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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Too Much of a Good Thing

The time between submission and publication of regular *Papers* has reached thirty months. Peer review, manuscript revision, galley preparation, and printing typically consume about nine months. The remaining delay stems from the backlog of accepted manuscripts. Shorter pieces such as *Communications, Letters to the Editor,* and *Book Reviews* normally appear within six to nine months of receipt. It is clear that regular *Papers* have lost all sense of timeliness by the time they reach the reader.

One reason for the backlog is the increasing size of manuscripts. Prospective authors often ignore the twenty page double-spaced (6000 word) limit proscribed in our Manuscript Guidelines. Two recent submissions were each split into three separate articles in an attempt to circumscribe this limit. It has been suggested that reviewing standards be stiffened, that we limit our pages to ASA members, increase the size or frequency of the publication, or use only commissioned articles. Each of these ideas has merit, but must be balanced by the need for *Perspectives* to be open to all who consider questions both as specialists in their profession and as amateurs dealing with the broader philosophical, ethical, or theological questions linked with science. The combination of professional and amateur poses challenges for reviewers and editors alike. There is no magic formula that transforms an expert in quantum physics into a philosopher or sociologist. We must encourage broad thinking, yet at the same time be willing to put in the time to gain the proper background. Prospective "amateur" authors should have their papers read by specialists in the field before submitting their papers for consideration for *Perspectives.*

Our diverse readership will best respond to articles that are attractively written and sized to be read in one sitting. We need to find a path that falls between superficiality and the formidable rhetoric of a biochemical or philosophical piece. *Perspectives* cannot be an alternative to publishing in specialty journals. The editorial staff will *insist* that authors adhere to the stated manuscript length and continue to help them communicate to a lay audience. Prospective authors should check to see if their topic has been covered in *Perspectives* in the last decade or by manuscripts already received.

Discussions of the subject of origins continue to be active. Often prospective authors do not approach this controversial area with a sense of history or careful attention to what has been published in *Perspectives* or the scientific literature. Another possible resource to check is the FAQ's (Frequently Asked Questions) of the Internet News Group "talk.origins." We welcome your response.

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In This Issue

Physician Jay L. Hollman begins a two-part series on current medical questions. In the first piece he discusses euthanasia, fetal transplant and homosexuality; issues which are not just "out there," but affect the Christian community.

A. L. Battson then examines the problems that the fossil record provides for the neo-Darwinian synthesis.

Revisionist historians of science have argued that earlier "conflicts between science and Christianity" could be better understood if we looked more carefully at the ways that the two disciplines have interacted rather than as combatants engaged in "bipolar warfare." In his paper, James P. Clark examines the philosophical presuppositions of modern science which he claims are an important source of the differences with Christianity.

J. Norris Beam's "Communication" examines Nicholas Berdyaev's Christian critique of the negative influence of science and technology on the human spirit. His analysis of the way this played out in the Holocaust is sobering.

Essay Reviews by Richard Bube and J. W. Haas, Jr. head the book review section.

The Future of Medical Science: Ethical and Theological Implications, Part I

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Ethical issues in medical science in the 1990s will be numerous, occur in all disciplines of medicine, and affect all physicians. To discuss future medical ethical issues in a relatively short space, it is tempting to choose one of two extremes. One extreme is to simply catalog all ethical problems arising from new discoveries or emerging technologies, while the other extreme would be to choose one ethical issue as most important and attempt to cover it in depth. In this two-part paper, I have chosen a middle ground, providing some background on five issues in medium depth: (1) euthanasia, (2) fetal tissue transplant, (3) psychiatry and neuroscience (specifically the issues raised by homosexuality), (4) health care costs and the ethics of cost containment, and finally (5) preventive medicine, particularly as it relates to sexually transmitted diseases including AIDS. I hope to supply some background information on these selected issues and to stimulate further reading and research.

Euthanasia

For us to meaningfully discuss euthanasia, the term must be better defined. I would choose to divide the term into four categories: (1) active involuntary, (2) active voluntary, (3) inactive voluntary, and (4) inactive involuntary. Before entering into an argument about euthanasia, it is important to define which type of euthanasia is under discussion.

Active Involuntary Euthanasia

Active involuntary euthanasia is nearly universally opposed by all philosophical viewpoints, except in cases of capital punishment. Precautions should be taken so that those who have committed crimes deserving the death penalty are killed in a humane manner with minimal suffering. The Nazi practice of killing first the infirmed and handicapped, and then the Jews, represents one of the greatest human atrocities on record. Those who hold to the *sacredness* of human life consider it murder to take a human life against that person's wishes simply because a family member or attending physician deems the potential victim does not possess a life that is worth living.

Active Voluntary Euthanasia

Much of the current controversy today has centered on active voluntary euthanasia and active involuntary euthanasia. Active voluntary euthanasia is also appropriately called assisted suicide. Retired Michigan pathologist, Dr. Jack Kevorkian, has attracted national media attention by helping a 54-year-old early Alzheimer patient to commit suicide.

In November 1991, Washington state narrowly defeated Initiative 119 — a referendum that would have legalized medically induced deaths for the terminally ill. Several evangelical and Roman Catholic leaders actively campaigned against this measure. This does not mean, however, that there is a Christian consensus regarding active voluntary euthanasia. A national poll released by the *Boston Globe* reported

This paper was orginally presented at the 1992 ASA Annual Meeting held in Kailua-Kona, Hawaii. This is the first of two parts.

that 71% of Catholics and 49% of born-again Christians said they would vote for Initiative 119 (Duggins, 1992). The Netherlands is the only country where active, voluntary euthanasia is legal. Holland's guidelines are:

- The patient must repeatedly and explicitly express the desire to die.
- The patient's decisions must be well informed, free and enduring.
- The patient must be suffering from severe physical or mental pain with no prospect for relief.
- All other options for care must have been exhausted or refused by the patient.
- Euthanasia must be carried out by a qualified physician.
- The physician must consult at least one other physician.
- The physician must inform the local coroner that euthanasia has occurred. (Horgan, 1991)

Assisted suicide raises many issues, one of which is: Is it ever right for a person to take his or her own life? Voluntary implies that the patient is in his right mind. For years the medical profession has assumed that a suicidal patient is incompetent and has always tried to save these patients from self-inflicted bodily harm. What does one do if the patient changes his mind half way through the suicide procedure? Can our current legal system protect the assisting physician from suits filed by relatives who might have wished their relative to live? What would the availability of a law similar to the Dutch law do to family relationships? Will families pressure elderly parents to accept assisted suicide rather than continue to be a drain on family resources? Once such laws are in place, the government might offer subtle financial incentives to those choosing a less expensive way to die.

Would not this also transform the doctor-patient relationship? The dual healer/killer role would be difficult to balance when a doctor tried to act compassionately in the best interest of the patient. Patients rely heavily on their physician's advice when making decisions regarding therapy. Older, paranoid patients might fail to seek an appropriate medical remedy from an unfamiliar physician because of the fear that this physician might advocate assisted suicide for their condition.

A commonly cited study of euthanasia performed in the Netherlands in 1990 demonstrated that 1.8% of all Dutch deaths in the second half of 1990 were due to euthanasia (Van der Maas, *et al.* 1991). In 0.3% of deaths, the physician assisted the patient in suicide by prescribing drugs. In 0.8% of deaths, the physician performed life-terminating acts without explicit and persistent request. Thus, 2.9% of all Dutch deaths were premature due to a decision by the physician. Patients gave several reasons for requesting physician-assisted death. In only 10% of the cases was pain the sole reason noted. The most frequent reason given was loss of dignity (57%).

In a larger theological and philosophical sense, many patients find the months or years after the diagnosis of a terminal illness to be some of their richest and best. Suffering is not all pointless. Facing terminal illness often allows a person to make peace with God and resolve bitter disputes with family members. It is alarming that in the Dutch experience so many requested suicide because of the loss of dignity. A Christian society should make even the dying feel dignified and wanted. Theologically, the sovereignty of God is to be respected. Active, voluntary euthanasia tries to usurp God's sovereignty. From a pragmatic perspective, the negative societal consequences of legalization outweigh any individual benefit. The Christian Medical and Dental Society and the American Medical Association have adopted resolutions opposing physician assisted suicide. I believe that those who think through this issue will oppose active voluntary euthanasia.

Inactive Voluntary Euthanasia

In inactive voluntary euthanasia, the physician allows the patient to live out the natural history of a terminal disease. This is the purpose of living wills and advance directives. When a patient with heart

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failure refuses a cardiac transplant, or an elderly patient refuses aortic valve replacement for aortic stenosis, or a patient refuses to be intubated and defibrillated when he or she experiences cardiac arrest, they are not committing suicide or devaluing their lives, but rather are living out the natural history of their disease. The role of the physician is first to know the particulars of the patient well and second to understand thoroughly the natural history of the patient's disease. Once this information is available, the physician should discuss frankly with the patient and family the treatments available and how therapy might impact on the natural history of the patient's illness. Once the patient is fully informed, a course of action should be outlined allowing the patient's wishes to be implemented. Allowing the patient to choose a less aggressive treatment program does not mean that the individual has committed passive suicide or denied the sacredness of human life. We need to allow people freedom to limit medical interventions. If we will be honest in discussing our mortality, we can defuse much of the pressure for active, voluntary euthanasia.

We need to allow people freedom to limit medical interventions.

Despite advances in medical technology and the humanist's optimism that individual immortality is on the horizon, careful study of the aging process by geriatric physicians reveals that aging is a complex multisystem failure. Cardiac reserve is decreased by a stiffness of the ventricle that slows the filling of the heart; pulmonary gas exchange and minute ventilation decrease; the skeletal system loses calcium and strength, predisposing it to fractures; and the immune system declines in its ability to resist infection and destroy cancer. Perhaps of greatest concern is the decline in brain function: the ability to learn, and the ability to perform complex functions. A study of a representative sample of 85-year-olds in Gothenburg, Sweden demonstrated that nearly one-third were demented (Skoog, 1993). If we live long enough, each of us will experience a decline in cognitive function.

This response is evident in our reflexes and variability in heart rate response to various stimuli. This variability is directly related to the number of brain cell connections in the brain. The size of brain cells and the number of synaptic connections decline with age (Lipsitz, 1992). This loss of brain connection eventually affects cognition, but before this becomes evident, there is a decline in response to new stimuli, slowing of reflexes, and an inability to form new creative associations. While mental decline can be slowed by active use of the mind, the brain, and the mind with it, are programmed for senescence.

Understanding aging is relevant to euthanasia in that it is important to understand the declining cost-benefit of performing expensive procedures in the elderly. For example, bypass surgery in a patient over seventy is performed with an increased risk of death, an increased risk of complications during hospitalization, and an expected longer recovery period following hospital discharge. If an elderly patient refuses extraordinary measures or declines extensive surgical procedures, this is not equivalent to denying a teenager potentially curative treatment of lymphoma because his parents are Christian Scientists. A mature understanding of the complex process of aging will help save us from simplistic answers to end-of-life decisions. Furthermore, rational understanding of the complex, multifaceted process of aging helps to keep humanistic hopefulness in check.

In science and medicine, we frequently encounter those who believe that a solution to man's mortality is just a few experiments or vitamins away. In actual fact, elimination of cancer and coronary artery disease would only prolong life by a few years. Other diseases of senescence such as dementia, accident, stroke, and pneumonia would quickly kill those spared cancer and atherosclerotic coronary artery disease. Doing what is reasonable to prevent premature aging is laudable, but to accept aging as inevitable is to view man in a proper perspective before God.

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A special case of inactive voluntary euthanasia relates to people with "locked in state." In this condition, the brain and brainstem are intact but because of degenerative neuromuscular disease, severe cerebral palsy, or a severe high spinal cord injury, the patient's movement is confined to facial movements with or without minimal arm movement. The recent court case of *Bouvia v. Riverside General Hospital* concerns a woman with cerebral palsy and quadriplegia who desired to have her feeding tube removed so that she could be allowed to die (Pellegrino, 1989). Although she has won her case in court, she has not chosen to exercise this right.

This small group of patients deserves real compassion and understanding. Many of their desires for death are related to individual depression and discouragement just as they are in the general population. Creating meaningful life for these people through the support of family, church, and the development of biomechanical equipment should give most of these patients the desire to live. Fortunately, this class of patients is relatively small.

Inactive Involuntary Euthanasia

When the patient is comatose or brain impaired and unable to make decisions regarding his therapy, the physician and family must make decisions for the patient. If they elect to withhold treatment and allow the patient's disease to follow its natural course then they are participating in inactive involuntary euthanasia. To understand this area better, several definitions are necessary.

Brain death. There is no evidence for cortical or brainstem function. Life cannot be sustained without a ventilator and major life support systems. Brain death is determined by a bedside examination by a competent neurologist or other physician.

Persistent vegetative state. The patient exhibits these symptoms (1) eyes are open, but the patient is unconscious, (2) spontaneous eye movements but no sustained tracking, (3) inability to follow commands, (4) no "cognitive" response, (5) no "voluntary" language, (6) intact brainstem reflexes and sleep-wake cycles, (7) spontaneous breathing but impaired chewing and swallowing, and (8) bowel and bladder incontinence (Child Neurology Society Ethics Comm., 1991).

