one of the organizers in my department who knew of my strong convictions on ethics and human values in science and engineering.

I felt I could not talk about the topic too abstractly. Instead, I had to start with my own beliefs, and hence, made it an opportunity for witness. In brief, I noted that the "ordinances of the heavens" (as the Book of Job poetically calls the "Laws of Nature") and the "Laws of Morality" come from the same Creator. The Bible, which begins with, "In the beginning, God created the heaven and the earth," and also teaches us "to love your neighbor as yourself," clearly links the "science" and the "ethics." While an earlier speaker decried the loss of what he called "frameworks of responsibility" among contemporary scientists, I cited my faith as providing one for my decisions concerning ethics and human values. Afterwards Dr. Theodore Taylor, a prominent nuclear bomb designer and now solar energy expert, was kind enough to tell me that he was impressed with the convictions of "religious people," as he put it, and of late, he had been inexplicably drawn to the writings of C. S. Lewis and other Christian writers. It was a reminder to me of the folly of pre-judging what sort of circumstances are best for witness.

It is precisely this sort of tendency toward caution that can figure in the internal obstacles that I alluded to at the beginning of this article. To demonstrate this in my final example from experience, we must to return to the former USSR. The conference I described earlier actually took place in Minsk, the capital of what is now Belarus. As you might find in other professional meetings, there was a sightseeing excursion scheduled for a free afternoon, but instead of hiking or snorkeling, we were taken to one of the more stark and dramatic memorials to the victims of World War II. The hour-and-a-half drive took us to Hatyn, a town that was totally destroyed about fifty years ago. When the Nazis arrived there, they crammed all of the inhabitants into a large barn, and set it on fire. The only survivors are immortalized in a huge statue that shows an old man carrying a boy in his arms. It is apparently the tradition that at each anniversary of the event, the boy, who is now as old as the man who saved him, recounts the story of the massacre to the gathered crowd.

The site was chosen as a memorial to all of the Belorussians who died in World War II precisely because of the contrast between its beautiful, pastoral surroundings, with no trace of war left, and the horror that time will not erase. The sites of the destroyed homes are marked with stylized chimneys, as you would find after a fire, with the names of the victims inscribed on them, and it had the same impact on me as the rows of name after name on the Vietnam Memorial in Washington. There was also a cluster

of three white birch trees, a national symbol of Belarus, with an eternal flame in the space where a fourth would have been. It symbolized the fact that 2.5 million Belorussians, or a quarter of the pre-war population, perished during the conflict.

The context of this trip, needless to say, lent itself to much reflection. I was able to use the drive to and from the memorial to share the Gospel with a young physicist, and I gave him one of my Russian New Testaments. It was easy to befriend him because we were engaged in related research, and he was very proficient in English. There was another physicist sitting near us in the bus, and I didn't know whether he was interested in our conversation, or even understood enough to follow it. Not wanting to impose anything on him, however, I erred on the side of circumspection, and did not talk to him or give him the extra New Testament I had with me.

It turned out that this second fellow was one of the health physicists investigating the effects of the Chernobyl disaster. Shortly after the conference, he was shot and killed. Whether or not it was related to what he uncovered is still unknown, so the circumstances of his murder are at least as mysterious as the death of Karen Silkwood several years ago. To say that I feel that I made a great mistake, then, in not at least trying to tell him the "Good News," is no exaggeration. On the other hand, I've had to remind myself that God is sovereign, and even after we have made terrible mistakes, he expects us to "keep up the good fight" in humble obedience to his perfect will.

In conclusion, new realities, especially in these uncertain times, are changing the details of the challenges we face as Christians, and we should certainly do our best to accommodate them. God's plan of salvation, and what He expects of us, however, are eternal, and it is good to return to His word for perspective. In a passage familiar to most readers, the ninth chapter of the Gospel of John records how Jesus healed a man blind from birth. The Pharisees, knowing that the miracle was performed on the Sabbath, wanted the man to denounce Jesus as a sinner. In the twenty-fourth verse, he replies, "Whether He is a sinner, I do not know; one thing I do know, that, whereas I was blind, now I see." To tell what we know as plainly and as honestly as we can is a truth that will serve each of us in good stead as we tackle both the opportunities and obstacles as witnesses to God, wherever He might lead us. ✱

NOTES

[1]R. Z. Sagdeev, "SOS! Save our Science," *Physics Today*, May, 1992.
[2]Ibid., p. 22.
[3]Ibid., p. 22.
[4]J. N. Wilford and T. L. Freidman, "U. S. to Offer Plan to Keep Scientists at Work in Russia," *New York Times*, February 8, 1992.
[5]Ibid., p. 1
[6]*The New Testament and the Four Spiritual Laws*, Russian Translation, Campus Crusade for Christ International, 1986.
[7]A. Kurayev, "Christ has Risen!," *Moscow News*, April 26-May 3, 1992.
[8]"Scientology's Largesse in Russia," *Time Magazine*, April 13, 1992.
[9]R. Czujko, D. Kleppner, and S. Rice, "Their Most Productive Years: Young Physics Faculty in 1990," *Physics Today*, February 1991.

An Invitation to Those Interested in the History and Philosophy of Science

Christians in Science, the U.K. analog of the ASA, has invited interested readers of this journal to join their working group on the history and philosophy of science. An April 1993 meeting at York offered papers on the evangelical response to science in the 18th and 19th centuries. Papers were presented by David Livingstone, John Hedley Brooke, Jonathan Topan, Paul Marsten and Jack Haas.

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A Statistical Test That Fails to Substantiate Decay in the Velocity of Light

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The velocity of light, *c*, has been calculated using many different methods since 1676 (for a list, see Froome and Essen, 1969). Recent creationists say the estimates have shown a decreasing trend, and posit the bold hypothesis that *c* has decayed from an infinite velocity at the big bang. This hypothesis harmonizes a young earth (10,000 years or so) with stars that are millions of present-*c*-light years distant from earth.

Refuting their hypothesis may seem superfluous, because in the last 25 years accurate modern methods seemed to have proved *c*'s constancy, consistently estimating it at 299,792.5 0.4 km/sec. But doubt still remains because *c* may follow an exponential rate of decline such that today it approaches an asymptote, and thus decays imperceptively over 25-year periods. Recent creationists hope ancient estimates such as Roemer's in 1676 are perceptibly larger than today's estimate.

Can we test the recent creationists' hypotheses? If we are willing to live with a few assumptions, we can perform a simple statistical test, the "sign test," using past estimates of *c*. The test will measure departure from the constant *c* model. We will see that the departure is negligible, so that the alternative decaying *c* model is not substantiated. Although it is not a very sensitive test, the sign test requires only a few assumptions. More sensitive tests require more assumptions, which may not be warranted. Without extensive knowledge of the physics pertaining to the estimation of *c*, a more sensitive test may be difficult to construct.

How Statisticians Test a Hypothesis

By rejecting as true a "null hypothesis" *NH*, statisticians conclude as true a subset of its complement, the "alternative hypothesis" *AH*. For example, suppose we want to show that a coin is biased. (Most are.) Suppose we know that the bias, if it exists, is one-directional — that is, tosses of the coin turn up "heads" too frequently. (The *velocity of light* test to follow is also one-directional.) We choose as our *AH* that the probability *(P(heads))* that a toss of the coin will come up "heads" *is greater* than .5. The null hypothesis we choose is *P(heads)* = .5 .

Rejection of the *NH* (*P(heads)* = .5) will *establish* the *AH*, namely that *P(heads)* > .5 — that is, the coin is biased towards "heads."

We model the null hypothesis with a "box" (Freedman, Pisani, and Purves, 1978) containing the two possible coin toss outcomes. Each withdrawal from the box produces either an *H* or a *T*, consistent with the null hypothesis that *P(heads)* = .5 .

We compare the real data we got from our coin tosses against the *NH* by computing a "*P*-value." The "*P*-value" is the probability that coin tosses are as seemingly inconsistent with the *NH* (and consistent with the *AH*) as our actual data was, or worse. For our example, if the actual data turned up 7 "heads" and 3 "tails," the *P*-value is the probability that any 10 tosses turn up 7 or more "heads"; this probability happens to be .17. The lower the *P*-value, the less likely the *NH*, and the more likely the *AH*. With a value of .17, we might conclude that the *NH* *P("heads")* = .5 is false, and so the *AH* is true. However, .17 is not very low; most people would demand a *P*-value less than 5 or even 1% before they conclude that the *NH* is false. E.g., if we got 9 "heads" and 1 "tail," the *P*-value is .01, and we would be prone to conclude that *NH* is false, *AH* is true, and the coin is, in fact, biased towards "heads."

A high *P*-value means the actual data observed are quite likely to occur if the *NH* is true. For example, a *P*-value of 38% is obtained if the actual data was

6 out of 10 "heads." This is too high to claim that the *NH* is false, but it doesn't imply that it's true, either. The test is inconclusive; we need more data. 60 out of 100 "heads" yields a low *P*-value of 3%. 120 out of 200 "heads" yields a very low *P*-value of .3%; here most would conclude that the *NH* is false without reservation. This coin example illustrates the use of what is called "the sign test," for testing a hypothesized proportion for an event.

If modelling *NH* with a box is inadequate, i.e. the data under *NH* do not resemble random withdrawals from a box, we ordinarily cannot calculate a *P*-value. The *P*-value is the basis for most statistical inferences. Therefore, as Freedman, Pisani, and Purves put it, "no box, no inference." Modelling the *AH* with a box is unnecessary because we calculate the *P*-value under the assumption of the *NH*.

Testing Our Hypothesis of a Decaying *c*.

Our alternative hypothesis is *AH*: *c* is decreasing over time; our null hypothesis is *NH*: *c* is constant over time. Our data (obtained from Froome and Essen) consists of estimates of *c* in the past. If *NH* is true, then a collection of independent estimates should resemble flips of a fair coin, in that half are expected to overestimate today's *c* estimate, and half underestimate it. By making some hopefully reasonable assumptions, we shall pare our data down to a collection of independent estimates. With this collection, we model *NH* with a box containing two possible outcomes, say "+" for overestimation, and "-" for underestimation, and apply the sign test. We gathered two collections of independent estimates; for each, the sign test rendered high *P*-values. We elaborate now.

Given that the null hypothesis is true, we can model the estimates of *c* as follows:

estimate = velocity of *c* + measurement error

Bias and measurement error are unaccounted for "noise" in our data. If we can eliminate some of it, we should, as this would increase the precision of our estimates, and thus the sensitivity of our test.

The measurement error term represents variability in the procedure's estimate, whether it be human variability in carrying out the procedure, or lack of precision in the measuring devices, etc. An example occurs in Roemer's 1676 estimate of *c*, which involved estimation of the diameter of the earth's orbit. Roemer inaccurately measured it, and this resulted in a low *c* value of 214,000 km/sec. In this case, we can eliminate this noise by substitution of the correct diameter; then Roemer's estimate is 302,000 km/sec (Froome and Essen).

Bias has at least two components. First, the procedure itself may exhibit a bias towards overestimating (or underestimating) *c*. Second, the experimenter may have subconsciously allowed preconceived notions of *c*'s value to interfere with his estimate, such as knowledge of previous estimates of *c* or theoretical values for *c* at the time. Our model thus expands to:

estimate = velocity of *c* + procedure bias + experimenter bias + measurement error

Consider the collection of all *c* estimates through time. Clearly they aren't independent, because estimates obtained from the same procedure will exhibit the same procedure bias, and estimates obtained from the same experimenter will exhibit the same experimenter bias. Instead, consider the collection consisting of one estimate, say the earliest, from each procedure. Each estimate has a distinct procedure bias value associated with it, not related to the other estimates' procedure bias values. If no experimenter appeared twice in this collection, then each estimate also has a distinct experimenter bias value. Assume the values for the distinct procedure biases are roughly independent, distributed symmetrically about zero, and expected to average to zero. Assume the same properties for the distinct experimenter biases, and for the measurement errors. Then if *NH* is true, the chance that any past estimate in this collection exceeds today's *c* estimate is ½, i.e., the box model is adequate. Using this chance, the *P*-value is the probability that at least as many estimates exceed today's estimate as was observed.

How willing are we to make the assumptions above? Measurement errors are most likely at least roughly independent, symmetrically distributed, and expected to be zero. But the assumptions on procedure and experimenter biases imply a rather haphazard historical development of the procedures and their results. While it may be that electrical measurements are independent of optical measurements of *c*, the different procedures within these groups may not be. Of even more concern is experimenter bias. Cornu's (1874) estimate of 300,400 km/sec was the average of numerous toothed wheel/deflection of light experiments, weighted in what he felt was an appropriate manner. Dorsey (1944) thoroughly studied these same observations and concluded they estimated *c* as 299,900. One might speculate that Fizeau's (1849) toothed wheel estimate of 315,000 may have impaired Cornu's judgement of his data.

In summary, one must be aware that the bias assumptions probably are, at best, only roughly true.

Test Results

Test results indicate high *P*-values. Table 1 lists the earliest procedure estimates data. Four out of the seven estimates before 1901 exceed today's value. The chance of observing four or more exceedances under *NH* (i.e. the *P*-value) is 0.50. Only six out of thirteen exceedances were observed before 1951, corresponding to a *P*-value of 0.71. Data after 1950 could be used, but if a decreasing c has reached an asymptote recently, then indeed, modern estimates may essentially be estimating the constant 299,792.5,

TABLE 1

Method	Used 1st By	Date	Estimate	
Jupiter's satellites	Roemer	1676	302,000	+
Aberration of stars	Bradley	1726	301,000	+
Toothed Wheel	Fizeau	1849	315,000	+
Electro-magnetic, -static ratio	Weber, Kohlrausch	1857	310,800	+
Deflection of light	Foucault	1862	298,000	
Lecher wires	Blondlot	1891	297,600	
Free Space	MacLean	1899	299,100	
Rotating mirror	Michelson	1924	299,802	+
Kerr cell	Karolus, Mittelstaedt	1928	299,778	
Cavity resonator	Essen, Gordon-Smith	1947	299,792	
Radar	Aslakson	1949	299,792.4	
Geodimeter	Bergstrand	1949	299,796	+
Quartz modulator	McKinley	1950	299,780	
Radio inter-ferometer	Froome	1951	299,792.6	+
Spectral lines	Rank, Sluis	1952	299,776	
Tellurometer	Wadley	1956	299,792.9	+
Modulated light beam	Karolus	1966	299,792.4	
Today's Estimate		1989	299,792.4561	

** Originally estimated at 214,000, but recalculated using correct diameter of earth's orbit, which Roemer inaccurately estimated. (Incidently, Roemer actually measured what is now known as the Doppler effect.)*

TABLE 2

Method	Used 2nd By	Date	Estimate	
Jupiter's satellites	Delambre	1790	303,200	+
Aberration of stars	Bradley	1726	301,000	+
Toothed Wheel	Cornu	1872	298,500	
Electro-magnetic, -static ratio	Maxwell	1868	284,300	
Deflection of light	Michelson*	1878	300,140	+
Lecher wires	Trowbridge, Duane	1895	300,300	+
Free Space	MacLean	1899	299,100	
Rotating mirror	Michelson, Pease, Pearson	1935	299,774	
Kerr cell	Anderson	1937	299,771	
Cavity resonator	Essen	1950	299,792.5	+
Radar	Aslakson	1949	299,792.4	
Geodimeter	Bergstrand	1950	299,793.1	+
Quartz modulator	Houstoun	1950	299,775	
Radio inter-ferometer	Froome	1954	299,792.8	+
Spectral lines	Rank, Shearer, Wiggins	1954	299,789.8	
Tellurometer	Wadley	1957	299,792.6	+
Modulated light beam	Karolus	1966	299,792.4	
Today's Estimate		1989	299,792.4561	

**Replaced Cornu's 1874 estimate of 300,400 because Cornu is already included.*

and so our test would lose sensitivity to departures from the *NH*. For completeness, using all of the data gives 8 out of 17 overestimations of c, and thus a P-value greater than .5 . Even if we data-snoop, i.e. look at the data before deciding which of it to use (which renders the P-value meaningless), the smallest P-value obtainable is 0.06, (the chance that the first four estimates of c exceeded today's value).

Undoubtedly, procedures were improved the second time around. Bias and measurement error may have been substantially reduced. Therefore, a collection of second earliest estimates (Table 2) may indicate more departure from *NH*. To remove some experimenter bias, an experimenter could only appear once in our data (Michelson appears twice, the second with two other authors which seemed to be OK; this problem didn't come up in Table 1). Unfortunately for the recent creationists, the P-values are exactly the same for Table 2 as those calculated for Table 1.

The sign test is not very sensitive, but more sensitive tests (e.g., t-test, sign-rank test) require assuming identically distributed errors for each of the noise terms in our model. Undoubtedly, the variability in these noise terms is changing (probably decreasing) as new procedures are found, so this additional assumption shouldn't be made. One might weight earlier estimates more heavily because c is larger for these under *AH*, but how much more is not clear because increased noise in the earlier estimates suggests not weighting them as heavily as later estimates.