Persistent vegetative state can be simply summarized as brainstem function *without* cortical function. The cortex or cerebrum is responsible for association, processing of visual and auditory stimuli and volitional movement. The brainstem controls autonomic functions such as breathing and reflex blinking of the eyes. A person can live with brainstem function alone for years, provided this person is supplied with food (usually through a feeding tube) and basic supportive nursing care to prevent bedsores and infections. As best we can scientifically determine, these people do not have conscious thought.

The subject of euthanasia for each of these two groups of patients is quite different. First, brain death is legal death. It is from these patients that organs are often harvested for transplant. There is no ethical dilemma in discontinuing treatment in this subset of patients.

Persistent vegetative state creates the most difficulty for physicians. This has been the subject of numerous court cases, highlighted by the Quinlan case, which was the first case to reach the Supreme Court. In this case, a 21-year-old was resuscitated after the accidental ingestion of sedatives and alcohol. She remained in a persistent vegetative state until her death ten years later from infection.

Unlike "locked in" state, persistent vegetative state is relatively common, being seen in perhaps 1% of the nursing home patients in this country or 40,000 patients (Spudis, 1991). It is this group of patients that cause the greatest ethical dilemma in the euthanasia controversy. The Christian Medical Society published two articles with contrary opinions on dealing with persistent vegetative state (Schiedermayer, 1992; Pankratz, 1992).

Persistent vegetative state creates the most difficulty for physicians ... When recovery is 1/1000 or less, is it ethical to discontinue treatment?

From a scientific perspective, persistent vegetative state results from brain injury, usually due to head trauma or temporary loss of oxygen supply to the brain, also called anoxic brain injury. Although late recovery from anoxia is possible, there is a diminishing probability of recovery with time. If no recovery is observed by four months, essentially no patient will recover. Following head trauma, late recovery beyond one year is extremely unlikely even in a young person. Clinical testing is of limited value prognostically, but positron emission tomography might yield valuable prognostic data with time (Spudis, 1991). A recent review of persistent vegetative state has summarized the science, highlighting the importance which mechanism of injury, age, and duration of persistent vegetative state have in determining prognosis (Multi-Society Task Force on PVS, 1994).

The ethical dilemma in these patients begins once the probability of recovery is minimal. When recovery is 1/1000 or less, is it ethical to discontinue treatment? Often at this stage the patient is not on a ventilator but dependent on tube feedings to maintain life. Court cases such as the Quinlan, Brophy and Johas cases have centered on discontinuing nutritional support. Given nutritional support and

proper nursing care, these patients may live for years in nursing homes.

Religious opinions regarding discontinuing medical treatment vary greatly even in our culture. Orthodox Jewish opinion is most firmly against any discontinuation of supportive treatment. Catholics generally would "see withholding nutrition or hydration as passive euthanasia and morally offensive if the intention was to directly kill the patient by this means." However, if the intention was to remove the patient from an unusual, gravely burdensome, extraordinary or futile medical intervention, with the foreseen but unintended consequence that death would come more quickly, this would be understood as a legitimate allowing-to-die, and would not be considered euthanasia (Bone, 1990). The problem with this Catholic view is that this can be two different ways of describing the same act.

It is better for us to work on the science and the ethics in [cases of persistent vegetative state] than to have the cases decided in the court.

The mainline Protestant view emphasizes patient autonomy. The pivotal question is, "What would the patient desire to be done if he could participate in the decision?" This follows from the golden rule of treating another as you yourself would like to be treated. In actual practice, it usually allows for the withdrawal of medical intervention since almost all who give advance directives do not wish to continue in persistent vegetative state when the probability of recovery is less than 1%. This approach is pragmatic, but does not deal with the absolute rightness or wrongness of discontinuing nutritional support in a patient with persistent vegetative state.

The second major class of passive involuntary euthanasia relates to infants. The case of "Baby Doe," involving an infant with Down's syndrome and esophageal atresia, is an example of this class. The parents refused to permit corrective surgery, which in this case would connect the esophagus with the stomach, preferring instead to allow the handicapped infant to starve to death. There are now laws to protect such handicapped infants. But is it always wise to do everything possible for every handicapped infant?

I personally am afraid of any stronger laws in this area. The medical circumstances are complex and are not easily covered by law. Hypoplastic left heart disease is a congenital anomaly in which the main pumping chamber of the heart is severely undersized. However, the scientific value of corrective operations on children with this anomaly are regarded as experimental and controversial. They are, without question, expensive. Without an operation or cardiac transplant, infants with this abnormality will die within a few weeks of birth. I believe that it would be wrong to compel parents by law or litigation to have a child with hypoplastic left heart undergo a corrective operation.

To resolve passive, involuntary euthanasia is beyond the scope of this paper. It is better for us to work on the science and the ethics in this area than to have the cases decided in the court. Advanced directives, by which we discuss and give our desires to our relatives and our physicians, are of value. The more concrete we can be in these matters, the more helpful they are. The issue raised by patients in a persistent vegetative state with virtually no hope for recovery should be addressed.

Euthanasia is a very broad term with many different meanings. We can be both for it and against it depending upon which definition is used. Active, involuntary euthanasia as practiced in Auschwitz is clearly murder and is condemned. Active voluntary euthanasia (assisted suicide) creates a great potential for abuse. Christians who think through this issue will very strongly oppose it. There is nothing wrong, however, with living out the natural history of a disease once the patient is informed of the alternatives. There is still no clear consensus on withdrawal of supportive care in persistent vegetative state; sharpening the science may help us define this issue better.

Fetal Tissue Transplant

Use of fetal tissue involves several issues: (1) Is there a high scientific probability that fetal tissue transplant will help patients? (2) If it is proven that fetal tissue is of value, and abortion on demand is considered an unacceptable source, are there sufficient alternative sources of fetal tissue (i.e. tissue from ectopic pregnancies and spontaneous abortions)? (3) Does it make sense to use tissue from abortion on demand? (4) Are there alternative methods that could accomplish the same objective?

Scientific Issues

The scientific answer to the first question raised by fetal tissue transplant is still open. Fetal tissue has been used for pancreatic transplant to insulin dependent diabetics, and fetal brain tissue has been transplanted to the *substantia nigra* of patients suffering from Parkinson's disease. Fetal bone marrow cells have been transplanted to patients with aplastic anemia. Potential applications are nearly limitless: fetal brain tissue injected into the affected area shortly after a stroke might improve neurologic recovery; injecting fetal cardiac cells into a recent myocardial infarction might allow for the regrowth of functional myocardial cells instead of the formation of scar tissue.

The transplantation of fetal brain tissue has been investigated for over 20 years in rats and non-human primates (Quinn, 1990). Transplantation in humans is still too early to judge scientifically (Sladek, 1988). Adrenal allografts were tried prior to fetal transplant. In this technique, the patient's own adrenal tissue was taken from his or her adrenal gland and placed in the brain. This technique has now by and large been abandoned because of questionable efficacy and autopsy findings uniformly demonstrating non-survival of the adrenal tissue. It is, however, theoretically feasible that fetal tissue will work where adrenal tissue failed, because of the ability of the fetal brain tissue to divide and send out dendrites, and because of the low antigenic expression on the cell membrane.

The results to date with using fetal brain tissue transplant to treat Parkinson's disease are mixed. A few dramatic improvements have been reported, but uniform improvement has not been demonstrated. The dramatic cases have occurred in younger patients with Parkinson's disease and in patients with MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine) induced Parkinsonism. These patients have acquired Parkinsonism from the use of MPTP as a recreational drug. Recent publications suggest that patients who receive the most fetal tissue appear to benefit the most (Spencer, 1992; Freed, 1992; Widner, 1992). The most successful transplants have been in young patients with MPTP induced Parkinsonism who have received neuronal tissue from four fetuses.

There are other mechanisms to explain the improvement. Postsurgical breakdown of the blood brain barrier may allow more effective transport of anti-Parkinsonian drugs or regeneration of host brain tissue, as has been demonstrated in animals (Sladek, 1988). The longer term effects of fetal brain transplant have not been studied in humans. There is concern about the effects of fetal tissue if it does continue to grow. Fetal tissue is programmed to grow for two decades, which might result in a graft fetal brain tumor, which could cause obstruction of the ventricles of the brain and cause hydrocephalus, an obstruction to the drainage of cerebral spinal fluid. Hydrocephelus, if unrecognized, can lead to dementia. The immunology of maturing fetal cells is largely unstudied: rejection of fetal tissue might be associated with significant host brain injury (Sladek, 1988). In summary, apart from the ethical issues surrounding the use of fetal tissues, there are unresolved scientific issues regarding the value of fetal tissue transplant.

Source of Fetal Tissue

What about the source of fetal tissue? Can spontaneous abortions and/or ectopic pregnancies supply the fetal tissue necessary for scientific investigation? Spontaneous abortion or miscarriage is recognized in 10-15% of pregnancies. The actual incidence is about 40%; however, very early miscarriages are unrecognized and probably would not be useful for fetal transplant. Of the fetuses analyzed, about 50% of fetuses miscarried in the first three months of pregnancy have chromosomal abnormalities, while only 20% of fetuses miscarried during the second trimester have chromosomal abnormalities. Three viruses (cytomegalovirus, herpes simplex, and rubella), a protozoa (*Toxoplasma gondii*), and a bacteria (*Ureaplasma urealyticum*) have been isolated from spontaneous abortions (Annas, 1989). Screening fetal tissue for chromosomal abnormalities and possible infection would add days and expense to fetal tissue harvest.

Further complicating the use of spontaneous abortion tissue is the tissue's passage through the vagina, which contaminates the fetal tissue with bacteria. Tissue viability is also at issue, since during the spontaneous delivery process the fetus suffers anoxic injury. The very controlled method of harvesting tissue from induced, elective abortion which can sterilely obtain tissue from largely healthy fetuses, has every potential advantage over fetal tissue that was harvested from randomly occurring spontaneous abortions (Brundin, 1990).

Moreover, induced abortions are relatively concentrated at abortion clinics, allowing for the harvest of many fetuses in a single day. Spontaneous abortions occur at home and in a random distribution of hospitals and clinics at all hours of day and night.

It is felt that to obtain enough tissue for transplant, multiple fetal donors are necessary; the most suc-

cessful fetal neural transplantations for Parkinson's disease require four fetuses (Widner, *et al.*). These can be easily obtained from an abortion clinic. The logistics of obtaining four fetuses of similar age from spontaneous abortions within 1-2 days are awesomely complicated. Thus, for all the above reasons spontaneous abortion does not appear to be a reasonable method for obtaining fetal tissue for transplant.

Surgical harvest affords a sterile method perhaps even superior to that of elective induced abortions.

Ectopic pregnancies hold some theoretical advantages over spontaneous abortions as a method for fetal tissue harvest. Ectopic pregnancy usually occurs in the fallopian tube. Although the fertilized egg can implant and develop normally, its growth cannot be sustained because of the small diameter of the tube. Typically, by 8-12 weeks of development, distension of the fallopian tube results in abdominal pain. Surgical removal of the fetus is then indicated to preserve the life of the mother. Use of this tissue for possible fetal transplant poses no ethical problem since the fetus cannot be carried to maturation. This tissue, unlike spontaneous abortion, is not likely to be infected or have chromosomal abnormalities. Surgical harvest affords a sterile method perhaps even superior to that of elective induced abortions. Ectopic pregnancies are increasingly frequent, with 78,400 occurring in 1985. Kathleen Nolan, a pediatrician-ethicist from the Hastings Center in Washington, D.C., has argued that there is sufficient fetal tissue available from this source to supply fetal transplant research needs (Post, 1991). There are, however, technical problems with the use of fetal tissue from ectopic pregnancy.

First, women whose ectopic pregnancies are diagnosed late may have suffered a tube rupture, damaging the fetus in the process. Second, even if the tube remains intact, there can be significant injury to the fetus from anoxia. Third, many women are diagnosed shortly after they have missed their period. If a woman's pregnancy test is positive and an ultrasound shows no fetus in the uterus, an early ectopic pregnancy is diagnosed. The patient (and fetus) are given a large dose of an antimetabolite, methotrexate, and fetal death occurs. This necrotic fetus will be absorbed or passed down the fallopian tube, eliminating the need for a surgical procedure and, therefore, the possibility of fetal harvest.

Anoxic injury and early treatment of ectopic pregnancy using antimetabolites will considerably reduce the number of fetuses available for harvest. However, there would still be a significant number of suitable ectopic fetuses available.

The problems of multiple sites and random presentation are similar to those of solid organ transplant, and might be solved if there were a commitment to obtain fetal tissue in this manner. Preservation of fetal tissue is also an issue. For the brain transplant in the rat model, the tissue must be used in 5 days to optimize growth in the recipient. It is naturally more expensive and more difficult to obtain tissue in this manner, but it is ethically acceptable. This method could supply enough tissue for pilot trials in major medical centers. If fetal transplant were demonstrated to be useful for a variety of conditions, demand for fetal tissue could easily exceed the supply, creating a problem similar to that experienced with solid organ transplants. Ethical issues would be more sharply defined and the pressure to use tissue from induced abortions greater if it could be positively demonstrated that fetal tissue transplant had definite benefits.