The recent creationists' claim of a decreasing c, even if true, can in no way be substantiated from the results of our test. The high P-values indicate the null hypothesis of a constant c as very plausible. This plausibility, it must be admitted, may just be a reflection the insensitivity of our test. Lack of numerous independent measurements from the 17th and 18th centuries prevents us from deriving any conclusions from Table 1's first four data points, curiously all over-estimations of today's c. Only by prior opinion can one really decide whether or not these points actually give evidence against a constant c. In truth, with these data, this statistician can shed no light on this debate, and recommends resolving the debate via non-statistical evidence. *

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Essay Review

Speaking Of "Science And Religion" — Then And Now

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Science and Religion: Some Historical Perspectives. *John Hedley Brooke (Cambridge History of Science Series, Cambridge University Press, Cambridge, 1991). Pages: x + 422. $44.50 (hardcover), $12.95 (paperback).*

It is 1942. From the Pyrenees to the heart of European Russia, from the North Cape to Crete, the Continent is swamped by Nazi forces. Italy is Hitler's partner; Spain collaborates. The liberation of Europe is under way. U.S. troops are marshalling in Britain. Montgomery and Eisenhower are sweeping across North Africa, aiming to slash the soft underbelly of the Axis. The Red Army, desperate for a Second Front, is regrouping to crush the Germans at Stalingrad, while the French dither and squirm to save their skins. For some there is no escape. The remnants of European Jewry are being rounded up for incineration — the "final solution" is in hand.

At this awful moment, with the outcome in the balance, what does it mean to write history of science? What does one actually say? Let three scholars speak.

Charles Raven, liberal clergyman and author of a vast new biography of John Ray, is preparing a series of Cambridge lectures for publication as *Science, Religion, and the Future* (1943). His message is unequivocal: the nineteenth-century failure to reconcile science and religion in a single, Christian vision has led directly to the present plight. The complacency with which "intellectual, moral and religious teachers" blame society, or Nazism, or the politicians, or the devil "makes it clear that they do not recognize their responsibility" for the emergence of "violently contrasted" ideologies.[1]

No such complacency for Charles Singer, writing anonymously in the *Political Quarterly*. He too is adamant: the history of science from Newton to Darwin shows that "the loathsome and satanic religion of National Socialism" has grown directly from the teachings of Christian theologians. "Those who have read the life of Martin Luther or Alexander VI need not be astounded at the life of Adolf Hitler. There is a stock whose root is rottenness and its fruit shall come up as dust." Singer, the son of a rabbi, is to reprint this indictment under his own name as *The Christian Failure* (1943), signing the preface "Christmas Day, 1942, being also the tercentenary of the birth of Newton."[2]

Finally, Joseph Needham in this momentous year. Having just decided to write "a work of some kind on the history of science and technology in the Chinese culture-area," he is on his way to China as the Royal Society's scientific attaché. The Anglo-Catholic socialist, so evident in his new book, *Time: The Refreshing River* (1943), is to become an "honorary

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Taoist." But before he leaves, the BBC requires his service. In a broadcast talk Needham pulls no punches: Protestantism and the profit-motive spurred scientific research until in the late nineteenth century "capitalism came ... to be a brake upon its further progress." The "Nazi gangster leaders" have met the crisis of capitalism with industrial dictatorship and extreme nationalism; their ultimate defeat — Needham is in no two minds — will bring new "watchwords" to the fore: socialism, internationalism, and human unity.[3]

Heady stuff this, fifty years on. Then the world was simpler, science simpler, its historians simpler — surely. Facing a conflagration, they wrote with fire in their bones. Today, in Bonhoeffer's "world come of age" we see things differently: our passion is to be dispassionate, to stand above warring factions, to abjure apologetics and point the way to truth. Of necessity — surely. For otherwise our histories of "science and religion" will one day read as oddly as Needham's, or Singer's, or Raven's — if indeed they are read at all.

Towards Newspeak

Some such conviction seems to inform John Brooke's remarkable new book, and my preamble is intended to point it up, to make both its reasonableness and its possible irrelevance as plain as possible. For Brooke's study is one of very few monographs, if not the first, on its subject deliberately to eschew an apologetic standpoint. What it offers are not historical "lessons" but "critical perspectives," and these in staggering abundance. Painstakingly contrived and crafted, *Science and Religion* moves by sure and stately steps, always judicious, guarded or noncommittal as fitting, and temperate on even the hottest topics. Yet the prose, far from bland, is elegant — it even entertains — making this magisterial synthesis an ideal textbook, one I shall surely set.

A single example must do: Brooke offers a marvelous introduction to Darwin in his theological context (pp. 255-63, 276-81). The account of natural selection is splendid, and I was gratified to see how far, on controverted points, our judgements coincide. Of course I differ over minor details or emphases — who couldn't find *something* to take issue with in his or her own specialist field? But this is nothing compared to our broad areas of agreement, and in some cases I think much more can be said in favor of Brooke's interpretations. For instance, the impact of Darwin's first encounter with native Fuegians, which Brooke suggests may have pushed him towards evolution, must have been forceful indeed, heightened by his receiving three weeks beforehand, and presumably reading, the second volume of Lyell's *Principles of Geology*, which damned talk of man's ape ancestry.

But I digress. As the locus for my further reflections, I want to concentrate on the one hundred-plus pages — about a third of the text — devoted to natural theology, the historical sciences, and evolutionary theory. This will serve as my pretext for remarking on the book's general subject and its pursuit in the nineteenth century.

While disclaiming "apologetic intentions" (p. 12), Brooke makes a running case for the inherent complexity of his subject matter. He stresses ambiguities and telling ironies — Cuvier's paleontology as promoting evolution, Lyell's fragmentary fossil record as Darwin's boon, Paley's perfect adaptations as grist for natural selection — and he finds no neat patterns or correlations in the dialectic. Indeed, he shows time and again, with wonted scrupulosity, how "fine distinctions are required if the texture of past thinking is to be recovered" (p. 189). Now I have no objection to any of this in *principle*. Brooke offers us liberation from trite and tidy "conflict" theses, historical "harmonies," and other axe-grinding approaches to "science and religion." Only, personally, I am inclined to take generalization somewhat further. If Brooke tends towards splitting, I'm an unrepentant lumper. If the phenomena we have to deal with are only part of what Chauncey Wright called "cosmical weather," if history is a radically messy, contingent, non-teleological process, then I am less interested in discerning local patterns of precipitation or temperature than in tracing large-scale configurations, passing though they may be: the major depressions, the great storms, the frontal systems, the sunny highs, and even successive climatic changes.[4]

That being said, I am unhappy with the umbrella term, "science and religion," beneath which Brooke practices meteorology. Perhaps it was prescribed by the Cambridge History of Science Series editor, a rubric hallowed by over a century's usage and long enshrined as a subject heading in the U.S. Library of Congress catalog. In any case, I suspect that Brooke shares my view. "Science and religion" lumps too much; or rather, it lumps in the wrong way. For instance, as Brooke points out, "the existence of a political dimension" to the debates he covers "means that to abstract both the 'science' and the 'religion' and then try to establish their mutual relationships can be highly artificial." More than this, it begs the question: it takes nineteenth century actors' catego-

ries for granted, or engages our own *a priori* ones uncritically. But these categories are part of the problem to be addressed, not the starting point of analysis. In the end we may wish to speak, as Brooke does, of "the two spheres of science and religion" (p. 15), but meanwhile we need a discourse in which to analyze the debates he discusses, without reifying, without illicitly importing or imbedding normative notions of "science" and "religion" in the messy, recondite past.

Let me call this discourse Newspeak (without Orwellian connotations). In Oldspeak we refer to people and ideas as scientific, or religious, or sometimes both. Even while refusing, as Brooke does, to offer definitions and demarcations, we persist in describing our subjects as thus *and* so or as thus *or* so. Newspeak will be different. In this discourse we will privilege the *terms* in which societies, institutions, groups, and individuals have represented reality, constituted knowledge as understood by them — "Christian Science" as much as "computer science"; computer science as much as "creation science." Further, we will aim to understand *how* this knowledge, this reality, was constituted, and by *whom*, in tracts and *Transactions*, from pulpits and platforms, in oratories and laboratories.

From the standpoint of cultural anthropology or phenomenology of religion I make no new proposal, but it will require a fundamental shift of historical vision in the field — if there is a field — framed by the conventional phrase "science and religion." We will have to drop the old dualism and focus instead on broad new notions, or "covering concepts," of which I am suggesting three: language, practice, and vocation.

Covering Concepts

Briefly, *language* maps cultural change, as Raymond Williams has shown; usage determines meaning, which is socially fraught and fought. In the history of nineteenth-century science we have exemplary semantic studies to guide us — Schaffer on Whewell's linguistic reform, Rudwick on transposed concepts in Lyell's work, and Young and Beer on Darwin's metaphor, to name only a sample — as well as background studies in the history of philology.[5] The sort of problem to be addressed appears in Brooke's discussion of the single European market in evolutionary ideas: he refers variously to England's chief export as "Darwin's theory," "Darwin's science," "Darwinism," and "popular Darwinism" (pp. 300-2). Such ambiguity may well be apt, but at another level what we have to deal with (as I've argued elsewhere) is a contentious lexicon — a point that Brooke himself recognizes in the parallel case of Haeckel, who, he says, "incorporated elements of *Naturphilosophie* into his vocabulary" (p. 301).[6] Further studies in the social history of semantics will be most welcome: rich, textured analyses of contested terms such as chance, law, and miracle; matter, spirit, and body; and of course nature itself.

My second covering concept, *practice*. Speaking and writing are practical activities, but I want to include much more. For instance, large agendas for society were worked out in the laboratory and at the altar. In the communion wafer natural philosophy and theology merged. Transubstantiation, Huxley wisecracked, will be as "nothing" if abiogenesis "turns out to be true." The priests might as well "shut up ... shop," for the "heretics" are fixing to outbid them. How so, and why?[7] Or what did "research" mean in a divinity school and in a science faculty? What role for experience or experiment in an evangelistic mission and in a lab? (According to Charles Finney's classic 1835 do-it-yourself manual, *Lectures on Revivals of Religion*, a religious revival "is not a miracle, or dependent on a miracle, in any sense. It is a purely philosophical result of the right use of the constituted means — as much so as any other effect produced by the applications of means." Perhaps then the Ulster Revival of 1859 and the reception of the *Origin of Species* could be looked at simultaneously.[8]) How did evidence in historical geology compare with "evidences" for Christianity? How were these compiled, presented, and assessed? What drew audiences to Westminster Abbey and the Royal Institution? How did they "hear" the likes of Friedrich Max Müller, who preached in both? What made a readership for *Nature* or the evangelical *Record*? How were the readers of the broad-church *Reader* expected to "read"? How indeed were sermons, research papers, and other discursive commodities produced, and under what conditions? Domestic servants and wives may yet prove to be the long-sought common bond between "science and religion" last century.[9]

Finally, *vocation*. The concept, biblical in origin, was construed by the Protestant reformers as an occupation or trade appointed by God. Even so, the word stands relatively inert in the nineteenth century. A vocation could be a divine calling, a social function, or merely a career ambition. Commitment was needed, as Jim Secord shows for Darwin, the aspiring geologist: his failure to be moved by God's Spirit and take orders did not rule out nature's numinous impact as he stood on the shimmering lava of St. Jago. Heartfelt motivation — that was the key. Amateurs like young Darwin, professional experts,

people of every stripe who devoted themselves to a task had found a vocation, a calling to serve, to lead, to ameliorate.[10] Those who concern us chiefly were bent on interpreting reality, representing the world by symbol or syllable to constitute true knowledge. They were priests and naturalists — an elite; they were Pooters and Gradgrinds — nobodies. They mediated universals to particulars, and always and everywhere their claims were agonistic. Credibility had to be vouched for, authority won. In society's power stakes, vocation and political identity were opposite sides of a coin.

Intermediate Phenomena

So much for Newspeak, or my halting attempts at it. The payoff is this: by parsing "science and religion" in terms of language, practice, and vocation, we shall open up new fields as well as deal with the old one in new ways. Certainly we'll recognize "intermediate phenomena" that defy classification as "religious" or "scientific." Brooke refers to the men studied in Turner's *Between Science and Religion* (p. 397) and he generously features the surd case of Henry Drummond (pp. 16-17), whose writings remind me of Mark Twain's *bon mot*, "chloroform in print."[11] This approach could be taken much further — for instance, to include the appropriation of terms like "New Reformation" for promoting naturalistic cultural change. Wilhelm Bölsche in Germany deployed the reformation metaphor, as Brooke acknowledges (p. 306); but a full-scale study is needed of the historical philosophy and changing social expectations invested in it within the British context, from George Combe in the 1830s, through Huxley, A. P. Stanley, F. D. Maurice, J. A. Froude, E. B. Tylor, and Frances Power Cobbe at mid-century, to Raven, Bernard Shaw, and Bishop John "Honest-to-God" Robinson in recent times.[12]

Such a study will further evince what Brooke calls "a secular religion pursued with all the fervor of the sacred" (p. 305), one indeed that was tackled with alacrity by the Victorian old guard. After Huxley, a self-styled "scientific Calvinist," emerged in November 1869 to chair the Sunday Lecture Society, a broad coalition offering weekly uplift to London's working classes in St. George's Hall, Langham Place, a counter-reformation got under way. Within months a Christian Evidence Society was formed under the chairmanship of the second Earl of Harrowby, a Tory diehard who still defended the trade in livings. The society swiftly mobilized a phalanx of prelates to give apologetic lectures at the same venue, beginning with a deliverance by the Lord Archbishop of York on "design in nature." To no avail. The Sunday Lecture Society flourished under Huxley: within ten years Tyndall, Spencer, and even Darwin himself were vice-presidents.[13]

Here then are phenomena that test Oldspeak to destruction. Vocation is the name of the game; public practice, rhetorical responsibility — Sundays were still sacred — and of course social clout. Partisans at the time, notably Huxley, may have claimed that "science and religion" were at odds, but we mime them at our peril.

Or take another tack: consider cosmological ventures such as mesmerism, spiritualism, Christian Science, theosophy, and psychical research. Each made empirical claims in so-called scientific language; each embarrasses our Oldspeak with its syncretism and metaphysics. Yet how much we lose by talking these movements out of existence. Some had lower-class affinities, as Barrow and others have shown; some offered refuge to women, equipping them to make intellectual judgements while asserting their moral authority in a patriarchal world.[14] Mary Baker Eddy, Harriet Martineau, and Annie Besant immediately come to mind, gifted sisters who had much to say about topics within the purview of Brooke's book. Newspeak will promote the gendering of its subject-area, augmenting Brooke's important but solitary references to Clémence Royer, Emma Darwin, and — not least — his own wife.

Appropriately enough, Alison Winter is showing us the way forward with a ground-breaking study of the personnel and the practices of mesmerism. This so-called science offered control over subjects' mental states by manipulation of imponderable force or matter. In religious hands, mesmerism illustrates graphically the ways in which order and belief were maintained in gendered forms of life. To mesmerize was a vocation, neither religious nor scientific but both and more. Male practitioners always took a leading role, public and visible, with females in a mental missionary position. Women's practice went on "downstairs"; it affected servants and children, and was socially inconspicuous. The broad potential of public mesmerism is apparent in the case of the Reverend William Scoresby, arctic navigator, student of geomagnetism, and vicar of Bradford from 1839 to 1847, years of Chartist revolt. To Scoresby, mesmeric and magnetic phenomena were all of a piece, manifestations of a power communicated to the earth and its inhabitants for maintaining order and working out God's will. This power was essentially a social force, and in Scoresby's hands a conservative one. But his efforts to control the Bradford body politic lacked punch. It was the Unitarian radical Harriet Martineau who achieved mesmeric

results — and notoriety — at the time by ridding her body of a tumor.[15]

Critical Perspectives

A topic that often gets short shrift even in enlightened Oldspeak is history's losers, the displaced intelligentsia — Cuvier and Agassiz, Paley and Whewell, Charles Hodge and John Henry Newman. Brooke shows them exemplary justice. He deserves emulation, I believe, on the premise that part of our task as historians is to offer perspectives for the critics as well as the ready consumers of today's science. Whether we fancy ourselves retrenchers or reformers, conservatives or radicals, the diehards may have something salutary to tell us about *tendencies* that resulted in what was later to be praised or deplored. They offer us, not pat "lessons" — which Brooke and I renounce — but contingent insights that, *mutatis mutandis*, may bear on our own situation.

The historical opposition, vast and boring though it may seem, was differentiated intriguingly by party, creed, and class. Its institutions and ideologies deserve careful study. The Christian Evidence Society was only one rear-guard faction to spring up in the post-Darwinian years. The Victoria Institute, founded in 1865, enrolled mainly London-based evangelicals, the largest group being clergy. But Philip Gosse and G. G. Stokes served as presidents; William Thomson, Balfour Stewart, J. Y. Simpson, and Louis Pasteur became members, and directors of Barclay's Bank joined en masse. Wertheimer's unpublished 200-page prosopography, now over twenty years old, should be the starting-point for a full-scale analysis of this genteel ginger group.[16]

Or consider the Religious Tract Society's major venture in the '80s and '90s, the "Present Day Tracts" series, which filled no fewer than eleven volumes. The authors were Reverends, D.D.'s, F.R.S.'s, and LL.D.'s; their subjects ranged from materialism, agnosticism, and evolutionary ethics to the world's religions, the authenticity of the Gospels, and the integrity of the family. At fourpence a time, believers scooped up these little treats to share with wavering friends. Were there many takers? Which titles did they prefer? Was there an overall message? The unanswered questions are endless.

Individuals, too, deserve to be read anew. Take John Wordsworth, later Bishop of Salisbury, delivering the 1881 Bampton Lectures:

> In the search for truth ... the pride of intelligence invests what it obtains with a kind of halo of interests as its own property; just as men, proud in this world, get to respect what lies about them, because of its nearness to the glories that flow from their own persons. The proud man seems to himself a sort of center of light and dignity, from which an effluence pours forth upon all which he touches, or at least gathers to himself; and this sentiment is hardly less common in the intellectual than in the secular sphere of life. This fault, in another type of character, becomes rather a species of avarice. Truth is looked upon as a kind of property, of which so much may be obtained by diligent and acquisitive habits, and as a property which lends glory to its possessor, just as acquired capital does honor to the successful merchant.

To which a footnote might be added to Evelleen Richard's splendid analysis of Richard Owen's lofty efforts to retain "property rights" in Von Baer's embryological anatomy.[17]

Other eclipsed intellectuals are sympathetically drawn to our attention in Brooke's book, two of whom, like Wordsworth, spoke from Oxford, the seat of all reaction. But in some ways they are fresh, prescient voices, echoing down the years. Brooke's reference to William Irons is the first I have seen in twentieth-century literature. Irons, a man of evident mettle, was only twenty-four in 1836 when his *On the Whole Doctrine of Final Causes* was published; the 200 pages are at times rather brash — anti-Deistical, anti-Broughamite, anti-Bridgewater Treatise — in short, a slap at what Irons calls "Naturalism." "The whole 'Argument from Design' is a fallacy," he declares. Imagine, "an effort on the part of a 'creature of a day,' to trace out the Designs of the Eternal! — to comprehend the plans of the Incomprehensible!" Recall, however, that almost within months Darwin would shower similar exclamations in his private notes. Recall, too, that a century later Karl Barth, the only German theology professor to refuse to take the state employee's oath of loyalty to Hitler without qualification, hailed the very prospect of Nazified natural theology with a single word: "Nein!"[18]

Brooke's second Oxford voice is Newman's. In 1841 Newman was at the height of his powers when Sir Robert Peel, opening a public reading room at Tamworth, afforded him one of his most memorable literary moments. Peel had dwelt grandiloquently on the service of science to religion in leading the mind up to God; works of "controversial divinity" would be unwelcome in the new library, he intoned. Newman, aghast, skewered the Tory leader with shafts of irony in seven letters to *The Times*. Again and again he drove the message home: natural knowledge is no basis for human values.

Hear him afresh:

> Physical philosophers are ever inquiring *whence* things are, not *why;* referring them to nature, not to mind; and thus they tend to make a system a substitute for a God.
>
> The material world, indeed, is infinitely more wonderful than any human contrivance; but wonder is not religion, or we should be worshipping our railroads.
>
> To have recourse to physics to *make* men religious is like recommending a canonry as a cure for the gout, or giving a youngster a commission as a penance for irregularities.
>
> If we commence with scientific knowledge and argumentative proof, or lay any great stress on it as the basis of personal Christianity, or attempt to make men moral and religious by libraries and museums, let us in consistency take chemists for our cooks, and mineralogists for our masons.
>
> Are not virtue and vice, and responsibility, and reward and punishment, nothing else than moral matters, and are they not of the essence of religion? In what department, then, of physics are they to be found? Can the problems and principles they involve be expressed in the differential calculus? Is the galvanic battery a whit more akin to conscience and will, than the mechanical powers? ... Astronomy witnesses divine power, and physiology divine skill; and all of them divine beneficence; but which teaches of divine holiness, truth, justice, or mercy? Is that much of a religion which is silent about duty, sin, and its remedies?

Or death? Sir Robert sees physical science as a "'pleasure and *consolation*' " at life's close. "Meditate indeed on the wonders of nature on a death-bed! rather stay your hunger with corn grown in Jupiter, and warm yourself by the Moon."[19]

Newman and Irons, Darwin and Barth all shunned natural theology. Brooke, I think, joins me in sharing their doubts, although without adopting their particular premises. For beliefs like Newman's, that "religion ... suggests to science its true conclusions; the facts come from knowledge, but the principles come of faith," can be cashed out in various ways, with alternative styles of transcendence.[20]

Towards Transcendence

In Brooke's later chapters the term "natural theology" usually refers to the argument from static design to God's existence and attributes. Sometimes the term stands for the bare "idea that divine wisdom could be discerned in nature" (p. 193), or for the larger effort to draw "moral lessons from nature" (p. 198); occasionally "natural theology" is used in the "wider sense of giving rational justification for a particular political system" (p. 199). It is this "wider sense" that I want to dwell on in conclusion, bearing in mind that, like natural theology in general, it presupposed belief in providence — the doctrine that God's will is expressed always and everywhere, in nature and history.

Belief in providence, as Brooke points out, practically entails addressing the problem of suffering, of natural and moral evil in the world (pp. 316-17). This is the traditional task of theodicy — justifying God's ways. Theodicy not only serves a defensive purpose, answering infidel objectors; it also reconciles people to the world's running, the natural order of things, including society. In this way theodicy is identical with natural theology in the wider, ideological sense of which Brooke speaks.

That theodicy, or political natural theology, can be divorced from belief in God may be less apparent. Yet any philosophy that takes responsibility for both the material and the spiritual well-being of humanity must sooner or later confront its own failures — failures to master not only nature, but human nature as well. It must account for the gap between reality and expectation, between the experience of pain and misfortune, and the hope of improvement that its own beliefs have instilled. Efforts to explain and bridge the gap, to plug or merely paper over it, serve to appease and reconcile, so fulfilling theodicy's traditional task.[21] Secular theodicies, without a theistic basis, escape Kant's transcendental critique, which Brooke so rightly presses (pp. 206-7). They are alive and well — or are they?

It is, after all, 199[3]. Communism has collapsed. Europe is pulling together, straining towards the east. Refugees are swarming, dying for the good life, while pundits seek a moral equivalent of the Cold War, which they preen themselves for winning. Capitalism is ascendant, the global market open. The planet groans. This will be a terrible Pyrrhic victory. Can the Earth sustain a billion private automobiles? If standard of living depends on car ownership, we are doomed — doomed either to defend permanent gross inequality or to lead radically altered lives.[22] What theodicy can handle this one prospect? Will Islam provide it, with mosques in every town? Christian fundamentalism, the imperial edge of the faith? Ancient orthodoxies with their old-boy enclaves and tarnished creeds? If nature is not our final source of value, scientists not our priests, whose transcendence will prevail?

What would a historian of science say? *

NOTES

[1]Charles E. Raven, *Science, Religion, and the Future* (Cambridge, 1943), p. ix. On Raven's unifying vision, see F. W. Dillistone, *Charles Raven: Naturalist, Historian, Theologian* (London, 1975) and James Moore, *The Future of Science and Belief: Theological Views in the Twentieth Century* (Milton Keynes, 1981), 5-22.

[2]Charles Singer, *The Christian Failure* (London, 1943), 9, 71.

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Book Reviews

REASON AND REALITY: The Relationship Between Science and Theology by John Polkinghorne, Philadelphia, PA: Trinity Press International, 1991. 104 pages, notes, bibliography, index. Paperback; $13.95.

John Polkinghorne, a former Cambridge Professor of Mathematical Physics and currently President of Queens' College, Cambridge, should need no introduction to the members of the ASA. He continues a succession of perceptive British authors who have written effectively on the interaction between science and Christian theology over the last few decades. This brief book contains eight chapters, the first six of which are based on invited lectures given by Polkinghorne in 1990 and 1991.

In "Rational Inquiry" Polkinghorne considers the claim that there is a kinship between the two disciplines of science and theology, and lays the basis for his position of critical realism. In "Rational Discourse" he explores the necessity for the use of model and metaphor in both science and theology and responds to some of the criticisms of a complimentary view of these two disciplines.

In "The Nature of Physical Reality" he suggests that one should think in terms of emergence not only as a one-way process, "by which the higher whole arises from the complex organization of its lower parts," but also possibly as a two-way process reflecting the apparent "existence of a degree of reciprocity between levels. Results involving chaos are particularly suggestive, as Polkinghorne writes,

> The general picture resulting from these considerations is that of deterministic equations giving rise to random behavior; of order and disorder interlacing each other; of unlimited complexity being generated by simple specification; of precise equations having unpredictable consequences. (p. 37)

In "Reason and Revelation" he argues for a view of revelation "as the record of particularly transparent moments of encounter with the Divine, not the issuing of guaranteed and unchallengeable propositions." Attempts to impose theological constraints on science at the one extreme (creationism), or to impose scientific constraints on theology at the other extreme (scientism), are both rejected. He concludes by saying, In both science and theology we are seeking a scheme of understanding in which interpretation and experience match with the most satisfying consonance and economy.

In "The Use of Scripture" Polkinghorne starts with the premise:

> Because revelation is the encounter with a Person and not the deliverance of a set of propositions, the Bible is not our divinely-guaranteed textbook but a prime means by which we come to know God's dealings with humankind and particularly his self-utterance in Christ.

It follows that the Bible does have an evidential role to play for supporting Christian claims, that a human being cannot come to know Christ fully without reading the Gospels, and that "the Biblical text mediates not information or opinion but encounter." In keeping with his critical realist position, Polkinghorne rejects both the propositional-cognitive view of theology at the one extreme, and the cultural-linguistic view at the other.

In "Cross Traffic" the author considers interactions between science and theology as they offer descriptions of the world. His position is summarized:

> What theology can do for science is to provide answers to those meta-questions which arise from science but which are not themselves scientific in character .... What science can do for theology is to tell it what the physical world is actually like.

In "Quantum Questions" Polkinghorne again strives to avoid extremes.

> ... the discrete and episodic picture of physical process presented by A. N. Whitehead's event-dominated philosophy is as much a half-truth as is the attempted assimilation of quantum theory to Eastern thought by Fritjof Capra and Gary Zukav.

He provides some useful insight into the central quantum problem of basic interpretation: the problem of "the collapse of the wavefunction" at the moment of measurement. He discusses the significance of the Einstein-Podolsky-Rosen effect and the test provided by the Bell inequality. One conclusion is that

> it is by no means clear that one would have the kind of situation described by the wilder flights of an alleged "observer-created reality." The more modest phrase of an "observer-influenced reality" would be a more appropriate account.

He rejects the claim that "the doctrines of traditional Christian theology need remodelling and simplifying to bring them into line with 'what an educated person might be expected to be able to accept'."

In the final chapter, "The Fall," he addresses the problem of evil, and draws a sharp distinction between "natural evil" and "moral evil." The existence of "natural evil" is identified with the gift of freedom from God in the physical creation, the existence of "moral evil" with human rebellion against God. Thus he proposes that "the whole universe is fallen physically but only part is fallen morally." The end times consist not of an abolition of the old creation but its transformation. The author is humble in his claims,

and concludes by saying, "I offer the discussion simply as an exercise in attempting to hold together the insights of science and the Christian tradition, both of which I wish to respect."

It is evident that Polkinghorne in this little book has dealt with every major issue involved in the relationship between science and theology. Many patterns for this relationship have been suggested and adopted by large contingents of the human race, both Christian and non-Christian. The perspectives espoused by Polkinghorne appear to be central for those who appreciate the significance of authentic science and authentic theology.

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

MICHAEL FARADAY: Sandemanian and Scientist by Geoffrey Cantor. New York, NY: St. Martin's Press, 1991. 395 pages. Hardcover; $45.00.

> This was a very private space for Faraday and we should tread carefully, not only to avoid breaking the delicate glassware that lines the shelves, but also because this is where Faraday communed with God's creation. A reverent silence is as appropriate here as in the Sandemanian meeting house.

This description of his personal laboratory in the basement of the Royal Institution is also in a way a reflection upon the person of Michael Faraday. One of the most prominent scientists of the 19th century, Faraday was also a member of an obscure group known as the Sandemanians, or Glasites, which sought to restore Christianity as it was practiced in the first century. This aspect of Faraday's life, which has often been overlooked by biographers and historians, is the theme of *Michael Faraday: Sandemanian and Scientist*. Written by science historian Geoffrey Cantor, this book explores the relationship between faith and science in the life of Michael Faraday. It is the major premise of the author of this book that Christianity, or more specifically, Sandemanianism, was the central strand in Faraday's life. He argues that it is not possible to fully understand the person of Michael Faraday without considering this aspect of his life.

In the early chapters, Cantor describes the Sandemanians and places this group within the social, economic, and religious environment of the time in which Faraday lived. He discusses Faraday's relationship within the Sandemanian fellowship and also explores the various ways in which his religious faith molded his thoughts and actions in other areas of his life.

A large portion of the book is given to discussion of Faraday as a scientist. In these chapters the author seeks to illustrate how Faraday's faith strongly influenced his scientific work. For example, in one chapter the author examines Faraday's concept of nature as the Creation, and another chapter contains a discussion of Faraday's view of the scientific method. Cantor correctly points out that although he was no doubt familiar with natural theology, Faraday did not view nature in this manner. For Faraday, the Sandemanian, nature was a revelation and science was but the humble attempt of God's servants to understand his creation. Faraday would never have exalted human reasoning above that which had been revealed in nature or in Scripture.

Much has been written about Michael Faraday, including biography, history, and scientific analysis. This book certainly is the most thorough study of the religious aspect of Faraday's life. It should be pointed out, however, that this is not an apologetic work supporting some particular "Christian view" of science. It is, however, a book which could be very useful to someone wanting to know more about science and faith. As a Christian and a scientist, I found this book to be not only informative but enjoyable. It was very easy for me to identify with Michael Faraday as he tried to live a life of faith in a very secular world. This book is "must" reading for anyone wanting to examine the relationship between science and the Christian faith.

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BELONGING TO THE UNIVERSE: Explorations on the Frontiers of Science and Spirituality by Fritjof Capra and David Steindl-Rast with Thomas Matus. San Francisco, CA: HarperSanFrancisco, 1991. 217 pages, index. Hardcover; $18.95.

This book is presented in the form of a trialogue script between Fritjof Capra, physicist and author of *The Tao of Physics* (a popular book seeking to show the compatibility between interpretations of modern physics and Eastern religion), and David Steindl-Rast and Thomas Matus, both members of the Camaldolese Benedictine community in Big Sur, California. Much of the discussion centers on a list of changes in traditional thinking as the shift has been made to new paradigms, both in science and in theology. An indication of the general thrust of the book is indicated by the conclusion of the preface,

> We like to think that the Earth, our Great Mother, is present on every page of this book .... Gaia, the living Earth, is the silent source of everything we say in these conversations. She gives us the context for the new thinking about God and Nature.

For a book promising to deal with a new paradigm in Christian theology as described by Christians, it is perhaps noteworthy that among terms missing from the index are atonement, sin (except for a single mention of "original sin"), holiness, justice, and forgiveness.

Capra describes himself as one who grew up as a Catholic but who worked out a spiritual path for himself influenced by Taoism, Buddhism and Hinduism, but until

recently, very little by Christianity. Steindl-Rast indicates that he recently carried out a baptism that was both Christian and Buddhist, and states that "these two traditions are perfectly compatible when rightly understood." The authors on both sides, therefore, hold a strongly egalitarian view of all religions.

The subtitle of the book is *Explorations on the Frontiers of Science and Spirituality*. The central thrust of the book can be seen in a brief listing of the paradigm shifts considered.

(1) Science shifts from "Part" to "Whole;" theology shifts from "God as Revealer of Truth" to "Reality as God's Self-Revelation."

(2) Science shifts from "Structure" to "Process;" theology shifts from "Revelation as Timeless Truth" to "Revelation as Historical Manifestation."

(3) Science shifts from "Objective Science" to "Epistemic Science;" theology shifts from "Objective Science" to "A Process of Knowing."

(4) Science shifts from "Building" to "Network" as the metaphor of knowledge; theology makes an identical shift.

(5) Science shifts from "Truth" to "Approximate Descriptions;" theology shifts from focus on "Theological Statements" to "Divine Mysteries."

These are difficult propositions to assess. As they stand, most of them could be quite acceptable, describing certain changes that have occurred in both scientific and theological thinking. Reading through the book as these propositions are explored by the authors uncovers many statements with which one could readily agree as correcting previous misunderstandings or inappropriate applications of both science and theology. Other suggestions may seem problematic at first, but are capable of shedding light on the current situation if carefully interpreted. But at the same time, the authors appear to be willing to dispense with major elements of historic Christianity.

A fairly accurate description of science and its limitations is given. Science is recognized as just one way of knowing among several, and both science and theology are seen to provide insights into an understanding of reality. Neither give a total understanding of absolute truth. In a traditional statement, the authors agree that science provides the "how" whereas theology deals with the "why." Faith is seen as a matter of existential trust, existing to some extent in both science and theology. There is no expectation of deriving meaning or morals from science.

On the other hand, a number of other statements are given that indicate a fairly radical departure from historic Christianity. It is claimed that the Trinity includes you and me, because this doctrine was formulated to guarantee the "total divinization of every single human being." The Gospel of John is cited as evidence that each follower of Jesus can say, "I and the Father are one." The possibility of pointing to the resurrection as evidence for Jesus' deity is disclaimed as old-paradigm thought. In new-paradigm theology, "the cosmos, God, and humans are all interrelated — you cannot speak about God except in the context of cosmos and humans." The world is seen to be a living system with its own intelligence, its own mind. In the new-paradigm, there is a switch from salvation-centered theology to creation-centered theology. If we believe that the fullness of divinity dwelt in Christ bodily, then we should discover that same divinity in the humanity of my Muslim brother or Hindu sister. Jesus does not stand on his own charismatic authority, nor does he base his claims directly on God's authority, as though God were standing behind him; rather he appeals to the divine authority in the hearts of his hearers.

The casual reader might conclude from this book that modern science and Christian theology agree in viewing all religions as essentially equivalent, differing only in emphasis. At one point Capra tries to press the issue by pointing out the apparent contradiction that Christianity presents salvation as a gift of grace from God, whereas Buddhism pictures Buddha as dispensing important advice to be followed in order to save oneself. The Benedictine respondents, however, do not agree to the difference and suggest instead that both Buddha and Christ save by empowering the individual.