The National Institutes of Health (NIH), under the Bush administration, issued a request for proposals for the establishment of a national fetal tissue transplant bank utilizing fetal tissues from ectopic pregnancies, spontaneous abortions, and stillbirths. Critics have claimed this program is not worthwhile (Garry, 1992). As of early 1993, however $6 million had been awarded to five centers to establish these tissue banks. The future and relevance of these tissue banks is in question following the Clinton administration's decision to lift the ban on fetal tissue transplant.

The Use of Tissue from Elective Abortions

Does it make sense to use tissue from induced abortion? If there were no question about the morality of induced abortions, the transplant researcher would be likely to choose tissue from induced abortions. The abundance of tissue available and the convenience of daily elective procedures make this method optimal in many ways. Proposals for improving tissue harvest at no increased risk to the mother are also under consideration.

The 21-member NIH Human Fetal Tissue Transplantation Research Panel (established in 1988) chose to separate the issue of the morality of induced abortions from the use of fetal transplant. They did provide ethical guidelines for obtaining tissue from

induced abortions that, if enforced, would eliminate several areas of potential abuse:

> (a) The decision to terminate a pregnancy and the procedures of abortion should be kept independent from the retrieval and use of fetal tissue.
>
> (b) Payments and other forms of remuneration and compensation associated with the procurement of fetal tissue should be prohibited, except payment for reasonable expenses occasioned by the actual retrieval, storage, preparation, and transportation of the tissues.
>
> (c) The decision and consent to abort must precede discussion of the possible use of the fetal tissue and any request for such consent as might be required for that use.
>
> (d) The pregnant woman should be prohibited from designating the transplant-recipient of the fetal tissue.
>
> (e) Anonymity between donor and recipient should be maintained, so that the donor does not know who will receive the tissue, and the identity of the donor is concealed from the recipient and transplant team.
>
> (f) The timing and method of abortion should not be influenced by the potential uses of fetal tissue for transplantation or medical research (Consultant to the Advisory Committee to the Director of the National Institutes of Health, 1988).

These guidelines attempt to morally isolate the issue of fetal transplantation from the morality of elective induced abortion. That is to say, even if abortion on demand is wrong, using these guidelines should prevent a second wrong from occurring. This issue sidesteps a major unresolved moral question of the late 20th century — is abortion on demand wrong? Can the use of fetal tissue, in fact, be isolated from the morality of abortion on demand?

To bolster the argument that the issues are separate, defenders of the panel's view have argued that a cardiac transplant surgeon who transplants a heart from a brain dead murder victim is not an accomplice to the murder, nor does transplant of this heart increase the probability of murder in society. He is only making the best of a tragedy. This analogy has limitations. It is more accurate to consider the following one.

Suppose a famous cardiac transplant surgeon is summoned to South America to aid in the care of a dictator who is dying of heart failure. Upon arrival, the surgeon learns that there is no method established for organ procurement but histocompatibility testing is done well. After consulting with members of the local surgical team, the surgeon learns that a harvest is planned from a member of the country's Olympic team. Prior to its arrival, the Olympic team was screened. A young sprinter was shown to be a four antigen match with the dictator. The sprinter has now been summoned to the hospital and is being put to sleep on the pretext that an abnormality on his blood screening requires a surgical exploration. The transplant team awaits the approval of the guest surgeon to begin the harvest.

Alternatively, the transplant surgeon comes to South America to aid the dictator dying of heart failure. Again there is no organized method of donor procurement but this dictator was deeply loved throughout his country. When the men on death row at the National Penitentiary learned of their leader's plight, they asked if one of them could donate their heart on the day of their scheduled execution. A young healthy prisoner is a four antigen match to the dictator. He is about to be put to sleep. Again the transplant team awaits the approval of the guest surgeon to begin.

Trying to bring good from abortion on demand ennobles it.

Because the transplant surgeon knows the source of the donor heart, he is morally accountable. Fetal tissue transplant surgeons similarly have a linkage with abortion on demand. While they may argue that these abortions are occurring anyway and they are only trying to bring some good from an evil or morally neutral act, the reality is that abortion on demand need not occur. Trying to bring good from abortion on demand ennobles it. If fetal tissue grafts are successful, it would create a new constituency of patients, families, and a medical industry complex anxious to see abortion on demand perpetuated.

Although the law may prevent counseling physicians from advising a pregnant teenager who is considering abortion about the potential good from fetal tissue transplant, it cannot stop family members and boyfriends from using this argument. In this regard, we must agree with bioethicist Carson Strong when he says that the morality of abortion and the use of fetal tissue for transplant are linked (Strong, 1991).

Even if the majority of the twenty-one members of the NIH panel believe that the two issues are not linked, the vast majority of members of the pro-

life movement in America believes that they are. When Halifax Hospital in Nova Scotia performed the first fetal brain transplant for Parkinson's disease, there were strident objections from pro-life groups, on the grounds of the familiar slippery slope argument (Jones, 1992).

The political reality is that the morality of abortion on demand and the use of fetal tissue is linked in the minds of a significant portion of Americans. This is the reason that the ban on federal funds for fetal tissue transplant remained in effect during the Bush administration.

Until the personhood issue of the early fetus can be resolved, i.e., until a definite answer to when life begins is resolved, the use of fetal tissue for transplantation will remain controversial. It is ethically indefensible for four young lives to be taken so that one Parkinson's disease patient might receive some temporary relief of his symptoms. The only rational defense is to declare the young fetuses non-persons.

Alternatives to Fetal Tissue Transplant

Are there alternatives to fetal transplants? It is beyond the scope of this paper to explore all alternatives to every proposed form of fetal transplant. However, for Parkinson's disease, as for other proposed forms of fetal tissue transplant, several alternative therapies exist. First, there are other forms of autologous transplants. Although adrenal tissue transplant in its current form has not been shown to be successful, it might be possible for specially modified adrenal or carotid body cells multiplied through a cell culture with certain trophic factors to be suitable for transplant.

Pharmacologic research has shown that deprenyl (selegiline) can slow the progression of Parkinson's disease (Parkinson study group, 1989), and can decrease cell loss in the substantia nigra (an area of the brain affected by cell loss in Parkinson's disease). Vitamin E may also act synergistically with deprenyl to slow neural loss in Parkinson's disease (Gilman, 1992). When directly infused on neuronal tissue, brain-derived neurotrophic factors can prevent neuronal degeneration. Studies of local trophic factors and mechanisms to induce them locally or implant them in a sustained release form in local areas of the brain might suggest ways to alleviate symptoms (Hyman, 1991; Otto, 1990).

Most analogous to fetal transplant is the use of fetal neurons derived from cell cultures. Assuming the initial fetal cells were obtained in an ethically acceptable means (such as from an ectopic pregnancy), the use of cultured fetal cells might yield a more predictable source of transplant for Parkinsonian patients. Interestingly, it is the legal and financial issues of ownership of the fetal culture that have inhibited growth in this area.

There are a number of possibilities dealing with the issues raised by fetal tissue transplant, and several possible areas for further research. The scientific issue of the efficacy of fetal tissue transplant needs to be carefully studied and patients must be monitored for long-term problems related to this method of treatment. The availability and feasibility of using fetal tissue from ectopic pregnancies need to be investigated. It is possible that there might be enough tissue for research centers to begin pilot work. Presently, there is no scientific basis for widespread application of fetal tissue transplant. Alternative research needs to be explored and encouraged through laws defining ownership of fetal cultures.

Conclusion and Perspective

Beyond the scientific issue, there are important political perspectives. Is it right to spend tax dollars for research that a significant percentage of Americans consider immoral? If this research is so valuable, why can't the worth be shown from privately funded investigations? If our society is careful not to fund studies that might have racial overtones, why do they feel so free to use public funds for studies that might be repulsive to many committed Christians?

We do not allow the transplantation of organs from executed criminals, in part because this would offend those opposed to capital punishment and in part because of concerns that this might sway a judge or jury to recommend the death penalty over imprisonment. If we are as a society to be sensitive to the concerns of those opposed to capital punishment, should not similar concerns be afforded to those who oppose abortion on demand? Justice would dictate waiting on fetal transplant until the issue of abortion on demand is resolved. Federal funding for such experimentation should be deferred. There are other morally acceptable ways to help persons suffering with Parkinson's disease. *

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On The Origin of Stasis By Means of Natural Processes

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"I am well aware that there is scarcely a single point discussed in this volume on which facts cannot be adduced, often apparently leading to conclusions directly opposite to those at which I have arrived. A fair result could be obtained only by fully stating and balancing the facts on both sides of each question, and this cannot possibly be done here." (Charles Darwin, The Origin of Species, *1859)*

Charles Darwin was well aware that scientists could come to directly opposite conclusions from those set forth in his *Origin of Species*. Although his theory could account for minor evolutionary change and the diversity of finches, Darwin knew that he had to virtually ignore the natural history of life on earth in order to maintain any hope of accounting for the origin of the phyla and the major disparity between arthropods and anthropologists.

Darwinian theory is in conflict with the most prominent features of earth's natural history. First of all, geology does not provide the transitional forms Darwin's theory demands. In 1859, the conflict with paleontology was the most serious objection to the theory and over the years the gap between data and theory has only grown wider. Today scientists acknowledge fewer transitional forms than Darwin thought existed. Species typically arise suddenly and "fully formed."

The second conflict between Darwinism and natural history is the phenomenon of stasis. Geology reveals the stability of forms rather than their gradual transformation into substantially different body plans. The stability of the higher taxa in particular suggests the existence of natural processes which prevent major evolutionary change from occurring on a gradual step-by-step basis.

Finally, the pervasive pattern of geologic succession is systematically backwards from that predicted by the theory. Darwinian theory predicts that the gradual accumulation of minor evolutionary change and the increasing diversity of the lower taxa should ultimately produce the profound differences among the major body plans and the disparity of the higher taxa. Diversity should precede disparity. Geologic succession reveals the opposite: disparity precedes diversity. The major themes or body plans appear suddenly in the history of life only to be followed by variations on these pre-existing themes. The natural history of life on earth is systematically top to bottom, not bottom to top as Darwinian theory predicts.

Had Darwin developed a theory to explain the empirical data of natural history, he should have come to directly opposite conclusions. He should have developed a theory to explain why species do not gradually transform into substantially different body plans on a gradual step-by-step basis. The phenomenon of stasis and the stability of the major body plans is based upon an abundance of data and our theories describing the natural world should explain that data. The empirical evidence suggests the need to develop a theory which is based upon natural history rather than one which must explain away its key features. Although neo-Darwinian theory

helps to explain minor evolutionary change, a theory of "macrostasis" needs to be developed that explains the stability of the major body plans.

Conflicts Between Darwin and Paleontology

Darwin saw evolution as a slow and stately process. He pictured organisms gradually transforming from one species into another over immense spans of time. Evolution, he believed, had to occur through "infinitely numerous transitional links" forming "the finest graduated steps." Darwin was a strict adherent of gradualism and the notion that "nature does not make leaps." He spelled this out very clearly in his *Origin of Species*:

> If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous successive slight modifications, my theory would absolutely break down (Darwin, 1859, p. 219).

There was one major stumbling block to this view of life: the fossil evidence. In a chapter entitled "On the Imperfection of the Geological Record," he readily admits:

> ... The number of intermediate varieties, which have formerly existed on the earth, (must) be truly enormous. Why then is not every geological formation and every stratum full of such intermediate links? Geology assuredly does not reveal any such finely graduated organic chain; and this, perhaps, is the most obvious and gravest objection which can be urged against my theory (Darwin, 1859, p. 292).

Despite the serious problems the geologic evidence presented, Darwin believed that the passage of time would reveal the enormous number of transitional forms his theory demanded. However, such was not to be the case. David Raup, former curator of geology at Chicago's Field Museum of Natural History, put it this way:

> Well, we are now about 120 years after Darwin, and knowledge of the fossil record has been greatly expanded ... ironically, we have even fewer examples of evolutionary transition than we had in Darwin's time. By this I mean that some of the classic cases of Darwinian change in the fossil record, such as the evolution of the horse in North America, have had to be discarded or modified as a result of more detailed information ... (Raup, 1979).

The paleontological case against gradualism was serious in Darwin's day and time has only made matters worse. Stephen Jay Gould, professor of geology and paleontology at Harvard University, explains:

> The history of most fossil species include two features particularly inconsistent with gradualism:
>
> 1) Stasis – most species exhibit no directional change during their tenure on earth. They appear in the fossil record looking much the same as when they disappear; morphological change is usually limited and directionless;
>
> 2) Sudden appearance – in any local area, a species does not arise gradually by the steady transformation of its ancestors; it appears all at once and 'fully formed' (Gould, 1977).

Gould honestly admits that the neo-Darwinian synthesis is not supported by the fossil evidence and "is effectively dead, despite its persistence as textbook orthodoxy" (Gould, 1980).