For a reader interested in the effects of modern scientific thought and philosophy on comparative religion, and with the discrimination adequate to sort out the variety of claims and counter-claims made here, this can be a fascinating book. Perhaps it could serve as the basis for a study group seeking to understand some of the thinking prevalent today and how it relates to the Christian faith.

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

READING THE MIND OF GOD: In Search of the Principle of Universality by James Trefil. New York: Charles Scribner, 1989. 232 pages. Hardcover; $18.95.

If nowadays an experiment or an observation is conducted by a scientist, then it is always implicitly assumed that the laws of nature observed on earth can also be applied to the most remote corners of the universe at any point of time. This is the essence of the principle of universality. The same general laws can be found across the entire universe, and, in principle, there is no restriction to their applicability. However, this methodological outlook is of relatively recent provenience, and the purpose of Trefil's book is to trace the origins of this principle.

Until Newton, the laws governing the motion of planets had been held to be different from the laws of motion operating on earth. That is where Trefil begins his story, although occasionally he mentions some other historical figures living before Newton, like Copernicus or Kepler, who shaped science and the modern understanding of the universality principle. After presenting Newton's contribution to science and the emergence of the universality principle, Trefil describes Halley's application of New-

tonian physics to predict the return of "his" comet; next, Herschel's discovery of Uranus and of double stars; Fraunhofer's achievement in glass production, Kirchhoff and Bunsen's spectroscopic analyses; Lockyer's discovery of helium, Hutton and Lyell's impact on the development of geology, Kelvin's calculation's pertaining to the age of the earth; the discovery by Hubble of the expansion of the universe that led to the Big Bang theory; and, finally the theory of inflationary universe that opens the possibility of building a universe.

All this shows that the universality principle was extended first from the earth to the moon, then to all planets, then to stars and their make-up, and finally to the entire universe. However, what about the moment of creation? No problem, says the author. Before the beginning "the universe was a vacuum full of evanescent matter. Then, just by accident, enough fluctuations occurred close enough together to trigger the process by which energy is drained from the gravitational field — When the process of inflation was over, the Big Bang had begun" (p. 212). Matter is just a form of energy, and in creation no new energy is created. Matter (under the disguise of energy) is eternal and only occasionally appears as a universe. Such a philosophy is the price one has to pay for an undivided victory of the universality principle.

The author is an excellent writer and presents scientific material very clearly. However, the *leitmotif* of the book, the universality principle, is frequently buried in unrelated information. In his attempt to maintain a light style throughout the book, the author falls into a gossipy tone, overburdening the book with unnecessary facts concerning the personal lives of many scholars. There are also too many self-serving allusions to Trefil's own personal experience. Regrettably, Trefil almost invariably gives references to his own books — hardly a token of modesty. But despite these drawbacks the book is worth reading.

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

ANARCHY AND CHRISTIANITY by Jacques Ellul. (Translated from the French: *Anarchie et Christianism* by Geoffrey W. Bromiley). Grand Rapids: Eerdmans, 1991. 109 pages. Paperback; $9.95.

Ellul's goal is to convince the reader that anarchism is a true path of Christianity. To him, anarchism, although defined as "an absolute rejection of violence" (p. 11) is much more than that: it includes total abstention from the political side of life, including non-participation in elections, conscientious objection to military service, "to taxes, to vaccination, to compulsory schooling, etc." (p. 15) — i.e., to everything that is imposed by the state. "We should lodge objection to everything — We must distrust all [the state's] offerings" (p. 16).

Ellul attempts to prove that the Old Testament is permeated by "an anti-royalist if not an anti-statist sentiment" (p. 52), that a typical attitude of Jesus was to devalue "political and religious power. He makes it plain that it is not worth submitting and obeying except in a ridiculous way" (p. 64). Ellul launches into an interpretation of many New Testament passages usually used in supporting the view that the authority of the state should be recognized. His interpretation is sometimes interesting, sometimes surprising, but other times disappointing, as it is the case with Romans 13. An attempt to explain it away failed; under authority of this passage he even says that "Christians must not refuse to pay [taxes]," (p. 81) contradicting his earlier statement (p. 15).

Sometimes, this attitude of total nay-saying smacks of elitism. For example, schools have to be organized by parents, "giving instruction in fields in which they are equipped and have authorization to teach" (p. 17). Putting aside a question of authorization (By whom? Certainly not by the state?), what is to be done if a community does not have sufficiently equipped parents?

Ellul says that he was driven to anarchism very early, and this book is a substantiation of his attraction to this movement. There arises an impression that Ellul did not want to relinquish either Christianity nor anarchism, so he attempted to blend them, relying upon his instinctive attraction to them. The result cannot be called entirely convincing or successful. There is very little room in his approach to a more moderate view, espoused, for example, by Francis Schaeffer, who states that "if there is no final place for civil disobedience, then the government has been made autonomous, and as such, if has been put in the place of the Living God" (*A Christian Manifesto*).

However, Ellul's discussion is much needed and very useful. Anarchism has its place in contemporary society, which is driven by technological development so well analyzed by Ellul himself starting with his *The Technological Society* (1954) and ending with *The Technological Bluff* (1986). It can help people realize the traps into which society is falling, but also how the church has been misguided, and what the essence of Christianity is.

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THE STRUGGLE TO UNDERSTAND: A History of Human Wonder & Discovery by Herbert C. Corben. Buffalo, New York: Prometheus Books, 1991. 398 pages. $29.95.

> Herbert C. Corben, now retired, is a theoretical physicist who has worked in both the academic world and in private industry. For many years, Professor Corben taught one of the most popular undergraduate courses at the University of Toronto. *The Struggle to Understand* builds upon and expands the many fascinating lectures and research materials used in his course. (From dust cover.)

The course must have been a stimulating one. This book is wide-ranging in its coverage and lively in its pre-

sentation. It presents a panoramic view of the history of thought, both in the West and as influenced especially by Muslim thinkers and authors. It is written by one who is obviously deeply concerned about his material and about the presentation of it. He says that his book "is intended for those who would like to think with me a little about 'this restless and reckless passion to understand' and the excitement and pain that has come with it" (p. 13).

Unfortunately, I found the book to be disappointing in its progress toward these lofty goals. In particular, it soon turns to a denigration of belief in God and a condemnation of much of what has been done in the name of God. While what religious fervor has justified in the history of humankind is distressing, there is certainly more to intellectual history than that, but the author cannot seem to pass beyond this theme. He is particularly critical of Christianity.

> Free enquiry was encouraged by some of the Muslim caliphs, who saw no conflict between science and their religion. The Christians, on the other hand, got so entangled in their theology and their struggle for existence that their leaders became intellectual dictators, as some of them still are today. It was, and is exceedingly difficult for free inquiry to take place in that sort of environment. (p. 152)

> The church again missed an excellent opportunity to embrace, or at least not to suppress, the inevitable advance of science, against which it was to fight so fiercely during the centuries that followed. Some churches are still fighting it today. (p. 184)

The book is written not simply because of an interest in the past. The author sees events in history that he does not want repeated, so he writes about and teaches this material to avoid further problems in the future.

> [The growing fundamentalist movement's] intellectual fascism is a genuine threat to this country. It is easy to dismiss it as unimportant, noting that nearly all of these problems were settled during the nineteenth century conflict between religion and science .... Passions are very strong, and it would be a disaster if these people gained more political power. (p. 301)

> It is clear that these well-meaning but thoroughly misguided Christians are regrouping, and will continue to push America into the straitjacket of their narrow views. Fortunately, they don't have the power of earlier religious leaders. They are forced to prosecute rather than persecute. (p. 305)

> We have cited many manifestations of the growth of superstition and fundamentalism in modern times; there are very many more. Two reasons for this are that scientific details are too complicated for all but the experts to understand, and although scientific thinking may offer a solid anchor, for some it is lodged in shifting sands. The conflict is one of method. One could hope that religion and science would not overlap each others' territories, but those territories overlap naturally, and there is no way to avoid disagreement. (p. 339)

While the historical material in this book is valuable and easy to read, the evaluative framing around the historical material is extremely limited in its perspective. A reader can legitimately wonder why. There is little that is said about the author's personal experience, and it is certainly dangerous to infer from this paucity of evidence, but I wonder how much his reaction is shaped by the particular details of his own life rather than by an objective study of his material.

> From a public elementary school and a Methodist Sunday School in then-isolated Melbourne, Australia, I came away with the impression that there were Jews in the early days, but that after Jesus came they rapidly became extinct and were replaced by Christians. There was also a mysterious group called "The Heathens," not to be confused with a place up in the sky called "Heaven," because they certainly weren't going there. (p. 137)

As he approaches the end of his book, Corben says: "It is often an aspect of human nature that, the closer you are to being 100 percent wrong, the more stridently you claim to be 100 percent right" (p. 296). The strident evaluations in this book should not lead the reader to conclude that Corben is 100 percent wrong.

Reviewed by David T. Barnard, Kingston, Ontario, Canada.

SCIENCE AND THE SOUL: New Cosmology, The Self and God by Angela Tilby. London: The Society for Promoting Christian Knowledge, 1992. 275 pages. Paperback; £12.99.

This book is based on research for the BBC television series *SOUL*. The result is an easy-to-read book, which often lacks references needed to trace assertions. And since it was based on research for the British Broadcasting Corporation, it is very British: the modern age starts with Newton. Antiquity, Middle Ages, Renaissance, and Reformation are mentioned as somewhat of a background. However, the important preparatory work and influence of 16th and 17th century continental philosophers and scientists is hardly indicated or omitted all together. Consequently, Newton's share in forming modern science with its beneficial and harmful effects is greatly exaggerated.

Newton is said to have not believed in the incarnation and deity of Christ (p. 53). Newton was a unitarian and an Arian. The source of that statement is not mentioned. Does it mean that Newton's discoveries were not influenced by Christianity though he studied and wrote often about the Bible? Tilby concludes that God became a distant controlling force due to Newton's scientific work. Religion changed from a source of "transcendent truth" to protection from the great emptiness of monistic atheism, a shelter from the harshness of the truth that science delivers (p. 56). Thus Newton is accused of causing a dichotomy which already existed for centuries.

Tilby asks in the concluding chapter: "What God 'fits' the cosmologies that have been described by the master scientists in this book?" (p. 235 and p. 180). She goes on to reject Western theology, but it is a theology many Western Christians do not recognize. Tilby wants to solve the

problem she sees as due to an increase in knowledge, and asks: how do we see, or to use her word, "image" God? Tilby's conclusion is that God is the "soul" of creation. "Soul" is used here in a Greek sense, not as in the Old Testament, where "soul" usually describes the whole person. Thus God becomes part of creation, as in pantheism. True, she says that she is uncomfortable with that, but then she rejects an authoritarian, transcendent God, as if those are the only two possibilities. We only know God as he described himself to Moses: "I am who I am."

The book makes it clear that for many, the new discoveries have had an immense impact upon their faith. These discoveries appear to make the new cosmology a faith, a faith that contradicts the Bible. Christians should be well aware of this development, especially because many non-scientists (including the writer of this book, who was trained as a theologian) think that the "discoveries" are more certain than the proposers of new theories suggest.

In general, the writer wants to draw God into our sphere. She talks about the "mind of God," the "properties of God" etc. I believe that we are not allowed to do that. God is the Creator. We may worship him, pray to him, etc., but we cannot "define" God or eternity. Eternity is not just extended time. What it is, we do not know. Another consequence of drawing God into creation is the denying of original sin (which Tilby does) (p. 249).

Despite many questions and disagreements, I do not hesitate to recommend the book to all who are wanting to study the relationship of faith and scholarship.

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THE SEARCH FOR PSYCHIC POWER: ESP & Parapsychology Revisited by C.E.M. Hansel. Buffalo, NY: Prometheus, 1989. 308 pages, index. Paperback; $16.95.

For the past quarter of a century, Hansel has been a thorn in the flesh to those who claim they have documented the existence of ESP and other paranormal phenomenon. His latest work, *The Search for Psychic Power*, which is a revised edition of *ESP and Parapsychology: A Critical Reevaluation* (published in 1980), is a continuation of his relentless criticisms of the experimental methods employed by those who investigate psychic powers. Hansel begins by saying that for the past one hundred years the general public has been hearing reports that "abilities such as clairvoyance and telepathy have been demonstrated in the laboratory by means of rigorously controlled experiments" (p. 13). He then addresses the scientific merits of this research, evaluating it on the basis of accepted scientific conventions used by the majority of practitioners of the scientific method.

Psychic phenomena can be partitioned into four processes, all of which do not rely on normal sensory channels: telepathy (a person who becomes aware of another person's thoughts); clairvoyance (becoming aware of an object or event); precognition (knowledge of the future); and psychokinesis (a person using his mind to influence an object). Today these are collectively referred to as *psi* or *psi* phenomena. *The Search for Psychic Power* confronts each of the four areas just mentioned. Part I of the book opens with a historical perspective of psychical research, then moves into some of the early (mostly nonscientific) investigations. Part II is an evaluation of many of the classical card-guessing experiments performed over the years, including those done at Duke University. These first two sections are virtually unchanged from the 1980 edition of the book. Part III deals with more contemporary research including telepathy in dreams, remote viewing, and the Ganzfeld experiments. The remaining three sections of the book include either new chapters or significant revisions made to the previous edition. They deal with psychokinesis, spiritualism, parapsychology and magic, and concluding remarks.

Overall, my evaluation of *The Search for Psychic Power* is a positive one. Hansel, among others, is concerned that the parapsychological community has been unwilling to look closely at the phenomena they claim exists. When "scientific" evidence has been found which apparently substantiates the parapsychologist's claim that *psi* phenomena are genuine, closer scrutiny yields either a host of methodological flaws or an experiment that cannot be replicated. I am pleased that Hansel has devoted much of his time to debunking these claims.

The book makes it clear that over the years psychical research has been plagued with design flaws which include a lack of independent recording of data (to avoid experimenter bias), poor documentation of the procedure, errors in data analysis, uncontrolled variables, and in some cases outright fraud. It is this last point, namely the fraud issue brought out in the book, that did not sit well with me. Hansel places too much emphasis on the need for incorporating procedures into the experiment which explicitly prevent cheating. In his analysis of some of the experiments in the book, he frequently alludes to how the researcher could have cheated, without giving any evidence that cheating was present. It is not proper, in my opinion, to casually put forth these kinds of remarks or accusations which concern the integrity of the investigators, without just cause. Hansel states "parapsychologists are themselves to blame for the emphasis that has to be placed on cheating when considering their work ... in denying the necessity to confirm experiments by repetition, making it essential to examine every experiment in detail in order to ensure that the result could not have been caused by cheating" (p. 265). I don't agree.

The only other criticism I have of this book is the occasional annoying typographical errors one encounters in the text and some errors with the referencing of significant articles (e.g., Rao & Palmer's article in *Behavior and Brain Sciences* was published in 1987, not 1988).

In general, this book is a nice contribution to the ongoing debate over the veracity of psychic phenomena.

Hansel's position is clear: "a great deal of time, effort, and money has been expended over a period of more than a hundred years, but an acceptable demonstration of the existence of extrasensory perception or psychokinesis has not been provided" (p. 272).

Reviewed by Bryan C. Auday, Assistant Professor of Psychology, Gordon College, Wenham, MA 01984.

DEADLY BLESSINGS: Faith Healing On Trial by Richard J. Brenneman. Buffalo, NY: Prometheus Books, 1990. 390 pages, index, appendix, annotated reading list. Hardcover; $21.95.

Brenneman is a reporter and media consultant who has won several journalism awards. His book examines three controversial court cases involving faith healing.

The first case is about the death due to meningitis of the infant son of a young Christian Science couple. The parents did not seek medical help; instead, they relied on the prayer of a Christian Science practitioner. Consequently, they were prosecuted on the ground of negligence in a court battle lasting from 1984 to 1990. Finally, they were acquitted because the court decided that the death came quickly; even if the parents had decided to seek medical help, there would not have been enough time to save the child. The author described this case with much insight, because he had been active in the Christian Science church. He left the church when he failed to have his crippling rheumatoid arthritis healed. He gives a detailed history of the founder of Christian Science, Mary Eddy Baker. The main thrust of her teaching was that the same power which heals sin also heals sickness. Physical illness is not a reality, and the power of prayer will defeat falsehood.

The author makes the point that the reasons that Christian Science could evolve in the 19th century were mainly due to the pre-modern condition of medicine and the robustness of human health. God has given mankind a cultural mandate to "cultivate the earth" and God has also provided humanity the gift of intelligence. Human beings should diligently use the gift to discover and apply the scientific truths of the universe.

The second case examined in the book is about the quackery of a Filipino "psychic surgeon" who claimed that he could remove tumors without breaking the skin. The husband of a patient complained to the local law enforcement. The psychic surgeon, "Brother Joe," was put on trial. The case lasted from 1986 to 1990, and Brother Joe was finally sentenced to nine months in jail and fined $400 because of unlawful practice and serious injury. This fraud was related to the New Age movement; the healer claimed his hands emitted electromagnetic energy and attracted foreign matters in the body.

The third case involved a California psychotherapist who used drugs to cure psychological problems. She also tried mind control to achieve therapeutic goals. One of her patients died after a bizarre "hot tub" treatment, and the psychologist was taken to court. The case lasted from 1976 to 1978, and finally the judge revoked the psychologist's license and convicted her of gross negligence.

The author describes these three cases in vivid detail. This book is recommended for those who are interested in the interplay of law and medicine. For the general reader of this journal, this book provides examples of problems with Christian Science, the New Age movement, and the drug culture. The author seems to have a cynical view of all belief in the supernatural. At one point, he states that it's not so much *what* you believe as *that* you believe. Evangelical Christians obviously cannot agree with that statement.

Reviewed by T. Timothy Chen, National Institutes of Health, Bethesda, MD 20892.

IN THE SPIRIT OF THE EARTH: Rethinking History and Time by Calvin Luther Martin. Baltimore: The Johns Hopkins University Press, 1992. 157 pages. Hardcover; $19.95.

The writer is the son of a preacher who introduced himself loudly as a Minister of the Gospel. Martin lived as a child near Montreal, close to what he calls Wildwood, at the junction of the Ottawa and St. Lawrence rivers. The place is now part of the Trans-Canada Highway. Martin tells the of story how he, growing up as a staunch Christian boy fed on the Bible and Bunyan's *Pilgrim's Progress*, became what he is now: a pagan Animist, propagating relearning the hunter-gatherer life-style.

The book is described on its dust cover as a meditation. Indeed, it has many beautifully written passages about his spiritual journey. Martin, an associate professor of history at Rutgers University, has "grown suspicious" of words. "The irony is that I am paid handsomely to use them. And use them I do, mostly in delivering windy lectures to hundreds of university students each year, trying to convey an understanding of the history of the North American continent both before and after the European arrival" (p. 1).

Genesis 1:2a is called an outrageous invitation, an *a posteriori* rationalization for humanity's new posture towards its surroundings (p. 39). It is well-nigh impossible, Martin says, to determine which came first, the population explosion or the food surplus. He then points out how hunter-gatherers insisted on limiting population growth through infanticide, birth spacing (prolonged lactation, abstinence, and plant-induced abortions), marriage exogamy, and geronticide (p. 42).

A Christian reading this book is likely to be hurt by the attacks on the Bible and our God. When on p. 78 the killings of a colonizer are rightly condemned, why bring

Old Testament killings in without any further indication what is meant? In the Old Testament, killings had a reason, and were either condemned or justified by God. Another instance: Martin relates on p. 25 how he played "hymns to a Middle Eastern sky god" in a mission church as an unbeliever on Sunday to humor the missionary " ... who could laugh that he spoke no Navajo." The next day he tries to conjure up spirits known by hunters ages ago.

I do not recommend the book to those who want to get a clearer insight in the relationship between religion and science. The religion propagated in this book is pagan. Nevertheless, it is true that we as Christians need to become more aware ecologically.

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THE DEAD SEA SCROLLS DECEPTION by Michael Baigent and Richard Leigh. New York: Summit Books, 1991. xix + 268 pages, endnotes, bibliography, index. Hardcover; $20.00.

"Of the making of books there is no end," especially weird books about archaeology and Jesus. Baigent's and Leigh's *Dead Sea Scrolls Deception* is not as eccentric as their earlier work, *Holy Blood, Holy Grail* (rightly called "an occult classic" by *Fate* magazine). But it will appeal to all those who want something more colorful than orthodox history.

The Dead Sea Scrolls Deception is divided into 16 chapters, grouped into three sections. Chapters one through five form "The Deception," six and seven, "The Vatican's Representatives," while chapters eight through sixteen make up "The Dead Sea Scrolls." A postscript, pp. 223-236, has been added to the American edition, discussing how the last Scrolls were made available to the world. *The Dead Sea Scrolls Deception* is not well written, resembling the duller sort of scholarly prose. This will probably give it a credibility that it does not deserve. The most obvious stylistic trait is the pervasive anti-Catholic innuendo.

Section One gives us our two television producers' thesis: that the Dead Sea Scrolls have been published slowly, not because all projects take longer and cost more than expected, but as the result of a conspiracy. Section Two gives more details: The Vatican and the Dominican Order (supposedly) know that the Scrolls will prove classic Christianity false, and therefore have held up publication as long as possible.

Their evidence for a conspiracy is extremely shaky. They rely on the assumption that no Christian (certainly no Catholic) can be an honest scholar, for he or she will inevitably skew the evidence to prove Christianity true (pp. 42-44; pp. 130, 137). A description of Roland de Vaux will illustrate the typical attitude:

> Certainly he [de Vaux] was ill-suited to preside over research on the Dead Sea Scrolls. In the first place, he was not just a practicing Catholic, but also a monk, and this could hardly conduce to balance or impartiality in his handling of extremely sensitive, even explosive, religious material. Moreover, he was hostile to Israel as a political entity, always referring to the country as "Palestine." (p. 28)

In contrast, John Allegro's desire to prove Christianity false, and that Jesus was a mushroom, is held up as a model of objectivity (pp. 46, 47, 59, 61-63). Frank Moore Cross, while frequently criticized, is not attacked for being a Methodist (p. 28).

Roland de Vaux (and the other Committee members by implication) is accused of anti-Semitism for not working closely with Israeli scholars. For example, de Vaux should have invited Sukenik to join the Committee from the beginning (pp. 31-32). Here Leigh and Baigent show themselves to be quite naive about Middle Eastern politics. Jordan and Israel were at war when the Scrolls were discovered; how were the two men to communicate? Fire machine-gun bursts in Morse code? A scholar who was not sympathetic to the Palestinian side of the war could not have worked in Jordan.

The best evidence for Leigh's and Baigent's claim is that the Scrolls have, in fact, been published slowly — eight volumes in forty years. This is a legitimate complaint. But how slow is slow? Many orthodox scholars also wish the Scrolls had appeared more quickly. Other more patient scholars reason that most document hoards appear no more quickly — often more slowly — and that fussing will not put twenty-five hours into a day. Leigh and Baigent point to the Nag Hammadi Papyri as an example of how others published their documents more quickly (p. 32). But again whether or not the Papyri were published in a more exemplary fashion is a subjective opinion. The Papyri were completely held from the world until the 1970s, then published *en masse*. Volumes of Dead Sea Scrolls began to appear soon after discovery, and continue to appear, if slowly, until the present. Which is the conspirator, the tortoise or the hare?

In Section Three, "The Dead Sea Scrolls," Leigh and Baigent give us their interpretation of the Scrolls. They have "discovered" that the inhabitants of Qumran were early Christians, and that Jesus was the Teacher of Righteousness (pp. 132-134). (DuPont-Somer and Eisenman are correctly credited with similar theories; pp. 44, 174.) Classic Christianity was a fiction created out of a Jewish liberation movement by Paul, perhaps too, a secret agent of the Roman authorities (pp. 218-221).

> The movement entrusted to "the early Church" and the Qumran community was effectively hijacked and converted into something that could no longer accommodate its progenitors .... What had been heresy within the framework of Judaism was now to become the orthodoxy of Christianity. Few accidents of history can have had more far-reaching consequences (p. 221).

Why should the readers of this journal take such a silly book seriously? To exercise our "bull-dada" detectors? No, we must take it seriously because others take it seriously. National Public Radio's program "Fresh Air" gave it an enthusiastic review, and probably many readers have already been asked their opinion. As teachers, it is our calling to cause learning, which includes teaching students how to tell truth from fiction and delusion. (The right adjectives for this book!) Moreover, as Christians, we have the privilege of giving to all an answer for the hope in us. For, foolish as it may seem, *The Dead Sea Scrolls Deception* is a significant attack on classic Christianity, in all its forms, and one which deserves an answer from any Christian scholar.

Reviewed by Lester J. Ness, Bloomington, IN 47401.

DOES PSYCHIATRY NEED A PUBLIC PHILOSOPHY? by Don S. Browning and Ian S. Evison (eds.). Chicago: Nelson Hall Publishers, 1991. 148 pages. Hardcover; $28.95. Paperback; $15.95.

Psychiatry is not just a science. It interfaces with philosophy, medicine, religion, ethics, and general society. One might picture a complicated Venn diagram with overlapping circles. This edited book represents a debate that seeks to identify the circles, argue about which circles should be included in the diagram, and define the overlapping and exclusionary areas among the circles.

The contributors are renowned experts on psychiatry and its interfaces with one or more areas. Don S. Browning wrote an introduction and a chapter on psychiatry and theology. Thomas Jobe addressed the interface between epistemology and psychiatry. James Drane explored the overlap between psychiatry and social ethics. Robert Michels examined medicine, psychology, and psychiatry. Edwin R. Wallace IV searched for a balance among psychiatry, epistemology, and ethics. Thomas Szasz argued that psychiatry functions more similarly to religion than to science. For the most part, the contributions are fresh and thought-provoking. All are of high quality, scholarly, and well thought out, though some of the chapters are more interestingly written than are others.

For example, all agree that psychiatry is concerned with trying to help relieve suffering of individual patients. Yet, should psychiatry attempt to use its expertise to affect a suffering society? As an over-simplified analogy, let us consider an individual who is diagnosed as having antisocial personality disorder. That person is characterized by having total concern for his or her own welfare and little concern with the welfare of others. He or she has strong (but misplaced) values—valuing personal freedom highly and communal responsibility negligibly. Psychiatrists have no ethical difficulty in providing therapy for such a person.

For argument, could we imagine a *society* that is antisocial — valuing personal autonomy and freedom for all and devaluing communal responsibility? We might even evaluate modern United States culture to reflect such traits—though not all would diagnosis a pathology in the culture. But suppose psychiatry diagnosed the culture as pathologically anti-social. Should psychiatry intervene to rectify the pathology? The authors disagree. Drane strongly argues in favor of social activism among psychiatry. Michels argues that psychiatric expertise and social expertise are separate—that when the psychiatrist speaks on social issues, he or she should disqualify himself or herself as an expert. Jobe, Wallace, and Browning adopt a perspective that accommodates the extremes. This issue is perhaps the most engaging of the book.

Another common thread throughout the volume is psychiatry's view of religion. The contributors almost unanimously agree that traditional religion has lost its normative power in modern society. They see health care as providing the new moral basis of society. It is physicians who now tell people what they should and should not do, not priests or even law makers. The concept of sin has been eroded until it is not a factor in directing life, except in conservative Christian communities, which are generally treated by the authors as being on the fringe of society. While some authors are more sympathetic to religion than are others, they are united in their belief that religion is peripheral to most people's lives.

The main strength of the book is its high quality debate over psychiatry's role in modern life. The main weakness—which is common among most edited books—is its lack of unified focus. In spite of Browning's excellent introductory chapter that spelled out many of the book's themes, the book would have been better if the debate had been focused on several central themes before the papers were written. Nonetheless, the book will interest readers with a philosophical bent who want to reflect seriously on psychiatry, society, and religion.

Reviewed by E. L. Worthington, Jr. Department of Psychology, Virginia Commonwealth University, Richmond, VA 23284.

EARTHKEEPING IN THE NINETIES: Stewardship of Creation by Loren Wilkinson, (ed.) Grand Rapids: Eerdmans, 1991. $19.95.

Loren Wilkinson, with other Fellows of the Calvin Center for Christian Scholarship, have beautifully updated the classic 1980 *Earthkeeping: Christian Stewardship of Natural Resources*. The 1991 volume serves as an excellent introduction to Christian principles of the stewardship of creation. The improvements are significant and the book is worth looking at even if you have already read the 1980 version.

The enduring principles as well as the maturing and refinement of this book are reflected in the title change. Our human responsibility is still described not as rulership over nature, nor as oneness with nature, but as stewardship

— taking care of something that belongs to our Master. But the original title of "natural resources" has been changed to "creation." In the text of both editions, the authors made it clear that God's creation is not "Nature" as a personified entity, nor merely "resources" which we can use. They wanted to make this point more clearly by taking "Natural Resources" out of the title.

The authors briefly survey "The State of the Planet." First, they describe how much fertile soil is being lost and why. Happily, they are able to include paragraphs about sustainable agriculture and minimum-tillage agriculture in this new edition. They explain what humans are doing to the other species of organisms that are "under our care." They describe the alarming growth of the human population (changing the original title "The Human Tide" to "The Human Deluge"). Some of the data is new, but some needs updating. They describe our depletion of energy and mineral resources. They have much more to say about the possibility of the greenhouse effect, ozone depletion, and acid rain as side-effects of energy use in this edition than in 1980. However, they can also report good news about Superfund and about alternative energy sources.

The 1980 version of the "State of the Planet" section ends with an entire chapter about "The Rich, the Poor, and Natural Resources," which has ben entirely omitted from the new version. It explained how our responsibility towards our poorer neighbors cannot be separated from our management of natural resources. Perhaps the topic was controversial, especially when it brought some criticism on multinational corporations, or perhaps the authors felt it was too far out from the main thrust of the book; but I for one was sorry to see it go.

They then present an historical overview of the development of our western attitudes towards the nonhuman universe. The Greek philosophers seem all alike to those of us who have not studied them, but I suppose Plato and Aristotle might have been as different as Julian Simon and Carl Sagan. In this edition, the authors added a survey of the pre-Socratic philosophers, expanded their treatment of St. Francis, and added sections abut Celtic Christianity and Hildegard of Bingen. They summarize the history of science (in this edition separating out theology and philosophy as distinct influences upon that history), since scientific viewpoints so strongly influence our view and use of the nonhuman world. In the chapter specifically dealing with the environmental history of North America, they describe the conflicting influences of hostility and reverence ... towards the wilderness. In this edition, they also analyze the influence of the Protestant work ethic on American attitudes towards the wilderness.

The authors have added a chapter to describe the religious explorations that many environmentalists pursued in the 1980s, including Deep Ecology, the Gaia Hypothesis, and Bioregionalism. They do this specifically because these quasi-religious approaches may be the chief rivals of Christian environmental stewardship.

In earlier decades, environmentalism often involved the rejection of "economic" considerations in decision-making about the earth and its creatures. More recently, most environmentalists have realized that it is necessary to find economically feasible ways to take care of the earth — and many economists have come to realize this, also. In recognition of this convergence of economists and ecologists, the authors have expanded the chapter in which they analyze the assumptions behind our decisions about how to use the resources and creatures of the earth, particularly pointing out the difference between price and value.

Many observers still consider Christianity to be perhaps the main culprit in inspiring environmental degradation. Others at least feel an uncomfortable tension between the Genesis command to have dominion and the concept of the stewardship of creation. The authors survey the Bible and examine Jesus as the perfect image of a ruler who is also a servant, which solves the paradox between dominion and stewardship. I consider these chapters to be among the best short treatments of this complex subject.

To address the question, "What shall we do" the authors have substituted the twelve philosophical models that they compared and contrasted in 1980 with a comparison among the concepts of "nature," "resources," and "environment." The list of suggestions for guidelines has been revised a little since 1980. The authors now identify world population control as a priority, and have otherwise made the list more concise and useful.

The main text originally ended with the report of a visit to a future earth, but this has been omitted from the new book, without significant loss of impact.

This book gives only a modest amount of information about what the reader can do to actually begin making daily decisions in an ecologically responsible fashion and become involved in environmentalism. Some readers might be more interested in this information than in anything else, but will have to look for it in Appendix A, expanded little if any from the 1980 version.

Both editions have an annotated reading list, indispensable for the beginner. The new edition has an index, which was inexplicably omitted from the original.

I have heard that some people have criticized this book, at least in its earlier edition, for being not quite orthodox. There are a couple of tangential instances where the authors go a little too far, as when the refer to recycling as the "salvation and new birth" of minerals. But in every case where biblical interpretation really matters, the authors are very careful to demonstrate a thoroughly biblical basis for their conclusions. If someone asked me to explain to them why a Christian should care about this present earth and its creatures, I would have no hesitation in referring them to this book for a concise and accurate analysis. It is one of the best brief surveys of all aspects of the Christian view of how to care for God's creation.

Reviewed by Stanley Rice, Department of Natural Resources, Huntington College, Huntington, IN.

RECLAIMING AMERICA: Restoring Nature to Culture by Richard Cartwright Austin. Abingdon, VA: Creekside Press, 1990.

This is the fourth and final volume of *Environmental Theology*. In the first two volumes, Austin aims at what is probably most important in the relationship between human beings and creation: that we love the things that God has created. *Baptized into Wilderness* describes those aspects of John Muir's experiences and writings that are consonant with Christianity, and *Beauty of the Land* expresses why Christians should " awaken their senses" to an awareness of the beauty of the natural world. In the third volume, *Hope for the Land*, he reviews a tremendous number of biblical passages to demonstrate that God gave rights to His non-human creation, and that it is not merely raw material for our use. In this volume, Austin presents a vision of how America could be transformed into a country that respects and loves the land as much as God wants it to.

In the first part, Austin describes how our founding fathers saw a strong connection between agriculture and liberty: free men were free when they could raise their own food. Free men were free when they could do good and lasting work, of which they could be proud. Jefferson, for instance, believed that every man should have access to his own land. There is a disparity, then, between the modern "free market economy." in which most land is owned by a few rich people, and the original ideals of the Founding Fathers. Austin urges us to return to living closer to these original ideals. Strangely enough, Japanese corporations (which rotate their workers among different jobs to keep their work from getting tedious) come closer to what Austin describes as "good work" than many American companies.

In the second part, Austin describes how agriculture can be transformed from being a destructive practice to being an activity that actually enhances the beauty of the heart. He outlines the history of how American agriculture changed from small independent farms to large farms owned by people who have little contact with, and may care little about, the land.