Although stasis is the dominant feature of the history of life, exceptions to the general pattern of stasis can be cited. Examples of transitional series can be found at lower taxonomic levels. At higher taxonomic levels, however, transitional sequences range from scarce to non-existent. Evidence of gradualism between phyla, classes, and even orders is either non-existent or is much disputed. Certainly, no pervasive pattern of gradualism exists. George Gaylord Simpson acknowledged this decades ago as he described the situation in these terms:

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> This is true of all thirty-two orders of mammals ... The earliest and most primitive known members of every order already have the basic ordinal characters, and in no case is an approximately continuous sequence from one order to another known. In most cases the break is so sharp and the gap so large that the origin of the order is speculative and much disputed ...
>
> This regular absence of transitional forms is not confined to mammals, but is an almost universal phenomenon, as has long been noted by paleontologists. It is true of almost all classes of animals, both vertebrate and invertebrate ... it is true of the classes, and of the major animal phyla, and it is apparently also true of analogous categories of plants (Simpson, 1944).

Recent research on the origin of the higher taxa confirms what paleontologists have known for decades.

> Taxa recognized as orders during the (Precambrian-Cambrian) transition chiefly appear without connection to an ancestral clade via a fossil intermediate. This situation is in fact true of most invertebrate orders during the remaining Phanerozoic as well. There are no chains of taxa leading gradually from an ancestral condition to the new ordinal body type. Orders thus appear as rather distinctive subdivisions of classes rather than as being segments in some sort of morphological continuum (Valentine, Awramik, Signor, and Sadler, 1991).

The origin of classes and phyla constitute an even greater difficulty for neo-Darwinian theory. Compounding the problem is the small window of time available for the origin of the vast majority of phyla. Recent research has squeezed "Biology's Big Bang" down to a few million years. (See Kerr, 1993 and Bowring *et al.*, 1993.) When one compares the period of time it has taken Darwinian processes to modify the beak of a finch with the period of time virtually all of the major body plans appeared in the Cambrian explosion, it becomes difficult to believe that a gradual accumulation of microevolutionary changes had much at all to do with the origin of the higher taxa.

Darwinian evolution predicts the regular presence of transitional forms. The fossil record reveals their regular absence. It also reveals a natural phenomenon which, until recently, was virtually ignored by paleontologists. That phenomenon is stasis. The tragedy of Darwinism is that it has impeded the progress of science by turning the attention of biologists and paleontologists away from the empirical data and distracting them from developing theories which explain the pervasive natural phenomenon of stasis. For over 130 years, scientists working within the Darwinian paradigm have attempted to develop theories to explain data which, on the macro level, do not exist (See Figure 1).

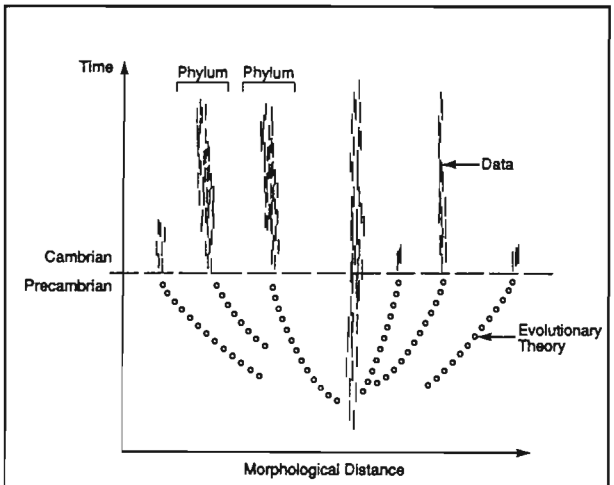

Fig. 1: Darwinian Theory vs. The Fossil Record

Darwinian theory attempts to explain the common ancestry of all species through the gradual transformation of major body plans. This theory is in opposition to the fossil evidence and the pervasive patterns of natural history.

An estimated 75 to 100 phyla appear explosively at the base of the Cambrian. Fossil evidence suggesting their common ancestry is not found in Precambrian rocks. A general theory of macrostasis is needed to explain the fossil data and the stability of the higher taxa.

Writing in the introduction to the 1956 reissue of the *Origin of Species*, W.R. Thompson commented:

> The success of Darwinism was accompanied by a decline in scientific integrity. This is already evident in the reckless statements of Haeckel and in the shifty, devious and histrionic argumentation of T. H. Huxley ...
>
> To establish the continuity required by the theory, historical arguments are invoked even though historical evidence is lacking. Thus are engendered those fragile towers of hypotheses based on hypotheses, where fact and fiction intermingle in an inextricable confusion (Thompson, 1956).

The fossil data clearly show patterns of stasis rather than of major evolutionary sequences and it is this phenomenon to which scientists must turn their attention. As Niles Eldredge and Stephen Jay Gould put it: "Stasis is data" (Gould, 1991). Scientists cannot afford to lose sight of this abundant historical

evidence. Gould recently described the importance of understanding stasis in these terms:

> ... we must understand that nothing happens most of the time — and we don't because our stories don't admit this theme — if we hope to grasp the dynamics of evolutionary change. (This sentence may sound contradictory, but it isn't. To know the reasons for infrequent change, one must understand the ordinary rules of stability.) The Burgess Shale teaches us that, for the history of basic anatomical designs, almost everything happened in the geological moment just before, and almost nothing in more than 500 million years since (Gould, 1988).

It is entirely conceivable that natural processes alone are insufficient to overcome what Gould has referred to as "the ordinary rules of stability." Kurt Wise, a former doctoral student of Gould, has suggested that there might be at least four distinct levels of stasis: molecular-level, population-level, species-level, and higher taxon-level stasis. Although Wise believes that the first three levels of stasis are violable, he points out that there may be a mechanism preventing change in higher taxa which is inviolable. Rejecting Gould's metaphysical assumptions, Wise concludes that natural processes probably exist which prevent major evolutionary change from transforming the baramin, or originally created kinds, into significantly different body plans:

> It is probably only the stasis on the level of higher taxa which is both valid and differs qualitatively from the other levels of stasis. Only higher taxa lack demonstrable evidence of change ... Higher taxon-level stasis could conceivably be the result of what might be called *Baraminic Stasis* — the permanent constraint of organisms under natural conditions to stay within the bounds of their baramin (Wise, 1991).

The concept of the baramin is synonymous with the concept of the "created kind" and is anathema to scientists who believe that the origin and diversity of life must be attributed to purely mechanistic processes. The goal of science, however, should not be to develop a naturalistic "creation account" in an attempt to explain the origin and diversity of all life by purely materialistic means. Instead, the goal of science should be to most accurately describe the pervasive patterns and phenomena found in nature even if those natural processes prevent major evolutionary change from occurring. Science needs a diversity of ideas unencumbered by philosophical naturalism. Scientists need a theory to explain the phenomenon of higher taxon-level stasis and a theory to explain why species do not appear to gradually evolve into something substantially different.

Conflicts Between Darwin and Geological Succession

Prior to the time *The Origin of Species* was written, the geologic time scale in its modern form was already fully developed. In fact, the time scale based on fossils was built by geologists who were creationists (Raup, 1981). Scientists of Darwin's day did not equate geologic succession with evolution, nor should we today. One reason is that geological succession does not reveal *how* new species came into existence, it only reveals *when*. Another reason is that the order of appearance found in the fossil record is, as a general rule, systematically backwards from the major predictions of Darwinian theory.

Geological succession is often looked upon as primary evidence for the fact of evolution. Amoebas appear before fish, and fish before philosophers. In the popular view, this succession from simple to complex is evidence for evolution. Geological succession, however, does not necessarily proceed from simple to complex. For example, trilobites, among the most advanced of the arthropods, are the first arthropods to appear in the geological record. Darwin lamented over the complexity of the vertebrate eye, confessing that

> to suppose that the eye ... could have been formed by natural selection, seems, I freely confess, absurd in the highest possible degree (Darwin, 1859, p. 217).

Yet some scientists believe that the schizochroal eyes of some trilobites possessed the most sophisticated optical systems ever utilized by any organism (Levi-Setti, 1975). David Raup has stated that the trilobites

> ... used an optical design which would require a well trained and imaginative optical engineer to develop today ... (Raup, 1979).

The early metazoans were anything but simple. The complexity of the early metazoans, however, is but a wrinkle in the irony of Darwinism. The real irony lies in the general systematic order of appearance of the taxa in the fossil record.

Life is far too complex for our theories to predict the specific body plans which should come into existence as the result of evolution. Both Darwinian gradualism and punctuated equilibrium, however, predict that a systematic branching pattern should be evident if all life has arisen from a common ancestor (see Figures 2 and 3). Both of these models are based upon relatively small intra- or inter-species change and, therefore, predict that numerous tran-

sitional species must come into existence which gradually diverge to produce the disparity of the higher taxa. Both models predict that as new species emerge and morphological distance between them increases, new genera and eventually new families should appear. As increasing diversity occurs, new orders, new classes, and ultimately new phyla should come into existence. In short, diversity should precede disparity. The gradually increasing diversity of the lower taxa should ultimately result in the disparity of the higher taxa and the appearance of major new body plans. The pattern of geological succession predicted by both of these evolutionary theories is from bottom to top: species to genera to families to orders to classes to phyla.

The pervasive pattern of geological succession is contrary to these theories (see Figure 4). Disparity precedes diversity. The initial appearance of virtually all phyla occurs with very low species diversity. The origin of the major body plans is not the result of the increasing diversity of the lower taxa; the general pattern is not bottom to top. Rather, the dominant pattern is top to bottom, contrary to theory. As paleontologists Douglas Erwin, James Valentine, and John Sepkoski describe the situation:

> The fossil record suggests that the major pulse of diversification of phyla occurs before that of classes, classes before that of orders, and orders before families. This is not to say that each higher taxon originated before species (each phylum, class, or order contained at least one species, genus, family, etc. upon appearance), but the higher taxa do not seem to have diverged through an accumulation of lower taxa (Erwin, Valentine, and Sepkoski, 1988).

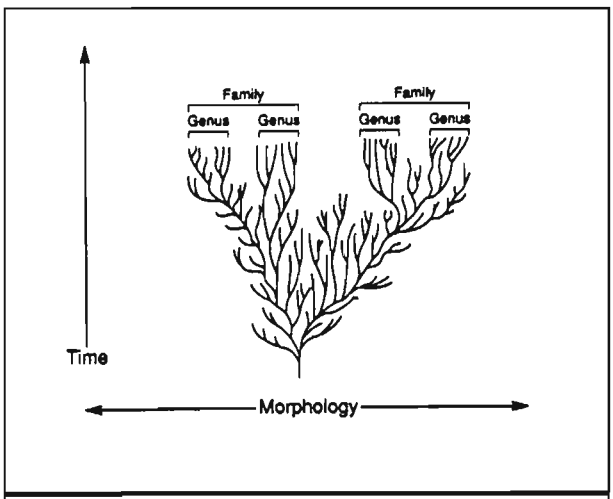

Fig. 2: Phyletic gradualism

Continuously gradual transformation of species. Model predicts that the increasing diversity of the lower taxa should precede the disparity of the higher taxa.

In another article, Valentine and Erwin review hypotheses regarding the mode of origin of animal body plans to determine their consistency with the fossil evidence. They conclude that both Darwinian gradualism and punctuated equilibrium are inadequate to account for the appearance of invertebrate body plans and their major modifications:

> The models we consider are of three sorts: those that extrapolate processes of speciation to account for higher taxa via divergence, those that invoke selection among species, and those that emphasize that many higher taxa originated as novel lineages in their own right, not only as a consequence of species-level processes. It is in this latter class of model that we believe the record favors (Valentine and Erwin, 1985, p. 71).

If large populations have gradually evolved, there should be unmistakable evidence in the fossil record, yet it is simply not found.

> ... many of the large populations should have been preserved, yet we simply do not find them. Small populations are called for, then, but there are difficulties here also. The populations must remain small (and undetected) and evolve steadily and consistently toward the body plan that comprises the basis of a new phylum (or class). This is asking a lot. Deleterious mutations would tend to accumulate in small populations to form genetic loads that selection might not be able to handle. Stable intermediate adaptive modes cannot be invoked as a regular feature, since we are then again faced with

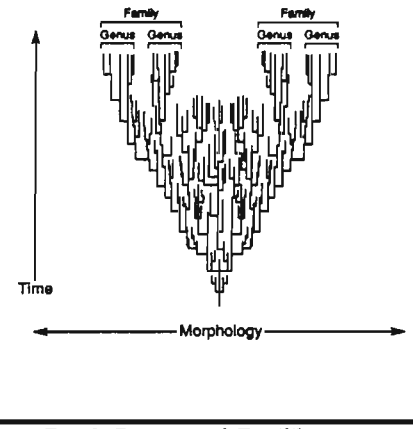

Fig. 3: Punctuated Equilibrium

Evolutionary change is confined to shorter time spans and small isolated populations to account for the lack of transitional forms among lower taxa. Lower taxon-level punctuations still require numerous transitional steps to produce the disparity of the higher taxa. Model predicts that the increasing diversity of the lower taxa should precede the disparity of the higher taxa.

the problem of just where their remains are. We might imagine vast arrays of such small populations fanning continually and incessantly into adaptive space. Vast arrays should have produced at least some fossil remains also. Perhaps an even greater difficulty is the requirement that these arrays of lineages change along a rather straight and true course — morphological side trips or detours of any frequency should lengthen the time of origin of higher taxa beyond what appears to be available. Why should an opportunistic, tinkering process set on such a course and hold it for so long successfully among so many lineages?

We conclude that the extrapolation of microevolutionary rates to explain the origin of new body plans is possible, but does not accord with the primary evidence (Valentine and Erwin, 1985, pp. 95, 96).

The model of punctuated equilibrium or species selection attempts to account for the lack of evidence by relying primarily on the evolution of small isolated populations which would have a diminished chance of leaving a fossil record. This scenario has its difficulties, however, as Valentine and Erwin point out:

The required rapidity of the change implies either a few large steps or many and exceedingly rapid smaller ones. Large steps are tantamount to saltations and raise the problems of fitness barriers; small steps must be numerous and entail the problems discussed under microevolution. The periods of stasis raise the possibility that the lineage would enter the fossil record, and we reiterate that we can identify none of the postulated intermediate forms. Finally, the large numbers of species that must be generated so as to form a pool from which the successful lineage is selected are nowhere to be found. We conclude that the probability that species selection is a general solution to the origin of higher taxa is not great, and that neither of the contending theories of evolutionary change at the species level, phyletic gradualism or punctuated equilibrium, seem applicable to the origin of new body plans (Valentine and Erwin, 1985, p. 96).

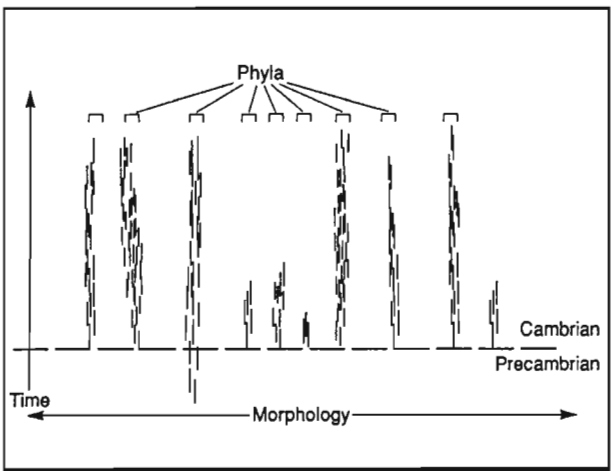

Fig. 4: The Fossil Evidence

Contrary to both Darwinian gradualism and punctuated equilibria theory, the vast majority of phyla appear abruptly with low species diversity. The disparity of the higher taxa precedes the diversity of the lower taxa.

This evidence further substantiates the proposition that minor lower-level evolutionary change cannot be extrapolated to account for major evolutionary change. This appears to be true for the both the tortoise and the hare, Darwinian gradualism and punctuated equilibrium. The tortoise is far too slow to account for the fossil evidence and the hare spends far too much time in stasis.

Darwin admitted that the geological evidence was the "most obvious and gravest objection which can be urged against my theory."

Darwin admitted that the geological evidence was the "most obvious and gravest objection which can be urged against my theory." At the time, he was primarily concerned with the lack of transitional forms in the fossil record. Today, those concerns are compounded by fewer transitional forms than Darwin had in his day, and by the systematically upside-down order of geological succession. Darwin was ironically prophetic in stating that the facts can lead to conclusions directly opposite to those at which he arrived.

Roger Lewin further describes the origin of most major body plans in the *Science* Research News report, "A Lopsided Look at Evolution":

Described recently as "the most important evolutionary event during the entire history of the Metazoa," the Cambrian explosion established virtually all the major animal body forms — Bauplane or phyla — that would exist thereafter, including many that were 'weeded out' and became extinct. Compared with the 30 or so extant phyla, some people estimate that the Cambrian explosion may have generated as many as 100. The evolutionary innovation of the Precambrian/Cambrian boundary had clearly been extremely broad: "unprecedented and unsurpassed," as James Valentine of the University of California, Santa Barbara, recently put it (Lewin, 1988).

Lewin then asked the all important question: "Why, in subsequent periods of great evolutionary activity when countless species, genera, and families arose, have there been no new animal body plans produced, no new phyla?" (Lewin, 1988). If neo-Darwinian theory is true, why should the Cambrian contain a greater number of body plans than exist today, particularly with such low species diversity? Figures 5 and 6 graphically illustrate the situation.

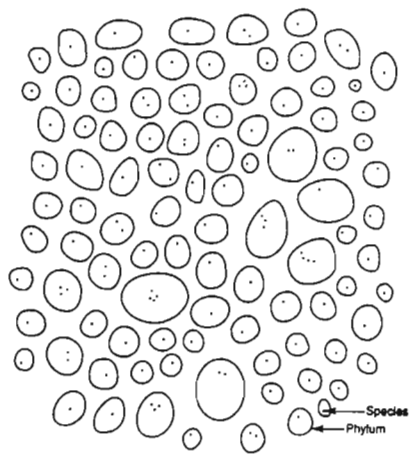

Fig. 5: The Cambrian Explosion

The sudden appearance of nearly 190 disparate body plans with extremely low species diversity supports the conclusion that neither gradual Darwinian evolution nor lower taxon-level punctuations can account for the origin of the higher taxa and the major body plans. In the history of life on earth, disparity typically precedes diversity.

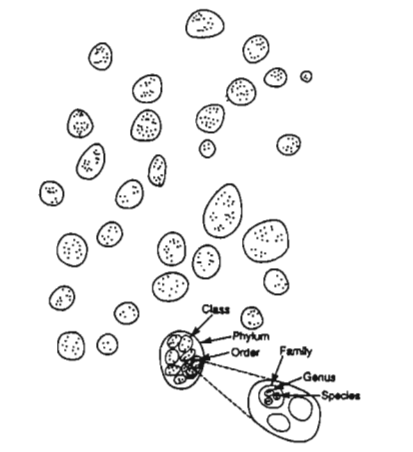

Fig. 6: The Present

"We may acknowledge a central and surprising fact of life's history — marked decrease in disparity followed by an outstanding increase in diversity within the few surviving designs."

Lewin's question leads us to an even more important question. What mechanisms have prevented major evolutionary change from occurring over the past 500 million years? Why did the origin of the phyla appear to have stopped first, followed by classes and then orders?

One rather convincing explanation that has been offered for the pattern is based upon the fact that any major novelty that arises relatively quickly through non-selective processes is likely to be poorly adapted. The more novel the body plan is, the more susceptible it will be to elimination by competition and, therefore, the more adaptive space will be required for it to become established. In short, competition tends to inhibit the establishment of higher taxa. Natural selection tends to inhibit major evolutionary change.

On The Origin of Stasis by Means of Natural Selection

Charles Darwin made the concept of major evolutionary change plausible by convincing scientists that natural selection could account for the appearance of design in nature (Horan, 1979). He would never have considered evolution to be a fact without a plausible theory of how it could occur. The very title of his book reflects the importance of an evolutionary mechanism. Although much evidence has been cited in favor of macroevolution, as it had been prior to 1859, such evidence in Darwin's own opinion would be unsatisfactory without a mechanism:

> In considering the Origin of Species, it is quite conceivable that a naturalist, reflecting on the mutual affinities of organic beings, on their embryological relations, their geographical distribution, geological succession, and such other facts, might come to the conclusion that each species had not been independently created, but had descended, like varieties, from other species. Nevertheless, such a conclusion, even if well founded, would be unsatisfactory, until it could be shown how the innumerable species inhabiting this world have been modified, so as to acquire that perfection of structure and coadaptation which most justly excites our admiration (Darwin, 1859, p. 66).

In considering the origin of phyla and the stability of the major body plans, it is quite conceivable that scientists, reflecting upon the empirical evidence of the history of life on earth, might come to the conclusion that mechanisms exist which prevent major evolutionary change from occurring on a gradual step-by-step basis. Stasis is a fact of life and mecha-

nisms must exist which account for it. Ironically, natural selection itself may play a major role in the phenomenon of higher taxon-level stasis.

Darwin was not without his critics. In his book, *Darwinism: The Refutation of a Myth*, Soren Lovtrup points out that "some critics turned against Darwin's teachings for religious reasons, but they were a minority; most of his opponents ... argued on a completely scientific basis." He goes on to explain:

> ... the reasons for rejecting Darwin's proposal were many, but first of all that many innovations cannot possibly come into existence through accumulation of many small steps, and even if they can, natural selection cannot accomplish it, because incipient and intermediate stages are not advantageous (Lovtrup, 1987).

Perhaps the most formidable of Darwin's critics was St. George Mivart. His major book, *On the Genesis of Species*, took aim at the notion that natural selection could account for the accumulation of the incipient stages of useful structures (Mivart, 1871). Stephen Jay Gould notes that

> Darwin offered strong, if grudging, praise and took Mivart far more seriously than any other critic .... Mivart gathered, and illustrated "with admirable art and force" (Darwin's words), all objections to the theory of natural selection — "a formidable array" (Darwin's words again). Yet one particular theme, urged with special attention by Mivart, stood out as the centerpiece of his criticism. It remains today the primary stumbling block among thoughtful and friendly scrutinizers of Darwinism. No other criticism seems so troubling, so obviously and evidently "right" (against a Darwinian claim that seems intuitively paradoxical and improbable).
>
> Mivart awarded this criticism a separate chapter in his book, right after the introduction. He also gave it a name, remembered ever since. He called it, "The Incompetency of 'Natural Selection' to account for the Incipient Stages of Useful Structures." If this phrase sounds like a mouthful, consider the easy translation: we can readily understand how complex and full developed structures work and owe their maintenance and preservation to natural selection — a wing, an eye, the resemblance of a bittern to a branch, or of an insect to a stick or a dead leaf. But how do you get from nothing to such an elaborate something, if evolution must proceed through a long sequence of intermediate stages, each favored by natural selection? You can't fly with 2% of a wing or gain much protection from an iota's similarity with a potentially concealing piece of vegetation. How, in other words, can natural selection explain these incipient stages of structures that can only be used (as we now observe them) in much more elaborated form (Gould, 1985)?

Gould goes on to point out that among the difficulties of Darwinian theory "one point stands high above the rest: the dilemma of incipient stages. Mivart identified this problem as primary and it remains so today."

There are numerous examples of organisms with systems of highly specialized, interdependent components, all of which must be integrated before they are functional and offer any selective advantage. Nature abounds in such systems of "irreducible complexity." Although there may be some examples where certain components take on some preadaptive function, these cases may be considered as exceptions to a more general rule. As a rule, any subset of the components would prove to be a burden to an organism and thus be eliminated by natural selection. Take, for example, the sensory and motor mechanism of the common bacterium, *Escherichia coli*, a relatively simple unicellular prokaryotic organism.

The sensory and motor mechanism consists of a number of receptors which initially detect the concentrations of a variety of chemicals. Secondary components extract information from these sensors which, in turn, is used as input to a gradient sensing mechanism. The output of this mechanism is used to drive a set of constant torque proton-powered reversible rotary motors which transfer their energy through a microscopic drive train and propel helical flagella (see Figure 7). This highly integrated system allows the bacterium to migrate at the rate of approximately ten body lengths per second.

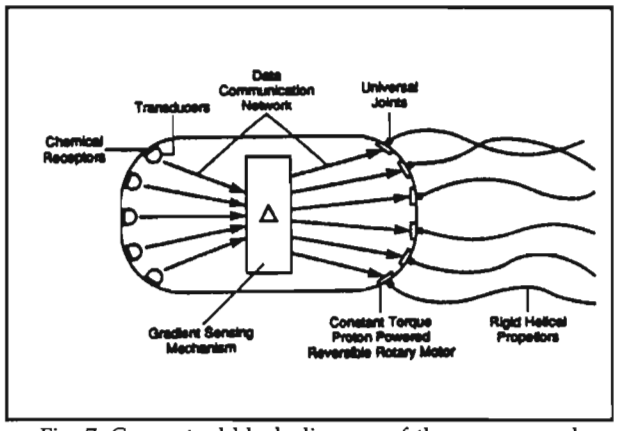

Fig. 7: Conceptual block diagram of the sensory and motor mechanism of the bacterium, *E. coli*.

Dr. Robert Macnab of Yale University concluded a major fifty page review of this mechanism with these remarks:

> As a final comment, one can only marvel at the intricacy in a simple bacterium, of the total motor and sensory system which has been the subject of this review and remark that our concept of evolution by selective advantage must surely be an oversimplification. What advantage could derive, for example, from a "preflagellum" (meaning a subset of its components), and yet what is the probability of "simultaneous" development of the organelle at a level where it becomes advantageous (Macnab, 1978)?

Each component in the flagellum alone (see Figure 8) is highly specialized in its function and it is highly unlikely that many of the components, if any at all, would have any preadaptive value. A subset of components would constitute a collection of superfluous parts which according to Darwinian theory should be eliminated by natural selection. Darwin pointed out in *The Descent of Man* (Darwin, 1871) that natural selection would act to preserve those individuals which were least encumbered with a superfluous part. Although this is one of the simplest organisms on our planet, it serves to illustrate how natural selection contributes to the phenomenon of stasis and helps explain the fact that most species do not arise gradually by the steady transformation of their ancestors.