Strangely again, it is a Japanese philosopher who said, "The ultimate goal of farming is not the growing of crops, but the cultivation and perfection of human beings." Agriculture is not just a way of getting food but a way humans relate to the creation and its creator. Many modern farmers cannot take the risks that environmentalism requires, but as Amish communities demonstrate, when farmers help one another out, they can afford those risks. What Austin calls "moral agriculture" is thus a way in which humans relate to their fellow humans in community. The Old Testament gave certain rights (e.g. sabbath rest) to animals, and, says Austin. We have a responsibility to treat farm animals with respect — for instance, not shooting them full of antibiotics. He also explains, with facts and figures, why we cannot separate the agriculture of food production from the injustice experienced by the landless poor.

In parts three and four, Austin proposes specific, and radical, constitutional changes that would be necessary to bring our relationship to the land back into a biblical morality. Everyone should be guaranteed a right and realistic opportunity of access to wilderness. Large landholdings should be condemned and made available for homesteading, but only for people who have undergone a curriculum of training in sustainable agriculture. He extends Aldo Leopold's concept that the land and its creatures have rights. "America is not yet the 'land of the free' when the earth itself remains enslaved," he says, and calls for the people in the churches to recognize the plants and animals of their regions as fellow members of the church along with them. In Chapter 15 he presents a fictional account of how a rural community could reclaim land that has been devastated, at the same time building a loving Christian community.

Earthkeeping in the Nineties, edited by Loren Wilkinson, calls for "stewardship" of the earth, because it belongs to our Master. In *Reclaiming America*, Austin calls for a lot more. " ... 'stewardship' is too constricted an idea to express the full moral relationship with nature that is conveyed by the biblical images of covenant, sabbath, and redemption. Nature is our partner, not our possession." says Austin.

It is possible that Austin's political suggestions are too extreme to work. I believe we should try more limited changes that our fellow citizens are less likely to reject. Small victories may be more valuable than large attempts that completely fail. But his personal suggestions are simple things that can be done at home — raise your own food, chop your own wood, do good and lasting work with which you can be satisfied.

But it is also possible that nothing less than the measures Austin suggests will be enough to save us from despoiling the earth. Certainly, if we do not approach the subject with the passion that Austin has, and love creation with the same intensity that Austin expresses, the earth will succumb to the abuse of those who are greedy, and the neglect of those who are not.

Some extremists suggest that human technology is not welcome on the earth, that civilized humans are a disease in the ecosystem. Austin, however, shows us how human activity can enhance the beauty of the land. We belong here.

Reviewed by Stanley Rice, Department of Natural Resources, Huntington College, Huntington, IN 46750.

HOW TO RESCUE THE EARTH WITHOUT WORSHIPPING NATURE: A Christian's Call to Save Creation by Tony Campolo. Nashville, TN: Thomas Nelson, 1992. 200 pages, index. Hardcover.

How to Rescue the Earth Without Worshipping Nature is a major challenge to the Christian church in these last years of the twentieth century. Any discussion of this emotion-laden subject needs to consider several dimensions of the problems: Does the earth need to be rescued? From

what? How? What is "worshipping nature"? How do we avoid such worship? Tony Campolo, professor of sociology at Eastern College and widely known writer and speaker, tackles these problems in this book.

That the earth, God's creation, is deteriorating as a result of human abuse seems obvious to a growing number of people today. Campolo emphasizes this properly in his first two chapters. Here he reminds the reader of pollution and environmental destruction. Further on in the book (Chapters 8-12) he discusses some of the actions and attitude changes evangelicals must make to fulfill our responsibilities as stewards. While much of this material is not new, Campolo makes a strong case for evangelical involvement, in contrast to the greedy, uncaring, "slash and burn" pronouncements that have come from some evangelicals, including theologians and politicians.

In Chapter 13 he outlines four "warnings" to keep evangelical environmentalists "out of the New Age Movement. (1) "Make sure your spiritual exercises and worship are Christian;" (2) "There is a vast difference between sensing a unity with nature and advocating union with nature;" (3) We must not think that all life is of equal value;" (4) "Know that God, not humanity, controls the future of planet earth."

Unfortunately, it seems to this reviewer that there are numerous instances in Chapters 3 through 7 in which Campolo does not always heed his own warnings. Furthermore, many of his suggestions for our thoughts and actions appear to be based on some very selective manipulation of Scripture as well as reliance on considerable nonbiblical emotional mysticism.

In several places in the book he refers to John 3:16 and emphasizes that the "world" that God loved is the "cosmos," a Greek word that includes all of creation. He does not refer to the remainder of that verse, that whoever believes in him shall not perish but have eternal life. Does Campolo want us to have plants and animals "believing" in order to have eternal life? On p. 127 he makes passing reference to Psalm 104 to illustrate that all God's creatures are called to worship him. But part of that worship (v. 21) is that "the lions roar for their prey and seek their food from God." Predation did not originate with Satan! On the other hand, he makes no reference to Hosea 4:1-3 or Jeremiah 12:4, which relate environmental degradation to specific human sins.

In Chapter 3 he blames science for an unfeeling attitude toward animals, as when frogs are dissected in a biology class. He objects to zoos and caged birds and even worries about worms feeling pain and plants that wither and die when surrounded by anger and hateful talk! Although he reluctantly admits that killing for food is permissible, he is much against hunting "for fun." There is no mention, for example, of the need for methods to control some deer populations because they no longer have natural predators.

Most disturbing to this reviewer are Campolo's violations of his Warning #3 that all life is not of equal value. He broadly condemns the use of animals in experimentation and suggests, "One of the ways Christians can demonstrate their readiness to be led by the Holy Spirit is by making a commitment to the animal rights movement" (p. 71). He does warn against extremists, but suggests that Romans 8:19-21 "sensitizes us to the agonies of animals." He admits that in Genesis 1:31 God called his creation "good." Then he recommends Eastern Orthodox theology, when it tells us, among other things, that "One of the consequences of Satan's work is that the evolutionary process has gone haywire. That is why we have mosquitoes, germs, viruses, etc. God did not create these evils. They evolved because Satan perverted the developmental forces at work in nature" (p. 38). This theology explains why there are so many "mean" characteristics in nature, and assures us that God didn't create them (p. 40). What about Psalm 104:21?

We *need* to be concerned with rescuing the earth. We *will* be held responsible as stewards for what we have done to counter the effects of sin on God's creation. We must attempt this "rescue" on biblical terms. "Nature" is God's creation — nature is *not* God. Mankind is to *use* but not *abuse* nature. In spite of his excellent title, Campolo's approach is too close to worshipping nature. For that reason I cannot recommend this book as a real contribution to the *Christian* approach to environmental problems.

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

NAMING THE SILENCES: God, Medicine and the Problem of Suffering by Stanley Hauerwas. Grand Rapids, MI: Eerdmans, 1990. 151 pages, preface & index. Paperback; $9.95.

For Hauerwas, the most troublesome situation in facing pain, suffering and death is the apparent inexplicable and pointless death of the child, e.g., with leukemia. Using poignant stories of, and research on, dying children, the author exposes the reader to the full impact of the problem in a sensitive treatment which interacts with other current viewpoints. He finds the freewill defense coldly theoretical and inadequate. The often pious reasons given by well-intentioned friends to the anguishing parents — "so that they could grow spiritually; so that God could be glorified; so that their values would be made more Christ-like; so that love and community would be fostered among believers; so that they would know how to help others who suffer" — are false and "make God the ultimate sadist" (pp. 94-95). Parents eventually realize that "suffering is the result of the world we live in. God isn't doing it" (p. 95).

Hauerwas calls the Christian community to reclaim the use of the Psalms of lament to incorporate the disorientations of life into its experience. "One of the profoundest forms of *faithlessness* is the unwillingness to acknowledge our inexplicable suffering and pain" (p. 83).

In the final chapter, "Medicine as Theodicy," Hauerwas observes that we have lost a communal sense of a good death. Thus "we conspire to hide our deaths form ourselves and from one another, calling our conspiracy 'respect for the individual'" (p. 101). Medicine has joined this conspiracy, going to elaborate lengths to keep us alive; curing, not caring has become the primary end of medicine; what *can* be done medically *ought* to be done. The author calls us from a humanly extended *chronicity* of life to a *narrative unity* of life experiencing wholeness and completeness as redeemed creatures of a gracious God. One thinks of the description of Abraham's death where longevity, narrative unity and community are all reinforced: "Abraham ... died in a good old age, an old man and full of years, and was gathered to his people" (Gen. 25:8).

In the Amharic language of Ethiopia (in the Semitic family similar to Hebrew) the word for salvation and medicine is the same. This book is a welcome effort towards narrowing the gap between a Christian response and professional medicine's approach to human pain, suffering and death. It merits your careful reading and reflection; if you do, you will be better able to name *your* silences.

I am writing this review two days before Easter, so Hauerwas' final parting shot comes with telling impact; "Everyone knows that there is no technology for overcoming death. Death is left for God's overcoming" (p. 151). He did it in the resurrection of his son, Jesus Christ!

While pain, suffering and death are our common lot in this *present* life (Rom. 8:18-25; 2 Cor. 4:16 ff.), the Christian believer looks forward in hope to the new heavens and earth where these will be abolished (Isa. 65:17-25; Rev. 21:1-4). Suffering and death are *not* the end of our life's narrative. Herein lies our comfort.

Stanley Hauerwas is professor of theological ethics at the Divinity School of Duke University, Durham, NC. He has authored many articles and several books, including another similar treatment: *Suffering Presence: Theological Reflections on Medicine, the Mentally Handicapped, and the Church.*

Reviewed by Albert C. Strong, B.S., M.Div., Retired, Silverton, OR 97381.

CREATION AND THE PERSISTENCE OF EVIL: The Jewish Drama of Divine Omnipotence by Jon D. Levenson. San Francisco: HarperSanFrancisco, 1988. xvi & 182 pages, indexes. Hardcover; $18.95.

Contrary to Qoheleth, there is something "new under the sun"; we have here a fresh approach to an old idea and a fresh look at data that have been known and endlessly discussed. Levenson sees three glaring deficiencies in past and current scholarship: 1) *creation ex nihilo* is "not an adequate characterization of creation in the Hebrew Bible" (p. xiii), 2) the connection of Gen. 1:1-2:3 with the Priestly theology of the cultus has not been adequately explored, 3) and the "vast amount of overlap between the idea of God as creator and the idea of God as lord in covenant needs to be exposed and explored" (p. xiv).

Levenson is well qualified to address these concerns. He is an associate professor of Hebrew Bible at the Divinity School of the University of Chicago and has authored *An Entry into the Jewish Bible* and *Sinai and Zion* as well as serving as associate editor of *Harper's Bible Commentary.* His writing style is lively and he has produced a well argued text. While he has largely succeeded in his goal of producing a book free of the normal jargon of the philologist and theologian, he has by no means given us a popularization.

Although the lack of chronologic certainty precludes writing a history of the idea of creation, Levenson gives primary consideration to the historical Near Eastern antecedents and to the Rabbinic successor of biblical Israel. He makes very extensive use of the pagan Near Eastern creation myths to elucidate the original meaning of the creation passages in the Old Testament. There is much that can be said for this approach. Language, unfortunately, is often very imprecise and what is obvious in one culture and era may give very erroneous meaning if interpreted in terms of a radically different milieu. Levenson's work is a valuable corrective to a great deal of the reading of modern approaches and ideas back into Scripture by many modern scholars and religious interpreters.

However, at times Levenson's connections of pagan myths and "myths" of the Bible get a little fanciful. We are never forthrightly told whether Levenson considers the Hebrew Creation account to be a theological statement using familiar ideas and phrases from the surrounding pagan mythologies as vehicles to express the inexpressible truths of God's activity, or he simply sees the Creation account as mythology that the Hebrews borrowed and adapted, albeit with some ethical and conceptual improvements, from their pagan contemporaries.

Nevertheless, there are many very provocative points made that will give the thoughtful reader a fresh start in seeking out the true meaning of the Scriptures. Not only does he provide fresh insights on the nature of Creation and the problem of evil, but his whole work can and should be carefully considered as a stimulus to a deeper understanding of the Scripture passages used by Jesus and the New Testament writers, either directly or as an assumed common knowledge, for their teaching on Creation. It gives us some theses to test in a fresh study of the Scriptures.

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

LIFE AND DEATH DECISIONS: Help in Making Tough Choices about Bioethical Issues by R. D. Orr, D. L. Schiedermayer, and D. B. Biebel. Colorado Springs, Colorado: Navpress, 1990. 208 pages. Paperback; $9.95.

As suggested by its subtitle, this book sets out to deal with the subjects of infertility, abortion, birth defects, AIDS, caring for the elderly, artificial life support, euthanasia, and medical treatment options. Dr. Orr has had consid-

erable experience in dealing with ethical issues and is currently Director of Clinical Ethics and Associate Professor of Family Medicine at Loma Linda University Medical Center in California. Dr. Schiedermayer is currently chairman of the Ethics Commission of the Christian Medical and Dental Society, and author of a regular column on "Biblical Perspectives in Clinical Ethics" for the Journal of that Society. Dr. Biebel is the New England Regional Director for the Christian Medical and Dental Society, and has fourteen years of pastoral experience.

The book is written in an informal style and features questions at the end of each of its eleven chapters for group discussion. The authors state that they "have not emphasized theoretical perspectives or philosophical arguments. Instead, we have focused on what is useful, practical, and rich in reality." The authors accept the four points of medical ethics usually dealt with: beneficence, nonmalfeasance, autonomy, and justice, and add to this list three others that might be included in the first four: confidentiality, veracity, and the sanctity of life. Consistent with its style, the book raises many questions for discussion, offers few guidelines, and provides almost no answers. It is left for a proposed discussion, for example, to answer the profound question of when an embryo achieves "the status of personhood."

Considering the expertise of the authors, it is sometimes surprising to find them dealing naively with terms that cry out for definition, and to make apparently different statements in neighboring paragraphs. Standard terms like "human," "life," and "person" do not receive the definitive treatment they need and deserve. In one paragraph the authors state that the fact that fetuses can be operated on, given medicine, and seen through ultrasound establishes that they have rights as persons, but in the next they indicate that we can't be sure whether the fetus is "human," or whether abortion involves the taking of "a separate human life." A positive aspect of their treatment is their repeated call for compassion and understanding between those who disagree: "This compassionate outreach would seem to us to be more Christlike than the strident condemnation often heard from well-meaning protectors of the unborn" (p. 58).

Sometimes the problems posed appear to be humorous. For example, it is apparently seriously asked what to do when a sick 6-year old boy with fever and sore throat refuses to open his mouth to allow a throat culture to be taken.

The authors call for a strict definition of euthanasia as deliberately acting to end a life that would not have ended at that moment, but argue that "withdrawing or withholding treatment or artificial means of life support in someone who is dying is not euthanasia at all." They label euthanasia as "evil," and argue that the term "passive euthanasia" should not be used. To support this absolutist position, they point out that "Those people who maintain that euthanasia should be allowed in those cases where there is intolerable suffering are saying, in essence, that the immediate absence of suffering is a higher good than liberty or life" (p. 160). They appear to confuse two responses to suffering: (1) my response to my suffering in which I may look for God to work something good, unless the suffering is destructive of my very faculties, and (2) my response to the suffering of others, in which it is seldom, if ever, appropriate to say to such a suffering person, "I will not help you alleviate your suffering, because your suffering is good for you." The authors make a very questionable statement, therefore, when they assert, "By rushing to eliminate pain and end suffering, we actually may be ignoring the grace and divine presence of God" (p. 190). One would be hard put to find a case where Jesus told someone who came to Him in suffering, that they should go away unhealed because the suffering was important for them. A more appropriate formulation would seem to be this: human suffering is a consequence of living in a fallen world; God allows suffering for His own purposes and can bring good out of them; our responsibility is to work for the healing of the whole person, never to considering healing to be working against God.

The authors do make a positive input by holding up the hospice movement as an appropriate way for Christians to deal with the sufferings of terminal illness. And they do provide a helpful list of "words of advice" at the conclusion of the book. The book concludes with a glossary of terms, and a recommended bibliography.

This book could be a useful study guide in the hands of a discussion leader who would supplement and sharpen its focus.

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

EVIDENCE FOR FAITH: Deciding the God Question by J. W. Montgomery (ed.). Dallas, TX: Probe Books, 1991. 346 pages, index. Paperback.

This volume arises from The Cornell Symposium on Evidential Apologetics, held in Ithaca in 1986. The authors describe themselves as people who "became and remain Christians because the evidence for the truth of Christianity overwhelmingly outweighs competing religious claims and secular world views" (p. 9).

> [The] purpose of the different arguments in this book is to justify the hypothesis that the God of the Bible does exist .... Even if biblical Christianity has less than a one-in-ten-million chance of being true, we should believe it and live in the light of it because the possibility of an eternal hell is such a great torment. (pp. 306, 307)

Another example of what could be called the statistical argument is given elsewhere in the book:

> Given that we have a limited amount of time in this life to study religions, we can dispense with those that offer us a second chance in the afterlife or which will reincarnate us if we make a mistake in this life, or which promise us that all will be well eventually no matter how we live now. Prudence dictates that we first ought to consider the claims of those religions which say that everything depends upon the decision made and lived by in this one life. (p. 175)

As stated in the subtitle, the goal of the writers is to "decide the God question" by looking at objective evidence that shows that the odds in favor of Christianity are much better than one-in-ten-million.

The book consists of 20 chapters written by 9 authors. Of the authors, 3 are specialists in science, 1 in philosophy, 3 in theology, and 2 are pastors. Of the 20 chapters, 11 are written either by Robert C. Newman, Professor of New Testament at Biblical Theological Seminary in Hatfield, Pennsylvania, or by William J. Cairney, Professor of Biology at the United States Air Force Academy.