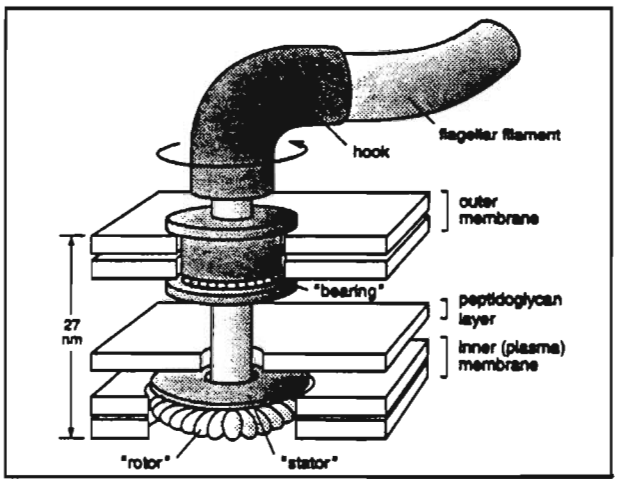

Fig. 8: Conceptual diagram of the motor mechanism of *E. coli*.

Facts, Fossils, and Philosophy

Charles Darwin's classic, *On the Origin of Species by Means of Natural Selection*, was a persuasive and compelling argument for the idea that minor evolutionary change could be extrapolated to account for the origin of all major forms of life by purely mechanistic and materialistic processes. Writing on the origin and impact of evolutionary thought, Douglas Futuyma put it this way:

> Darwin showed that material causes are a sufficient explanation not only for physical phenomena, as Descartes and Newton had shown, but also for biological phenomena with all their seeming evidence of design and purpose. By coupling undirected, purposeless variation to the blind, uncaring process of natural selection, Darwin made theological or spiritual explanations of the life processes superfluous. Together with Marx's materialistic theory of history and society and Freud's attribution of human behavior to influences over which we have little control, Darwin's theory of evolution was a crucial plank in the platform of mechanism and materialism — of much of science, in short — that has since been the stage of most Western thought (Futuyma 1986).

Were Darwin's extrapolations justified? Judging from the conclusions of many of the scientists attending one of the most important conferences in evolutionary biology in the past forty years, the answer is, probably not.

> The central question of the Chicago conference was whether the mechanisms underlying microevolution can be extrapolated to explain the phenomena of macroevolution. At the risk of doing violence to the positions of some of the people at the meeting, the answer can be given as a clear, no (Lewin 1980).

Lewin's article on the conference in the AAAS journal, *Science*, described some of the major conflicts between the modern neo-Darwinian theory of evolution and the empirical evidence:

> Evolution, according to the Modern Synthesis, moves at a stately pace, with small changes accumulating over periods of many millions of years yielding a long heritage of steadily advancing lineages as revealed in the fossil record. However, the problem is that according to most paleontologists the principle feature of individual species within the fossil record is stasis, not change ...
>
> In a generous admission Francisco Ayala, a major figure in propounding the Modern Synthesis in the United States, said, "We would not have predicted stasis from population genetics, but I am now convinced from what the paleontologists say that small changes do not accumulate" (Lewin 1980).

If small changes do not accumulate, if stasis is the principle feature of individual species in the natural history of life, if natural selection inhibits or precludes major evolutionary change, if the order of appearance in the geologic record is systematically backwards to Darwinian predictions, and if the

higher taxa are as discontinuous as they appear to be, why is it that scientists don't develop theories to explain the natural limits to biological change? The answer seems to be more philosophical than empirical. Although the question would probably lead to a more accurate description of nature, it would undoubtedly undermine the pervasive secular philosophy of mechanism and materialism which has come to dominate modern science. Although the question could certainly lead to fruitful scientific research, the thought that natural processes might actually prevent major evolutionary change from occurring would be anathema to those scientists who hold to some form of philosophical naturalism or secular religion.

In a recent AAAS conference Michael Ruse, philosopher of science and noted defender of Darwinism, admitted that evolutionary theory is based upon metaphysical assumptions.

> And certainly, there's no doubt about it, that in the past, and I think also in the present, for many evolutionists, evolution has functioned as something with elements which are, let us say, akin to being a secular religion ... And it seems to me very clear that at some very basic level, evolution as a scientific theory makes a commitment to a kind of naturalism, namely, that at some level one is going to exclude miracles and these sorts of things come what may (Ruse 1993).

In other words, no matter what the evidence infers, no matter how inadequate Darwinian theory might be, only naturalistic explanations to questions of origins will be considered scientific.

If we assume science to be limited to the study of purely materialistic processes and we further assume that the origin of life and the origin of the major body plans are subject to scientific investigation, then the only truly scientific explanation of origins must be materialistic and naturalistic by definition.

If we assume science to be limited to the study of purely materialistic processes and we further assume that the origin of life and the origin of the major body plans are subject to scientific investigation, then the only truly scientific explanation of origins must be materialistic and naturalistic by definition. Under these rules of reasoning some form of Darwinism is the only possible "scientific" explanation of origins. Creation in any form, including theistic evolution, is by definition "unscientific."

Such reasoning is reflected in a booklet published by the National Academy of Sciences entitled *Science and Creationism* (1984). The influential National Academy of Sciences, representing the nation's most notable scientists, has argued that the concept of creation is not scientific:

> ... it fails to display the most basic characteristic of science: reliance upon naturalistic explanations. Instead, proponents of "creation-science" hold that the creation of the universe, the earth, living things, and man was accomplished through supernatural means inaccessible to human understanding (National Academy of Sciences, 1984).

For the most part, [proponents of "creation-science" or advocates of "intelligent design"] have attempted to critique evolutionary theory and to point out areas of the theory which are either untestable or in conflict with empirical data.

The National Academy of Sciences simply defined away all alternatives to purely naturalistic evolution by insisting that only naturalistic explanations can be considered in answering questions of ultimate origins. By definition there is no scientific alternative to the idea that

> man is the result of a purposeless and natural process that did not have him in mind (Simpson, 1967).

Proponents of "creation-science" or advocates of "intelligent design" have never pretended to explain the mechanism by which the universe, the earth, living things, or man came into existence. For the most part, they have attempted to critique evolutionary theory and to point out areas of the theory which are either untestable or in conflict with empirical data. In so doing, they have inferred that purely mechanistic processes are insufficient to account for the order and complexity of the cosmos.

This has provoked an almost religious reaction from the Academy:

> "Creation-science" is thus manifestly a device designed to dilute the persuasiveness of the theory of evolution. The dualistic mode of analysis and the negative argumentation employed to accomplish this dilution is, moreover, antithetical to the scientific method (National Academy of Sciences, 1984).

Given the fact that creation events are historical possibilities it is entirely possible that natural processes alone are insufficient to account for the origin of life and all genetic information.

Berkeley law professor, Phillip E. Johnson, in his book, *Darwin On Trial*, concludes:

> The Academy thus defined "science" in such a way that advocates of supernatural creation may neither argue for their own position nor dispute the claims of the scientific establishment. That may be one way to win an argument, but it is not satisfying to anyone who thinks it possible that God really did have something to do with creating mankind, or that some of the claims that scientists make under the heading of "evolution" may be false (Johnson, 1991).

Must scientists and science educators continue to operate under the assumption that origins must be accounted for by purely unguided naturalistic processes? Despite the fact that all other explanations of origins fail to meet the Academy's definition of science, the answer can be given as a clear "no." Given the fact that creation events are historical possibilities, it is entirely possible that natural processes alone are insufficient to account for the origin of life and all genetic information. Although philosophical naturalism requires a cosmos without a creator, science does not. Scientists working within the confines of methodological naturalism could, in fact, discover natural processes which prevent major evolutionary change from occurring, processes which explain the pervasive patterns of higher taxon-level stasis.

Without question, scientists will need to gain a much greater understanding of the processes underlying stasis. Species stasis commonly continues for millions of years, periods of time for which environmental constancy does not seem possible. Indeed, species stasis often appears to persist despite evidence for environmental change. Natural selection is, obviously, only a part of the whole picture. Internal genetic and developmental mechanisms may play an even greater role in maintaining stasis by inhibiting transitional forms from developing in the first place.

If Mivart were correct in concluding that natural selection is incompetent to account for the incipient stages of useful structures, we can only criticize him for not taking his idea far enough. He could have developed a theory of "macrostasis" and established natural selection as a key mechanism underlying the phenomenon of morphological stability and the mechanism which explains the lack of transitional forms in the fossil record. Had he done so, we might have emerged from the nineteenth century with two major theories of biological change: one accounting for minor evolutionary change and the common ancestry of the lower taxa and another accounting for the stability of the higher taxa. More importantly, we would have entered the twentieth century with theories which more accurately reflected the empirical data.

In retrospect, it seems as though Darwin was less concerned with the scientific question of accurately explaining the empirical data of natural history and more concerned with the religious or philosophical question of explaining the design of all species without a designer.

As we enter the twenty-first century we should pause and re-examine our presuppositions as well as our data. We must be careful not to slip into scientism and must constantly strive to most accurately describe nature, even if it means discarding some of our most cherished beliefs. As Pierre-Paul Grasse', past President of the French Academie des Sciences and editor of the 35 volume *Traite' de Zoologie*, expressed it:

> Today our duty is to destroy the myth of evolution, considered as a simple, understood, and explained phenomenon which keeps rapidly unfolding before us. Biologists must be encouraged to think about the weaknesses and extrapolations that theoreticians put forward or lay down as es-

tablished truths. The deceit is sometimes unconscious, but not always, since some people, owing to their sectarianism, purposely overlook reality and refuse to acknowledge the inadequacies and falsity of their beliefs (Grasse, 1977).

We must bear in mind that just because neo-Darwinian evolution is the most plausible naturalistic explanation of origins, we should not assume that it is necessarily true. Likewise, just because creation involves processes which are non-natural, we should not assume that creation events — whether sudden or gradual — have not occurred. It would be unreasonable to assume so. Creation events may not be subject to scientific investigation, but stasis most definitely is. "Stasis is data."

In retrospect, it seems as though Darwin was less concerned with the scientific question of accurately explaining the empirical data of natural history and more concerned with the religious or philosophical question of explaining the design of all species without a designer. Darwin's general theory of evolution may, in the final analysis, be little more than an unwarranted extrapolation from microevolution based more upon philosophy than fact. The problem is that Darwinism continues to distort twentieth century science. ✱

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Fact, Faith and Philosophy: One Step Toward Understanding the Conflict Between Science and Christianity

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Many contemporary scientists have adopted the philosophical position of naturalism as their personal view of the cosmos, thereby excluding the truth of Christiantiy definitionally. However, the impression is frequently given that science itself has provided the justification for such a world view. The author argues that recognizing the presence and influence of philosophical presuppositions is basic to understanding how Christianity remains intellectually credible in the modern world and compatible with modern science. He employs the work of Thomas Kuhn as well as taking a look at the interaction between philosophical and scientific thought since the inception of the modern era.

When modern science emerged approximately 500 years ago, it did so in harmony with a Christian view of what the world was ultimately like. It was not problematic for the leading scientists of that day to believe that God existed and that he had created the physical world they studied. In the centuries that have since lapsed, a radical reversal has taken place. This has had serious ramifications for the Christian believer for the last 200 years. Currently, any discrepancy between the claims of science and the claims of Christianity tends to be settled by default in favor of science. Science is fact. Christianity is faith. And if science is always fact, then Christianity, at many of its central points, is also false. Or so it seems to many.

Critics of Christianity put forth many charges that share the common theme of the conflict between some areas of modern science and traditional Christian faith. "Hasn't science explained the things that used to be explained by invoking God?" "Since we now know how the universe works through modern science, isn't it true that there is no room left in the picture for God?" "Even if there is a God, hasn't science proven that miracles are not possible?" Assertions like these are all too familiar. It is commonly believed that traditional faith in God (if it is even allowed that he exists) is incompatible with the findings of modern science. For the Christian to hang onto his or her faith, then, supposedly requires an act of "intellectual schizophrenia."

How does the Christian who wants to retain both his faith and his intellectual integrity respond? Is it even possible? Can the theist escape the crushing weight of the proclamations of modern science? Christian philosopher and apologist J.P. Moreland states:

> Undoubtedly the most important influence shaping the modern world is science ... If the church is to speak to the modern world and interact with it responsibly, it must interact with modern science.[1]

This paper will be limited to working toward taking an initial, yet fundamental, step in the direction of understanding the mutually exclusive truth claims of science and Christianity. That step involves an analysis of the relationship between science and philosophy. More specifically, it is my contention that the philosophical presuppositions that are embraced by modern science are the source of many

(though not all) of science's irreconcilable differences with Christianity. I will seek to make the following points:

1. Science can never be completely separated from, but is inextricably interdependent upon, philosophical assumptions.

2. Modern science is currently dedicated to the particular philosophical world view of naturalism.

3. Naturalism constrains and restricts the scientist's thinking. It can dramatically affect the way scientists perceive and interpret data.

I will then briefly illustrate, before concluding, how these points might be applied to some of the actual areas of conflict.

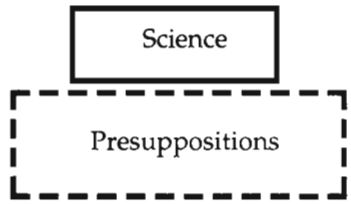
The Role of Philosophical Presuppositions

The most important key to understanding the conflict between some areas of modern science and Christianity is to be found in the sphere of philosophical presuppositions. When seen in their proper light, presuppositions profoundly account for a great deal of that conflict. However, many scientists mistakenly deny that science must rely upon anything in order to function, even philosophy. The average scientist seems to think that science can operate in an objective box, totally self-contained and untainted by elements of subjectivity that hamper other disciplines.