One approach to the goals chosen for this book would be to look at a variety of scientific, historical and philosophical evidences, which show that Christianity does not rest on non-existent, irrational or purely subjective grounds. Insofar as the book does this, it fills a continuing need for exposition of the evidence that demolishes the caricatures that are often constructed by non-Christians (and sometimes even Christians themselves) which hinder the defense of the faith.

This approach, however, is not really the one chosen by the authors of this book. Rather they seek to demonstrate that such abundant objective evidence exists that on the basis of it alone people should be convinced to become Christians. They follow the common modern trend that exalts the authority of science, so that the first step in establishing the truth of anything must be to argue for its scientific demonstrability. Thus they argue, "Show me that there is sound evidence that even a scientific mind can accept that the Bible is the actual Word of God, that it is accurate and authoritative in its assertions" (p. 19). They seek to provide this evidence by showing that (1) the Bible contains "history written in advance," (2) accurate statements are found in the Bible "demonstrating scientific knowledge and concepts far before mankind had developed the technological base necessary for discovering that knowledge or those concepts," (3) historical assertions in the Bible are verified by continuing historical scholarship, (4) statements about people and places are made in the Bible that are verified by ongoing archeological research, and (5) the Bible contains "well-developed common themes and is internally consistent ... even though written piecemeal over thousands of years."

Most of these arguments could well be advanced positively to demonstrate that the Bible provides authoritative and reliable revelation and that Christian faith is a rational faith. But the authors have more than this in mind: they wish to set forth this "objective evidence" in such a convincing way that faith itself (personal commitment on the basis of strong but incomplete evidence) becomes almost unnecessary. Properly aware of the weaknesses of "blind faith," they often appear to advocate a position dependent on science for its credibility and on an intellectual approach alone to the Scriptures. They argue that there is no "scriptural basis for believing any inner feeling, conviction, or sense of peace is the voice of God" (p. 34). There appears to be no place for a personal response to Christ's love, only an intellectual response to scientifically testable evidence. How difficult it is to keep a balance in this matter, as in so many other matters relating science and Christian faith!

Space does not allow a description of the variety of different kinds of arguments advanced as evidence in the book. Some are valid and show good insight, others are based on faulty definitions or understandings. Perhaps the most questionable are those arguments based on the

BOOKS RECEIVED AND AVAILABLE FOR REVIEW

(If you would like to review one of these books, please contact Richard Ruble, Book Review Editor, Perspectives, *212 Western Hills Drive, Siloam Springs, AR 72761.)*

W. Ball, (ed.), *In Search of a National Morality: A Manifesto for Evangelicals and Catholics*, Baker/Ignatius
I. Barbour, *Ethics in an Age of Technology*, HarperCollins
P. Bowler, *The Eclipse of Darwinism*, Johns Hopkins
P. Bowler, *The Non-Darwinian Revolution: Reinterpreting a Historical Myth*, Johns Hopkins
J. Carr, *The Art of Science: A Practical Guide to Experiments, Observations, and Handling Data*, High Text
D. DeYoung, *Weather and the Bible: 100 Questions and Answers*, Baker
J. Fisher, *RX 2000: Breakthroughs in Health, Medicine, and Longevity by the Year 2000 and Beyond*, Simon and Schuster
C. Gay, *With Liberty and Justice for Whom? The Recent Evangelical Debate Over Capitalism*, Eerdmans
N. Geisler, *Miracles and the Modern Mind: A Defense of Biblical Miracles*, Baker
G. Habermas & J. Moreland, *Immortality: The Other Side of Death*, Nelson
W. Harwood, *Mythology's Last Gods: Yahweh and Jesus*, Prometheus Press
T. Hill & D. Shirley, *A Good Death: Taking More Control at the End of Your Life*, Addison-Wesley Publishing Company
J. Hillman & M. Venture, *We've Had a Hundred Years of Psychotherapy and the World's Getting Worse*, HarperCollins
D. Hopper, *Technology, Theology and the Idea of Progress*, WJKP
A. Jones, *Capitalism and Christians*, Paulist Press
M. Lappe, *Chemical Deception: Exposing Ten Myths That Endanger Us All*, Sierra Club Books
G. MacGregor, *Images of Afterlife: Beliefs from Antiquity to Modern Times*, Paragon House
L. Margulis & L. Olendzendki, (eds.), *Environmental Evolution: Effects of the Origin and Evolution of Life on Planet Earth*, MIT Press
H. Nebelsick, *Renaissance and Reformation and the Rise of Science*, T & T Clark
R. Numbers, *Prophetess of Health: Ellen G. White and the Origins of Seventh-Day Adventist Health Reform*, Tennessee University Press
D. Overbye, *Lonely Hearts of the Cosmos: The Story of the Scientific Quest for the Secret of the Universe*, HarperCollins
I. Pardes, *Contradictions in the Bible: A Feminist Approach*, Harvard

existence of "prescience" in the Bible. Almost everything we know about the nature of the biblical revelation as developed from its own character and purposes argues against hidden prescientific insights as the result of special revelation thousands of years ago. It hardly seems appropriate to cite Mosaic divisions of animals into clean and unclean as the result of prescientific divine revelation about sanitation (what happened to Peter in his vision before going to visit with Cornelius in Acts when this same distinction was discredited?), or to argue that Mosaic prohibition against eating fat was actually divinely revealed, prescientific understanding of the effects of cholesterol.

Potential harm for the cause of Christianity is unfortunately implicit in a claim repeated several times in the book. The accepted recognition that authentic science limits itself to interpretation in natural categories without reference to the supernatural as science is challenged without recognizing that this self-imposed limitation on science is the necessary prerequisite for science's reliability within its own sphere of reference. Ignoring the intrinsic differences between science and legal thinking, Montgomery writes in a final chapter, "Theological presuppositionalists ... tell us that there are no self-interpreting facts ... We profoundly disagree ... the very nature of legal argument — rests on the ability of facts to speak for themselves" (pp. 334, 335). But one acquainted with the doing of science knows that facts do not provide their own meaning, and that every experiment is itself "theory laden." To deny this is to reject the very qualities that characterize authentic science as human interpretation of observations. It is not surprising that such advocates also frequently misunderstand the essential role of human interpretation in understanding the biblical revelation.

Some help can be obtained from this book in dealing with those who argue that Christianity has no rational basis. But the reader needs to be cautious about accepting all the arguments, and should supplement the treatment with a genuine understanding of personal faith and commitment.

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

DICTIONARY OF JESUS AND THE GOSPELS by Joel B. Green, Scot McKnight, and I. Howard Marshall (eds.). Downers Grove, IL: InterVarsity Press, 1992. 934 pages, index. Hardcover.

This volume is unique. It is the first of its kind since 1909 when James Hastings published his *Dictionary of Christ and the Gospels*. In the past eight decades, knowledge about Jesus and the gospels has increased to the point that a new presentation of the material in this area is justified. New methods of interpretation, additional information about first century culture, and provocative questions about Jesus and the gospels are all discussed in this volume. To the scholar, most of the material presented will be familiar. However, in this compendium, evangelical scholars provide the valuable service of making a lot of information accessible to both scholar and layperson in a succinct and engaging way.

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

EERDMANS' HANDBOOK TO THE BIBLE by David and Pat Alexander (eds.). Grand Rapids, MI: Eerdmans Publishing Co., 1992. 680 pages. Paperback; $19.95.

In print for twenty years in many languages, this is Eerdmans' most popular reference publication. This book has sold so many copies in the hardcover edition (nearly two million) that Eerdmans decided to issue it in paperback. It contains a survey of the contents of the Bible, articles on the background and setting of the Bible, over 400 photographs, many maps and charts, and indices on people, places, events and themes. It is not a bulky volume, which makes it easy to turn to anytime information is needed to prepare a talk, write an article, or just check a fact. It is a good book to keep next to the Good Book.

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

JESUS DOESN'T LIVE HERE ANYMORE by Skipp Porteous. Buffalo, NY: Prometheus Books, 1991. 293 pages, index. Hardcover.

This book is an autobiography by a man who has had difficulty deciding what he believes. He seems to have discarded all of his religious beliefs, but in an interview on WSB, Atlanta, he said to a caller, "No, I'm not an atheist" (p. 267). However, on a Morton Downey, Jr., show Porteous responded, "No, I don't believe the Bible at all" (p. 221).

Porteous was born in 1944. He was very close to his grandparents, who were devout Methodists. He recalls saying the children's prayer, "Now I lay me down to sleep," and at times would wonder if he would die before he woke. He also recalls that many of the hymns sung in church "contradicted reality." Although he continued to be very religious, his habit of questioning the teachings of Christian leaders and the church eventually brought about a dramatic change in his convictions.

Many well-known people appear in the book. They include Billy Graham, A. S. Allen, Kathryn Kulman, Dr. James Dobson, Don Wildmon, D. James Kennedy, and

Pat Robertson. Initially he admired many dynamic and charismatic people, but he finally decided that most of them were insincere and threats to the American way of life.

In recent years Porteous and his wife, who is from a Jewish family, have published *The Freedom Letter*. They see any effort to get prayer back into public schools, force stores to quit selling pornographic material, or persuade parents to spank their children as contrary to the principles of the Bill of Rights. In this regard they cite the "Reconstructionists" and the "Coalition on Revival" (COR) as groups who teach that biblical law should be the law of America. The WSB talk show host said "There's a group of Christian people ... who advocate the execution of homosexuals, adulterers, fornicators, and, I guess, women who have abortions." Porteous added, "Yes, and the ones who perform the abortions" (p. 241).

This story by one who has been a pentecostal preacher, a faith healer, an exorcist, a radio minister, a journalist, and an undercover agent assigned to catch drug dealers will be read by most with mixed emotions. One appreciates his apparent honesty, but wonders what movement will consume him next. Some readers will be offended by the occasional vulgarities.

Reviewed by Ralph C. Kennedy, Professor Emeritus, John Brown University, Siloam Springs, AR 72761.

THE RIGHTS OF NATURE: A History of Environmental Ethics by Roderick F. Nash. Madison: University of Wisconsin Press, 1989. Hardcover; $27.50.

Roderick Nash, professor both of history and of environmental studies at the Santa Barbara Campus of the University of California, is perhaps best known for his book *Wilderness and the American Mind*, which outlined the history of conservation and wilderness preservation, together with its cultural background, in the United States. *The Rights of Nature* documents the history of the development of the concept of natural rights, with focus on religion, legal philosophy, and recent environmental activism. This book, in the series "History of American Thought and Culture," is almost entirely limited to the Anglo-American tradition. The book is very well documented and interesting to read. It focuses on one main theme: the concept of "natural rights" has expanded through the centuries (rights were gradually extended to include women, nonwhite races, workers, etc.) and is now extending to include the natural world (sentient animals, all organisms, whole ecosystems). Therefore the demand of some environmentalists that nonhuman organisms be granted legal rights, a demand usually considered to be on the radical fringe, is actually the next step in the extension of civil liberties to oppressed parties. Nash considers radical environmentalism to be a continuation of rather than a departure from Anglo-American tradition. This seems to contradict his earlier book in which he implied that saving the wilderness required a departure from Anglo-American habits of thought.

In his earlier book, Nash made a clear and important distinction between two kinds of "conservation": the kind that insisted on conserving "natural resources" for future human use (the Pinchot concept), and the kind that insisted on protecting the natural world because of its right to exist, without reference to human utility (the Muir concept). In the current book he elucidates another important distinction: there is a fundamental difference between those who campaign for the rights of *individual* organisms to live (usually, individual animals) and those who campaign for the rights of *species* or *ecosystems* to persist; and these two campaigns have more or less separate histories. As a result, there are three different and sometimes conflicting views of conservation: 1) human use of "natural resources," 2) "animal rights," 3) the "rights of the earth" as a whole.

Nash's main theme is intriguing and nearly convincing, but there remains one problem. Liberating animals and rocks is not simply an extrapolation of the liberation of slaves. It was obvious to anyone who cared to look, even in ancient times, that slaves were people. Anyone who doubted this had only to consider the status of freedmen and of slaveowners' children born to slave mothers. It is equally obvious to everyone today that bacteria, oysters, and cats are not people. There is a vast gulf between person and non-person. Nash addresses this problem but does not emphasize what a big problem it is.

When I was an undergraduate I took Dr. Nash's class in American Environmental History. He presented a brief and very opinionated case condemning Christianity for playing a major causal role in environmental degradation. In contrast, the first chapter of *Wilderness and the American Mind* presented a much more carefully reasoned argument for the influence of Christianity on environmental ills. And in *The Rights of Nature*, Nash was careful to leave aside his own opinions and, as an historian, presented a very fair and thorough review of the positive contributions made by Christians not just to the preservation of natural resources but to the appreciation of the rights of nature apart from humans. Certainly the discovery of environmental issues by the church (see Sheldon's article in *Perspectives*, 41 (3)) has impressed Nash favorably since I took his class in 1978. Some problems, however, remain. He documents the "greening of religion" that has occurred in the past few decades, but seems unaware that *the Bible itself* contains not only passages commanding humans to be good steward of creation but also passages that extend legal rights to components of the natural world (see Deuteronomy 22: 6-7 and Hosea 2:18, for instance). He also overlooked the possible historical role of Christianity in extending the circle of ethics to include slaves and women (first-century Christianity was derided by its enemies as a "religion of slaves and women"), and the possibility that the tradition of Christian martyrs may have influenced the choice of tactics used by some radical environmentalists today.

Nash credits Darwin with an important role in the origin of environmentalism. While it is true that modern

ecology and population biology practically began with Darwin's experiments with earthworms and seedlings (see Harper, J.L. *Journal of Ecology* 55:247-270 (1967)), it is not clear that Darwinism can provide a basis for environmental ethics. Darwin's work toppled humans from lordship over the universe; but Genesis 2 saying that man was made from the dust had already done this. Houston (see *Perspectives on Science and Christian Faith* 34 (1)) said the Bible "out-Darwins Darwin." If Darwinism is used as a basis for ethics, then economic success is the only yardstick by which our actions can be measured; we should care no more about our environment than does a toxigenic fungus or an allelopathic plant. However, we cannot deny that many environmentalists, such as John Muir and John Howard Moore, did in fact take courage from Darwin's writings, even if they should not have.

Nash has documented the struggle that legal philosophers have undergone to define the limits to which ethics can be extended. There has even been serious discussion about whether variola, the smallpox virus, had a right to not be exterminated. Many environmental activists believe that humans have no more right to exist than the variola virus; indeed, some believe human extinction would only be a just punishment for our perturbation of the natural world. I had not realized before what a hopeless philosophical mess one can get into without the acceptance of an almighty Creator to whom all of the natural world is good, to whom we are accountable, but also in whose image we are made.

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

PSYCHOLOGY OF RELIGION by H. Newton Malony, (ed.). Grand Rapids: Baker Book House, 1991. 628 pages. Paperback.

Twenty-two authors who come from and work in different parts of the world have written essays for this collection. Each chapter presents a brief biography of a psychologist and two essays by that psychologist. Many of the articles in this book first appeared in a 1986 edition of the *Journal of Psychology and Religion*. The authors of these original articles have each added a new essay. In addition, articles by authors not included in the 1986 journal are included.

This book is the fifth in a series of books published cooperatively by Baker Book House and the Christian Association for Psychological Studies. The topics discussed include religious experience, personality theory, psychopathology, research methods, social and clinical psychology, and the integration of psychology and theology.

The purpose of this book is to examine "19th- and 20th-century thinkers, from Freud to Fromm to Allport, from a new international perspective .... The result is a well-rounded historical and personal retrospective." This book is offered to those who want to know more about "psychological understandings of religion." It is appropriate for use in a psychology of religion course. Videotaped interviews with some of the authors are available.

Malony teaches in the School of Psychology at Fuller Theological Seminary where he directs the program in the integration of psychology and theology. He has written over a dozen other books which attempt to relate psychology and the teachings of the Bible.

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

THE VATICAN, THE LAW AND THE HUMAN EMBRYO by Michael J. Coughlan. Iowa City, IA: University of Iowa Press, 1990. 112 pages, notes, bibliography, index. Paperback; $8.95.

The question of when life begins, or more correctly, when the human embryo or fetus becomes a person entitled to legal rights, is the basis of this compelling and comprehensive study. Examining the historical, philosophical, and theological basis of the Vatican's views on the origins of human life and procreation, the author draws upon numerous references to document his view that "the embryo, or early fetus, cannot be considered a person." He strongly objects to appeals by the Vatican authorities for civil legislation dealing not only with abortion, but also with artificial means of fertilization and birth control that would force upon non-Catholics values and principles that limit what he believes to be fundamental human rights.

The introduction, a short ten pages, provides a readily understandable outline and summary of the book. This manner of organization is ideal for a book of this type, since the conclusion is already established and subsequent chapters provide detailed references and discussion. The rest of the book is not easy reading, except for those accustomed to philosophical discussions. Nevertheless, Coughlin's clear and deliberate style rewards the dedicated reader with logical and well-supported conclusions. The subsequent chapters cover topics such as:

- *Catholic mediation theology* in which God is revealed through natural media (i.e., popes and bishops, the scriptures, the sacraments, nature, etc.) and how the concept of natural law is derived based on the views of Saint Thomas Aquinas.

- *The concept of double-effect and the Pauline Principle*, as applied to the value of human life. The principle as stated in the postconciliar Vatican Council II document *Humanae Vitae*, is "Though it is true that sometimes it is lawful to

tolerate a lesser moral evil in order to avoid a greater or in order to promote a greater good, it is never lawful, even for the gravest reasons, to do evil that good may come of it." This statement has been the subject of numerous theological gymnastics and inconsistencies which are ably described by the author.