But this is simply not the case. Walter M. Pitch is one scientist who sees this. He not only sees this necessary dependence of science, but calls upon his colleagues to acknowledge it, too. Writing in *Evolution* magazine, he says:

> By a metaphysical construct I mean any unproved or unprovable assumption that we all make and tend to take for granted. One example is the doctrine of uniformitarianism that asserts that the laws of nature, such as gravity and thermodynamics, have always been true in the past and will always be true in the future. It is the belief in that doctrine that permits scientists to demand repeatability in experiments. I like the word doctrine in this case because it makes clear that matters of faith are not restricted to creationists and that in the intellectual struggle for citizen enlightenment we need to be very clear just where the fundamental differences between science and theology lie. It is not, as many scientists would like to believe, in the absence of metaphysical underpinnings in science.[2]

Significantly, he declares that we must recognize a line of distinction between science and theology (or philosophy) that isn't often seen by the scientific community. That line involves the presence of "metaphysical underpinnings" in all that scientists do. This idea can be illustrated as follows in the diagram below. Science never operates in a box. It always rests upon one philosophical foundation or another.



The import of this observation, as we will shortly see, would be hard to over-emphasize. When the line of distinction between science and philosophy, between fact and faith, goes unnoticed, it becomes much easier for a theory to be defended sincerely yet erroneously as fact. If a pivotal presupposition turns out to be false, any theory or theories which rest upon that presupposition will also be affected.

The Prevailing Philosophy: Naturalism

But if science must rely upon philosophical assumptions, what are they? They have been different

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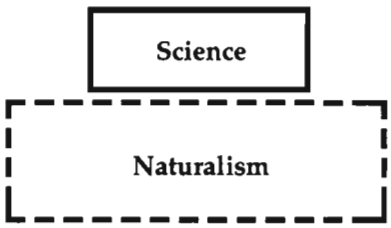
at different times. Today, overwhelmingly, the philosophical metaphysic subscribed to by the scientific establishment is that of naturalism. Christian thinker Francis Schaeffer explains:

> What we have to realize is that early modern science was started by those who lived in the consensus and setting of Christianity.... The early scientists believed in the uniformity of natural causes. What they did not believe in was the uniformity of natural causes *in a closed system.* That little phrase makes all the difference in the world. It makes the difference between natural science and a science that is rooted in naturalistic philosophy. It makes all the difference between what I would call modern science and what I would call modern modern science. It is important to notice that this is not a failing of science as science, but rather that the uniformity of natural causes in a closed system has become *the dominant philosophy* among scientists.... This shift did not come because of newly discovered facts, but because of a shift in their presuppositions — a shift to the world view of materialism or naturalism.[3]

We can, therefore, amend our previous diagram from its generic formulation to describe the condition of "modern modern" science as follows:



But what exactly is naturalism? Dr. Schaeffer hinted at it, but let us look more closely. There is an element of naturalism that says nature cannot be influenced by any outside force. Webster's dictionary highlights this element by defining naturalism this way:

> A theory denying that an event or object has a supernatural significance; specifically: the doctrine that scientific laws are adequate to account for all phenomena.[4]

Another, and I believe more helpful, explanation of naturalism is given by philosopher Ronald H. Nash. His presentation and summary makes the ramifications of naturalism easier to see.

> The touchstone proposition or basic presupposition of naturalism states: "Nothing exists outside the material, mechanical (that is, nonpurposeful), natural order." ... For a naturalist, the universe is analogous to a box. Everything that happens inside the box (the natural order) is caused by or is explicable in terms of other things that exist within the box. Nothing (including God) exists outside the box; therefore, nothing outside the box we call the universe or nature can have any causal effect within the box.[5]

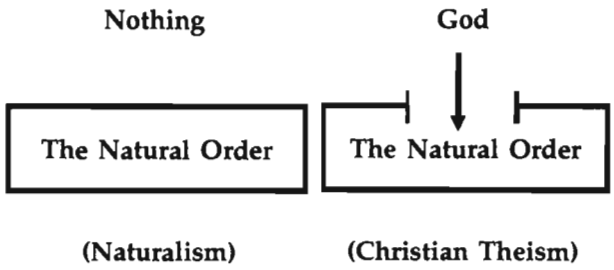
Nash summarizes the beliefs that flow from a consistent philosophy of naturalism as follows:

1. Only nature exists.
2. Nature has always existed.
3. Nature is characterized by total uniformity.
4. Nature is a deterministic system.
5. Nature is a materialistic system.
6. Nature is a self-explanatory system.[6]

In contrast to naturalism's metaphysical assertions, the Christian world view says:

1. God exists outside the box.
2. God created the box.
3. God acts causally within the box.[7]

The rival systems are helpfully illustrated by Nash in the following way.[8]



A "Kuhnian" Hermeneutic

The work of Thomas S. Kuhn in his book, *The Structure of Scientific Revolutions*, will be helpful at this time in dissecting the issue of how philosophy (i.e., presuppositions) and science interrelate. Several important points in his thought dovetail very well with my allegation that presuppositions play a fundamental role in sorting out the conflicts between Christianity and some areas of modern science. By mentally inserting naturalism into Kuhn's model, we can apply his teachings to the controversy between some areas of science and Christianity.

The focus of Kuhn's book is the question of how science develops or progresses through time. It is ordinarily assumed that science progresses via "de-

velopment-by-accumulation."[9] In other words, science is believed to progress slowly and smoothly by adding one new discovery upon former discoveries in a unified, coherent stream. Kuhn says that this isn't so. Instead, he argues, it progresses that way for a while, but invariably will need to radically shift gears and head in a new direction under what he terms a new "paradigm." A paradigm, for many practical purposes, has synonymous parallels to the way I have been using the term "presupposition." When a shift in paradigms takes place, it can alter the assumptions, rules, expectations, and interpretations of scientists at a fundamental level as they study the world.

What Is a Paradigm?

Basic to Kuhn's presentation are several specific terms. By "paradigm," mentioned earlier, Kuhn refers to a model for actual scientific practice which includes law, theory, application, and instrumentation, among other things. It is within the guidelines of a given paradigm that particular traditions of scientific research operate.[10] There is also an element within every paradigm that Kuhn says is "arbitrary." When this element is seen in past periods of science, it is called "myth." However, it is no doubt present within contemporary paradigms without being recognized as mythical or erroneous. In his words:

> The more carefully [historians of science] study, say, Aristotelian dynamics, phlogistic chemistry, or caloric thermodynamics, the more certain they feel that those once current views of nature were, as a whole, neither less scientific nor more the product of human idiosyncrasy than those current today. If these out-of-date beliefs are to be called myths, then myths can be produced by the same sorts of methods and held for the same sorts of reasons that now lead to scientific knowledge. If, on the other hand, they are to be called science, then science has included bodies of belief quite incompatible with the ones we hold today.... Out-of-date theories are not in principle unscientific because they have been discarded.[11]

It is this arbitrary element of a paradigm that most closely resembles philosophical presuppositions.

What Is "Normal Science"?

Another basic term which Kuhn uses is "normal science," by which he means:

> ...research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice.[12]

One of the most well known examples Kuhn uses throughout his book is the switch that took place as a result of Nicholas Copernicus. Until Copernicus's day, the Ptolemaic conception of the universe, in which the earth was believed to be the physical center, reigned supreme. (The Ptolemaic view is an example of what we have seen as "myth" contained in former periods as well as an example of what is meant by "paradigm.") But when the Copernican revolution was finalized by Galileo's confirmation, the science of astronomy was never the same.

"Normal science," in this example, is the exploring and the discovering that took place after the paradigm shift of the Copernican revolution. With the new paradigm in place, research was conducted and discoveries made, but all within the new and guiding view developed by Copernicus and Galileo. Scientists then knew that the earth revolved around the sun and that the stars did not revolve around the earth or the sun, but there was still a tremendous amount they did not know. The research that followed was normal science. For this reason, Kuhn likens normal science to puzzle-solving. Normal science seeks to answer unsolved questions, *but only within the limits of the paradigm.*[13]

Science Is Committed to Naturalism

Defined this way, it is easy to understand why Kuhn says that a "commitment" to a paradigm is a pre-requisite for normal science. There can be scientific research without paradigms, but not within a mature field.[14] And in speaking of the arbitrary element, he says:

> Normal science, the activity in which most scientists inevitably spend almost all their time, is predicated on the assumption that the scientific community knows what the world is like.[15]

This is what I have claimed in saying that science does not operate in objective factual isolation, but rests upon certain assumptions. Notice also the clear metaphysical nature of those assumptions.

What effect does this "commitment" of science to an unproven and unprovable philosophical position have? Kuhn continues:

> Much of the success of the enterprise [of science] derives from the community's willingness to defend that assumption, if necessary at considerable cost. Normal science, for example, often suppresses fundamental novelties because they are necessarily subversive of its basic commitments.[16]

Further illustrating the distinction between fact and philosophy are his comments concerning the early stages of development within a particular field of science.

> If [an initial paradigm] is not already implicit in the collection of facts — in which case more than "mere facts" are at hand — it must be externally supplied, perhaps by a current metaphysic, by another science, or by personal and historical accident.[17]

So, normal science operates solely within the confines of the arbitrary metaphysical parameters included in its adopted paradigm. Normal science is also committed to that paradigm. We could move from Kuhn's generic statement to say that some areas of today's normal science are committed to a belief that ultimate reality is accurately represented by the naturalistic model.

We are now in a better position to appreciate some of the ramifications of the presuppositions that undergird science. For the one who sees that science rests upon a foundation of naturalism, and who objects to the naturalistic pronouncements of science, the following observation by Kuhn holds significant explanatory force.

> Closely examined, whether historically or in the contemporary laboratory, [normal science] seems an attempt to force nature into the preformed and relatively inflexible box that the paradigm supplies. No part of the aim of normal science is to call forth new sorts of phenomena; indeed those that will not fit the box are often not seen at all. Nor do scientists normally aim to invent new theories, and they are often intolerant of those invented by others.[18]

...many of the best scientists work their whole lives without ever seriously questioning the truth of the presuppositions their work rests upon.

Also suggestive is that the solving of puzzles via normal science occupies "even the very best scientists"[19] and that "many of the greatest scientific minds have devoted all of their professional attention to" this sort of work.[20] In other words, many of the best scientists work their whole lives without ever seriously questioning the truth of the presuppositions their work rests upon. This must certainly be part of the reason why so many scientists insist dogmatically upon the truth of a naturalistic worldview while that worldview remains nothing more than a philosophical position outside the reach of scientific verification or falsification.

But if paradigms are held on to so tenaciously by scientists, why, in the past, have they given them up over time? Isn't the allegation of dogmatism on the part of scientists contradicted by the historical fact that paradigms have been forsaken for newer, more helpful ones? The answer is an unequivocal No, and the explanation is found in another principal element in Kuhn's thesis.

Normal science is unable to solve some of its most significant puzzles.

Remember that the overriding focus of Kuhn's book is to take issue with the conventional idea that science progresses slowly, gradually and cumulatively. Kuhn contends, instead, that science advances cumulatively only within normal science.[21] Eventually, however, whether sooner or later, anomalies arise. Normal science is unable to solve some of its most significant puzzles. When these anomalies remain problematic and defy resolution long enough, and when those problems are fundamental to the truth of the paradigm, they begin to transform the scientific community to a state that can be accurately described as one of crisis.

Crises can be resolved in one of three ways. In the first scenario, normal science ends up being able, at long last, to solve the puzzle. Second, the problem is set aside for future generations with the assumption that they will be better prepared to resolve the issue. Third, a new paradigm emerges to replace the old.[22]

There is a reason why Kuhn treats resolution through normal science as something completely different than resolution through a new paradigm. If the old paradigm were slightly altered, this would merely be the refining work included in the operations of normal science. However, what takes place is more than slight modification to the old paradigm.

> The transition from a paradigm in crisis to a new one from which a new tradition of normal science can emerge is far from a cumulative process, one achieved by an articulation or extension of the old paradigm. Rather it is a reconstruction of the field from new fundamentals, a reconstruction that changes some of the field's most elementary theoretical generalizations as well as many of its paradigm methods and applications.[23]

It is precisely this type of "shift of professional commitments" which he describes as a "scientific revolution."[24] When a paradigm shift occurs, the paradigmatic components that are left behind come to be known by later scientists as the myths and errors we discussed earlier.

So these paradigms, or commitments, are not left behind easily. They are clung to dogmatically. The anomaly or anomalies which bring about crisis do so only after the scientific community has wrestled with them long and hard enough to bloody their heads, as it were, against an impenetrable wall. Then, and only then, are they willing and able to let go of the former paradigm, and even then not until a more acceptable replacement has been furnished.[25]

It is also revealing to observe that periods of crisis produce a greater level of humility within the scientific community with respect to the certainty of their cherished paradigmatic presuppositions. The transition to crisis is also the transition from normal to extraordinary science.[26] It is during these periods that the heaviest concentration of speculative theories (theories that go beyond the paradigm) are produced and proposed.[27] Most significantly:

> It is, I think, particularly in periods of acknowledged crisis that scientists have turned to philosophical analysis as a device for unlocking the riddles of their field. Scientists have not generally needed or wanted to be philosophers. Indeed, normal science usually holds creative philosophy at arm's length, and probably for good reasons.[28]

We see once again that philosophy is inextricably related to science. But unless a crisis forces them to think differently, many scientists fail (or refuse) to realize that fact.