• *The relationship of divine law to natural law* and inconsistencies in the manner in which the Vatican interprets natural law in its moral judgements on contraception and killing.

• *An examination of what constitutes a human being.* The concepts of human versus rational nature are studied, as well as the inconsistent application by the Vatican of the concept of physicalism, where the morality of an act is defined only by the nature of the act and not by the circumstances associated with it. Physical tests to establish the existence of a "person," such as viability and brain activity, are discussed.

• *The question of ensoulment.* While scientific concepts are incorporated in some discussions, most material is of a highly philosophical nature, as it must be to deal with the complex issues and confront claimed inconsistencies in the Vatican statements.

If there is a weakness in this book, it is that no attempt is made to present the views of those within the Catholic church that oppose the Vatican positions, particularly in the area of artificial fertilization and contraception. In point of fact, the reader must understand that the author's reference to a monolithic Catholic point of view can only be expressed as the view of the Vatican and not of the entire church membership, particularly in the American Catholic community. Evidence presented by Greeley (*The American Catholic: A Social Portrait,* Basic Books, NY, 1977) indicates minimal difference between Protestant and Catholic attitudes on birth control, premarital sex, and abortion, none of which precisely follow the Vatican guidance presented in *Humanae Vitae, Quaestio de aboru,* and *Personae humanae.* It has been also been claimed that the majority of Catholic intellectuals are on the side of common sense and therefore in opposition to their church (*Steve Allen on the Bible, Religion, and Morality,* Prometheus Books, Buffalo, NY, 1990) on the question of contraception.

One can imagine a society where the question of abortion would never arise. A society where, among other things, a massive program of health care, day-care, and family-counseling was available to all. Unlike some who take the pro-life stand to the limit, and to its credit, the Catholic Church has paid far more than lip-service through social service programs to the aspects of such an ideal. So while *The Vatican, The Law, And The Human Embryo* should be required reading by everyone (particularly Catholics) who seek to fully understand the position of their church, it should not be used as a guidepost to Catholic thought on the questions of concern. That is too broad and diverse to be covered in 112 pages.

Reviewed by Michael Epstein, Research Chemist, National Institute of Standards and Technology, Gaithersburg, MD 20899.

MATTERS OF LIFE AND DEATH by John B. Co, Jr. Louisville, Kentucky: Westminster/John Knox Press, 1991. 122 pages. Paperback; $9.95.

The author of this pocket-size book is Professor of Theology at Claremont School of Theology in Claremont, California, and has written two other books dealing with process theology. In addition to the title, the cover bears the words, 'The right to kill, the right to die, the right to live, the right to love." These are the four main sections of the book, dealing in more standard terms respectively with animal rights, the right to commit suicide, the right to have an abortion, and the right to have premarital sexual intercourse and homosexuality.

In the first two sections he argues that "there is no basis for an absolute right to either life or death. " In the third he argues that "Love, then, expresses itself foundationally not in keeping people alive but in respecting their freedom and responsibility. He calls for a wider context: "A consistent theme in this book is that a purely individual view of rights should be rejected. Human lives are so bound together that all decisions about life and death need to involve the others who are affected." He calls for an "advance, rather than the present polarization" in Christian thinking on these subjects.

The author approaches these issues openly and honestly, offering his own conclusions as his own conclusions, and in general seeking to steer a path between extreme positions. He frequently refers to the Bible for insight, and recognizes that his position is not the only possible Christian position. He indicates his indebtedness to the father of process philosophy, Alfred North Whitehead, who taught him "to reject dualism, anthropocentrism, substantialism and essentialism," as well as "to understand that God is in the world and the world is in God." His basic conclusions are that although humans do have dominion over other creatures, they must view their "right to kill" within "a much wider context of responsibility to contribute to the welfare of other creatures as well as of human beings; that if a person with a debilitating disease desires to die, then that person has the right to die; that the choice to have an abortion is a choice to prevent the development of a human being rather than to kill one, so it should therefore be planned for an early stage in the fetal development, and public policy should seek to maximize both personal freedom and community well-being; and that the ideal for sexual practice would be to exist only within committed relationships, but that every deviation from this form should not be viewed as "a violation of moral law against which rules and sanctions should be enforced."

If sometimes the theological foundations of the author's conclusions might be questioned, his overall perspective is in general a contribution toward working out several conflict areas. The book could therefore serve as a resource for group discussion on topics related to Christian ethics.

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

MIND MATTERS: How Mind and Brain Interact to Create Our Conscious Lives by Michael S. Gazzaniga; Houghton Mifflin, 1988. 255 pages.

The thesis of this book is that the brain ("fluctuating physical-chemical state") interacts with the mind ("the interpretive state"). Mind is an emergent phenomenon, a higher level of description. The interaction is complex, and it is just beginning to be understood. "A thought can change brain chemistry, just as a physical event in the brain can change a thought." The author describes the current state of understanding of this interaction in a wide range of areas of our conscious lives, including pain, intelligence, anxiety, addiction, love and healing. Accepting this interaction entails a view of the world that "shows the limits of the genetic imperative on what we turn out to be" and thus, of course, leaves room for both form and freedom, both a givenness of reality and a responsibility to live in a meaningful way.

The notion of levels of explanation of phenomena is familiar to readers of this journal. The interaction between the levels identified by the author is well documented here. The tension between determinism and significant individual choice is also a familiar one, both theologically and scientifically. Gazzaniga seems to say that the current state of scientific knowledge allows and even demands the recognition that an individual is not able to determine everything about life (brain structure) but is responsible for choices made (the mind state). For him, holding these in balance leads to "the good life." As Christians we must do more than hold these in balance, because for us the fulfilled life is found when choice is exercised in a way that aligns our lives with the revealed will of God.

The book is well written. It summarizes a great deal of research and experience in an accessible form. It should be of interest to those concerned about brain science and how this effects our thinking about a biblical view of humanness.

Reviewed by David T. Barnard, Associate to the Vice-Principal (Resources), and Professor, Department of Computing and Information Science, Queens' University, Kingston, Ontario.

RESCUING THE BIBLE FROM FUNDAMENTALISM by John Shelby Spong. San Francisco, CA: Harper, 1991. 249 pages, footnotes, index. Hardcover; $16.95.

Episcopal Bishop Spong has written a book which is certain to be controversial. The Bishop's main point is that the Bible cannot be interpreted literally. It is a point he makes boldly and repeatedly, even asserting that those who do take the Bible literally are "destroying Christianity" (p. 226). The bulk of the book, chapters 5 through 12, is a survey of both the Old and New Testaments, with the bishop explaining all the things which no modern person can believe as literal truth. In his analysis of the Pauline writings the author has come to the conclusion that Paul was a homosexual. The "evidence" for this conclusion is most unconvincing to this reviewer, but it is rather ingenious. A special chapter is devoted to the virgin birth of Jesus and his resurrection, neither of which really happened, according to Spong. The author betrays his bias in statements like the following: "I know of no reputable biblical scholar in the world today who takes these birth narratives literally" (p. 215). My library is full of books by reputable scholars who take the birth narratives of Jesus literally. Either the bishop only reads authors who agree with him, or he simply dismisses those who disagree with him as unreliable, a most unscholarly attitude to say the least. The irony is that Spong, who dismisses all fundamentalists as narrow-minded and non-thinking persons, comes across as a very narrow-minded liberal thinker who completely ignores viewpoints at variance with his. There are liberal scholars who take note of the integrity and intelligence of their conservative opponents, but Spong is not among them.

There is not much new in this book except the notion that the Apostle Paul was gay. Liberal theologians have been questioning the Bible for decades, making the same points made by Spong. The book will have little impact on conservatives, who have heard it all before. ASA members, accustomed to addressing the problems of science and the Bible with greater scholarly integrity, will find little new here, and may be irritated by the way in which the author refuses to recognize that many intelligent persons take the Bible literally.

The orthodox church has for centuries realized that there are problems in the text of the Bible. Nevertheless, the church has also insisted that these problems do not detract from the truth that the Bible is God's Word. Spong questions why anyone would believe literally a book so old (we would not believe an ancient science text, would we?), failing to take into account that religious/moral ideas are different than scientific ideas, that the truth of God, who is immutable, does not change from generation to generation. The church in its orthodox manifestation has always believed that God can and has given us a book containing a verbal, Spirit-inspired revelation of His nature and will. Spong ignores the work of the Holy Spirit in the production of the text of Scripture, speaking only of the human authors and their bondage to their age and culture, assuming, I suppose, that God has no way to transcend such factors and create a text relevant for every age.

In the interest of fairness it should be mentioned that Spong has a positive goal in mind in the book. He believes that modern scientific man simply cannot accept the biblical text literally, and is therefore unable to know the God of the Bible. He hopes to help us to be free from literalistic constraints, and thus better able to relate to God. The author's intentions may be good, but I am not convinced that his approach will draw persons to God. The mainline churches where theological liberalism prevails are slowly dying numerically, while Bible based churches continue to flourish.

For persons wanting a summary of where unabashed liberalism will lead, read this book. If you are a conservative, prepare to have your intelligence and integrity insulted.

Reviewed by Richard M. Bowman, Pastor, First Christian Church, 441 North Church St. Decatur, IL 62522.

Letters

On the Mind/Brain Question

I have agreed with those many philosphers who have contended that the mind and the physical brain are united but are entities of quite different natures, over against the contention of other philosphers or materialists who have contended that the term "mind" should refer wholly to the physical brain.

Consider Einstein's dramatic conclusions: "space" is actually "time;" the universe exists within "space-time" so real that the very curvature of "time" (space-time) has been verified by science. (In encyclopedias, see "relativity.") Then how unthinkable that no part of personal existence is derived from that curved, intangible, pervading reality that we innocently have called "time"!

In this connection, I contend that intersteller space is more than simply a void — that in fact it represents the inner curved structure of a definite sphere (a time-sphere) set apart unto itself within the infinite being of God. I submit that this sphere, an intangible pervading reality of sublime nature, has definite boundaries far beyond the uttermost stars.

Einstein concluded that "space" and "time" are the same, and science tells us that fully ninety-nine percent of every atom is not physical reality, but rather is space — that is, "time." (In the context of the following view of the atoms of the brain, then, intangible thoughts originate and are held in the ninety-nine percent of the brain that is the intangible essence of "time," not in the one percent that is physical.)

In my view, intangible "mind" is derived from the intangible essense of the space-time (time-sphere) within which our entire physical universe exists. That is, it seems reasonable that all of this goes back to relatively soon after the Big Bang, to some primordial uniting of space-time with physical reality to form each atom. Current "mind," then, may be regarded as the united, intangibly interconnected essence of "time" within the atoms of the brain — united into an intagible entity when those atoms first became relative to and reactive to one another in some special way, as at some point in the birth process of a personal being.

Rapidly affected by this remarkable union, this intangible entity may become of immortal nature, caught up as "soul" at physical death, once more in the safety of the larger essence of space-time, as our galaxy continues on, hurtling ever outward from the vast explosion that began the universe.

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Proffering Some Advice

Owen Gingerich is frustrated with Phillip Johnson (*PSCF*, June 1992, p. 142). John Wiester is frustrated with Owen Gingerich (*PSCF*, December 1992, p. 249). We are all frustrated with Carl Sagan and undoubtedly he is frustrated with us.

Christians have a reason to be frustrated when the world's leading scientists insist that the origin of all biological information must be attributed to purely mechanistic, materialistic processes. Most of the frustration stems from the fact that modern science is limited by methodological naturalism. Creation events are by definition non-natural, and are, therefore, not subject to the scientific method. However legitimate *methodological naturalism* may be, when it is folded, spindled, stapled and mutilated into *philosophical naturalism*, it distorts the natural sciences in ways far beyond those attributed to the Medieval Church. The illogical leap from not being able to study creation events scientifically to assuming that God played no role whatsoever in creation has left scientists with little alternative but variations on neo-Darwinian theory, a theory which, if geological succession is correct, forces scientists to literally ignore the pervasive patterns in the natural history of life on earth. Yet no other theory seems to be possible once we consider the subject of origins (from time, space, matter, and energy to biological information) to be legitimately within the realm of the natural sciences.

As Christians we all acknowledge that we are more than the result of natural processes that did not have us in mind. The Cosmos is not all that is, or ever has been, or ever will be. This knowledge gives the scientist working within a Christian framework much greater latitude in studying the natural world than any scientist working within the bounds of philosophical naturalism could possibly have. The unbeliever has but one option: the assumption that the origin of life and the origin of all biological diversity and disparity must be the result of purely mechanistic and materialistic processes. The Grand Evolutionary Story and the Theory of Common Ancestry must be a fact, Fact, FACT! Evolution, as Sagan, Gould, Simpson, or Dawkins define it, is an unfalsifiable truth.

The Christian, on the other hand, should not only be open to the possibility that God may have created sufficient processes and initial conditions to allow the universe to unfold naturally (Van Till's "functional integrity"), but should also be open to the possibility that natural processes alone are insufficient to account for origins. This latter possibility seems to have been a major theme of the ASA's *Teaching Science in a Climate of Controversy* and Johnson's *Darwin on Trial*. Unfortunately, it also seems to be the cause of Gingerich's frustration, "So what does he (John-

son) want us to do about all this? ...he seems to offer no prescription. If he understood how science functions, perhaps he could have proffered some advice."

The frustrating thing about the "insufficiency of natural processes" approach is that it leaves the scientist with little alternative but to continue on the path of naturalism to find purely mechanistic solutions to today's unsolved problems of origins. It also leaves the theist with little more than a series of gaps which God is allowed to bridge for the time being.

A third alternative exists for the Christian which eliminates the God-of-the-gaps and insufficiency problems, undermines philosophical naturalism, and offers scientists an alternative research program subject to methodological naturalism. The alternative is developing a theory of "macrostasis" to describe the natural processes which prevent major evolutionary change from occurring and which account for the natural phenomenon of higher taxon-level stasis. At the level of chemical evolution the alternative includes the study of natural processes which prevent life from arising spontaneously, the mechanisms which account for Pasteur's Law of Biogenesis.

This alternative involves a shift in focus away from the question of origins to the question of change. Do life forms gradually transform into substantially different body plans through time or do they retain their original "functional integrity" (with apologies to Van Till) throughout their tenure on earth?

Although critiquing current macroevolutionary theories is important, it is even more important to provide scientists with an alternative research program. Developing a theory of "macrostasis" would constitute a paradigm shift in science away from developing theories which explain data which paleontologists don't have, to theories which explain the data they do. As Stephen Jay Gould put it, "Stasis is data." Fossil after repeatable fossil documents stasis. The study of macrostasis would certainly shift science back to a more empirical base.

Another major advantage of focusing on the questions of change and stability rather than on origins is that both macroevolution and macrostasis, unlike creation and evolution, can be studied under the same rules of methodological naturalism. Opening science to the study of macrostasis requires that we do more research, not less. The evolutionist can continue his attempt to explain how major evolutionary change could occur without leaving any transitional forms leading to the higher taxa, while the scientist explains why major transformations in body plans do not occur naturally by either saltation or gradualism. It may ultimately turn out that natural processes do not exist which can overcome the genetic, developmental, and environmental constraints which account for macrostasis. However, there would be no reason to abandon macroevolutionary research if results looked promising.

Refining neo-Darwinian theory, however, does not look very promising:

> 1) Darwin had to virtually ignore the pervasive patterns natural history in order to preserve his theory of evolution. The two key features of the fossil record are stasis and sudden appearance, not gradualism. This is true at lower taxonomic levels and becomes even more pronounced at higher taxonomic levels.
>
> 2) Darwinian theory (including punctuated equilibrium) predicts that the accumulating diversity of the lower taxa will ultimately produce the disparity of the higher taxa. Natural history, however, reveals that disparity preceded diversity. From a systematic point of view, Darwinian theory is in reverse order to geologic succession.
>
> 3) Speciation acts to restrict evolution to minor changes, changes which do not accumulate to create major disparity. Speciation also prevents major evolutionary change from occurring by saltation. In fact, speciation even reduces microevolutionary potential as gene pools are subdivided.
>
> 4) Natural selection tends to eliminate incipient and transitional stages thus preventing major evolutionary change from occurring on a gradual step-by-step basis.

Despite these shortcomings, it may be premature to take Occam's chainsaw to neo-Darwinian theory. The theory still explains the transitional forms we don't have better than any other theory (although the God of Chance would certainly have an easier time without the constraints of speciation, natural selection and that frustrating geological data). The time is definitely ripe, however, for a theory which explains why the major kinds of plants and animals retain their basic body plan and "functional integrity" throughout their tenure on earth. Stasis is the basis for a new research program which all scientists should welcome.

There is nothing like a good theory, and neo-Darwinism is nothing like a good theory. Knowing that some of the world's leading scientists still defend it should bring great comfort to Christians. If this is the best there is, what threat could it possibly be to "what was from the beginning, what we have heard, what we have seen with our eyes, what we beheld and our hands handled, concerning the Word of Life" (1 John 1)? Just whose faith is empirically based anyway?

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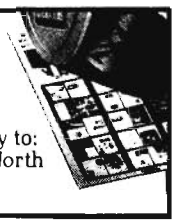

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The American Scientific Affiliation (ASA) is a fellowship of men and women of science who share a common fidelity to the Word of God and to the Christian Faith. It has grown from a handful in 1941 to a membership of over 2,500 in 1990. The stated purposes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

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

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

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* * * * *

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

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

The American Scientific Affiliation

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Canadian Scientific & Christian Affiliation

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

LOCAL SECTIONS

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

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VOLUME 45 NUMBER 2 JUNE 1993