The Power of a Paradigm

Let us turn our attention now to what is possibly the most significant aspect of this analysis. Is it possible that this "commitment" to a paradigm, this firm belief in its legitimacy, including the unscientific metaphysical elements it includes, can affect the perception of the scientist as he makes observations of the physical world? Specifically, can an unreserved belief in naturalism exert a blinding effect upon a scientist as he interprets the physical world he observes? Can it drive him forcefully to the conviction that there is no God, or if there is, that he has no on-going affiliation to the operating of the physical world and its laws?

Can an unreserved belief in naturalism exert a blinding effect upon a scientist as he interprets the physical world he observes?

Consider the following experiments taken from what Kuhn says is only a sampling of a "rich body of psychological literature":

> An experimental subject who puts on goggles fitted with inverting lenses initially sees the entire world upside down. At the start his perceptual apparatus functions as it had been trained to function in the absence of the goggles, and the result is extreme disorientation, an acute personal crisis. But after the subject has begun to learn to deal with his new world, his entire visual field flips over, usually after an intervening period in which vision is simply confused. Thereafter, objects are again seen as they had been before the goggles were put on.... Literally as well as metaphorically, the man accustomed to inverting lenses has undergone a revolutionary transformation of vision.[29]

I find it quite fascinating that anyone could adjust to such a disorienting influence as these goggles. And yet, the experiment proves that it is done. It was a problem of perception, not vision. It wasn't a case where the subjects could not see the true world. It was a problem of their being able to interpret properly what they saw.

In another experiment, subjects were asked:

> to identify on short and controlled exposure a series of playing cards. Many of the cards were normal, but some were made anomalous, e.g., a red six of spades and a black four of hearts.... After each exposure the subject was asked what he had seen ... For the normal cards these identifications were usually correct, but the anomalous cards were almost always identified, without apparent hesitation or puzzlement, as normal. The black four of hearts might, for example, be identified as the four of either spades or hearts. Without any awareness of trouble, it was immediately fitted to one of the conceptual categories prepared by prior experience.[30]

It was only after continued exposure that most subjects began to see the problem cards and a few of them were never able to figure out exactly what was wrong.[31]

What does this tell us? These experiments show that "what a man sees depends both upon what he looks at and also upon what his previous visual-conceptual experience has taught him to see."[32] Kuhn draws a direct parallel to the way a paradigm influences the views of scientists, not in their perception of the physical world, but in their conceptual interpretations of those observations.[33]

Is it really so ludicrous to suggest that naturalism can blind scientists to equally plausible interpretations of the brute facts of science? I think not. When asked to conceive of the existence of God, the scientist who is controlled by a naturalistic worldview feels a conceptual disorientation similar to the experimental subject who was given the special goggles. He just can't conceive of it. On top of that, however, is the fact that he's convinced his opinion is rooted in a "scientific" and factual view of the universe while in reality it is the fruit of his philosophical beliefs.

"Systematic Deception"

There is yet one more dimension to the work of Kuhn that we need to explore. Why is it that a much larger percentage of the scientific world seems to embrace naturalism than that which is found in the rest of the population? Doesn't this suggest that there is something that scientific research reveals about the nature of the world that drives many of its practitioners to accept naturalism as true? How can this be explained away?

In reply, the real reason why naturalism is the prevailing metaphysic of the scientific sub-culture is to be found, not in the practice of science, but in the preparation for a career in science. Once again, while making a different point altogether, Kuhn helps to establish one of my own. He is addressing the reason why so many, including scientists, think that science has progressed solely through accumulation and why the revolutions he argues for are not so readily seen. His explanation is riveting.

> Textbooks of science together with both the popularizations and the philosophical works modeled on them ... All three record the stable outcome of past revolutions and thus display the bases of the current normal-scientific tradition. To fulfill their function they need not provide authentic information about the way in which those bases were first recognized and then embraced by the profession. In the case of textbooks, at least, there are good reasons why, in these matters, they should be systematically misleading.[34]

... the real reason why naturalism is the prevailing metaphysic of the scientific sub-culture is to be found, not in the practice of science, but in the preparation for a career in science.

In other words, the reason why scientists don't realize how radical things have deviated from time to time as a result of paradigm shifts is because it is not the purpose of the text to explain it. The text aims simply to bring the students up-to-date as quickly as possible with everything relevant for them to continue the quest for knowledge under today's paradigm. As a result, the true nature of development through revolution is made "invisible."

He adds:

> For reasons that are both obvious and highly functional, science textbooks ... refer only to that part of the work of past scientists that can easily be viewed as contributions to the statement and solution of the texts' paradigm problems.... The depreciation of historical fact is deeply, and probably functionally, ingrained in the ideology of the scientific profession, the same profession that places the highest of all values upon details of other sorts.[35]

Elsewhere, he explains how the rigorous and rigid educational process comes "to exert a deep hold on the scientific mind."[36]

But, you may object, "That's the ingraining of a false view of scientific progression. You've gone beyond that to imply an indoctrination of naturalism to the point that it 'blinds' the scientist's judgement. You're stretching that point for more than it's worth." Let's consider one more piece of illuminating testimony. In explaining how changes in paradigms affect the way that scientists in different periods interpret the same phenomena in different ways, Kuhn writes:

> Looking at a contour map, the student sees lines on paper, the cartographer a picture of a terrain. Looking at a bubble-chamber photograph, the student sees confused and broken lines, the physicist a record of familiar subnuclear events. Only after

> a number of such transformations of vision does the student become an inhabitant of the scientist's world, seeing what the scientist sees and responding as the scientist does. The world that the student then enters is not, however, fixed once and for all by the nature of the environment, on the one hand, and the science, on the other. Rather, it is determined jointly by the environment and the particular normal-scientific tradition that the student has been trained to pursue.[37]

We can see from this that what takes place in the training of scientists is a very thorough conditioning process — a process that conditions them to see and interpret the data through the contemporary paradigm. And the over-arching metaphysical aspect of today's paradigm is hands down that of naturalism. It is impossible to conceive that that conditioning process does not result in a tremendous amount of absorption of naturalistic thinking by the scientists in training. This would be especially so for those students who are not consciously aware of the role of presuppositions as they receive their training. But even for those who are, and who seek to exercise discernment as they study, I can't imagine that the force of this presupposition upon their thinking can be easily avoided.

Philosophy as a Molder of Science

It will be helpful at this juncture to briefly sketch the role of the developments in the world of philosophy in shaping the presuppositional foundations of scientists. This will reinforce the contentions offered so far as well as provide fresh insights. It has been mentioned that in the early days of modern science, theism and scientific thought co-existed harmoniously. However, it did not remain so for very long. The turning point can be located generally around the middle of the seventeenth century.[38] Historian of science, Sir William Dampier, writes:

> Descartes [1596-1650], who was accused by his opponents of having devised so effective a cosmic mechanism that it left no room for Providential control, held that the mathematical laws of nature had been established by God.[39]

So we see that with Descartes an important, though unintended, step was taken toward a mechanical or naturalistic view of the universe. But it is important to see that this was not a necessary ramification of his thought. A rigidly ordered universe did not mean there was no God to create it or maintain it.

Soon afterward came the monumental work of Isaac Newton (1642-1727). With Newton came a "change in mental outlook" in the world of science.[40] This change in outlook is explained by Dampier:

> Newton's work was assailed ... because he offered no explanation of the ultimate cause of gravitational attraction. Newton was the first to see clearly that an attempt at an explanation, if necessary or possible at all, comes at a later stage ... It was not necessary to know the cause of the attraction; Newton regarded that as a secondary and independent problem, as yet only in the stage suitable for speculation .... It is a testimony to the wisdom of Newton's true scientific spirit of caution that, since his day, in spite of many attempts, no satisfactory mechanical explanation of gravitational attraction has been given ...[41]

...the important distinction we have noted between the observations of science and the metaphysical interpretation of what is observed ... is the difference between fact and faith

Newton distinguished between what was observed in nature and why it behaved the way it did. This is the important distinction we have noted between the observations of science and the metaphysical interpretation of what is observed. It is the difference between fact and faith. The former is knowledge, the latter is speculation. Dampier reminds us that, even today, explanations for why the laws of nature behave the way they do is not a matter that has been established by science. In other words, he is helping us to keep clear that important line of demarcation between fact and philosophy.

But if Newton made the proper distinction between facts and speculation, how is it that we don't clearly see that distinction today? The explanation is found in two phases. Science first influenced philosophy. Then philosophy influenced science. More specifically, philosophy erroneously interpreted the Newtonian method concerning its metaphysical implications. Then, science later adopted (without necessary scientific justification), the new philosophical outlook.

In explaining why Newton made the distinction he did, Dampier writes:

> It was not that he had no philosophical or theological interests: quite the contrary. He was a phi-

losopher and a deeply religious man, but he regarded these subjects as a vision to be seen from the topmost pinnacles of human knowledge, and not as the foundation on which it must be built: the end and not the beginning of science ... All that Newton thought could fairly be written in such a work on the metaphysical import of his physical discoveries [is contained in seven pages at the end of his book *Principia*]. It is expressed in the natural theological language of the time. Its sense is that of the argument from design. "This most beautiful System of the Sun, Planets and Comets," he wrote, "could only proceed from the counsel and dominion of an intelligent and powerful Being..."[42]

Clearly, Newton did not understand the meticulous natural order of the universe to mean that God was not immanently involved in it.[43] But those who came after him believed that it did. Dampier continues:

> It must be allowed that, at a later date, Newton's science was taken by others as the basis of a mechanical philosophy, but that was not the fault of Newton or his friends. They did their best, in the theological language which was natural to them, to make clear their belief that Newtonian dynamics did not controvert, rather indeed strengthened, a spiritual view of reality ... To them theism was fundamental and unquestioned, and they had no fear in accepting fully and entirely the new science ... The "most beautiful System of the Sun, Planets and Comets," which to Newton could only proceed from a beneficent Creator, was used in the eighteenth century as the basis for a mechanical philosophy, and replaced the atomism of the ancients as the starting point of an atheistic materialism [i.e., naturalism].[44]

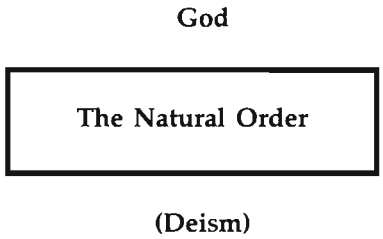
Theism to Deism to Atheism

Before Newton, and contemporaneous to both Galileo and Descartes, was the birth of deism.[45] Deism took the philosophical baton from theism and handed it to naturalism in the western world. Deism was not absolutely necessary for the transition from theism to naturalism to take place, but it no doubt accommodated that transition by making it smoother and by stretching it over a longer period of time.

But what exactly is deism? In contrast to theism, Norman Geisler describes deism in this manner:

> Theism is the belief that there is a God both beyond and within the world, a Creator and Sustainer who sovereignly controls the world and supernaturally intervenes in it. Deism holds with theism that God created the world but denies his supernatural intervention in it on the grounds that the world operates by natural and self-sustaining laws of the Creator. In short, God is beyond the world but he is not active in the world in a supernatural way.[46]

By referring again to Nash's diagrams which depicted theism and naturalism, and by introducing a third diagram of our own, we can see how deism served as a kind of stepping stone between theism and naturalism.



From this we can see that deism agrees with theism that there is a God who created the box. However, deism agrees with naturalism that nothing can interfere with the workings of the box, including the God deists believe created the box. Rather than the huge step from theism to the atheistic outlook of naturalism, deism allows for two shorter steps. First, deism retains God's existence while maintaining that he no longer interacts with his creation. From there, atheistic naturalism eliminates the existence of God altogether. Significantly, since this second step involves no difference in how people believe the world functions in relation to God, only a difference in what is believed to be beyond the world, the step to atheism was made notably more palatable to a culture which had previously been steeped in a theistic view of the world.

As time went on, a more and more rigid naturalism took shape within the logic of deism.[47] This found one of its most celebrated expressions in the classic essay by Hume where he attacked the probability of miracles.[48]

Dampier summarizes the waning of deism and the waxing of naturalism as follows:

> Newton and his immediate disciples used the new dynamical science to demonstrate the wisdom and goodness of an all-powerful Creator. In Locke's philosophy this tendency was less vigorous, and it was ruled out altogether in Hume's separation of reason and faith ... The astonishing success of the Newtonian theory in explaining the mechanism of the heavens led to an overestimate of the power of mechanical conceptions to give an ultimate account of the whole Universe.[49]

While all this was taking place, he writes:

> [A] more popular current of thought was setting strongly in the direction of materialism, a word first used in the eighteenth century.... Materialism [naturalism] takes the phenomenal world as real, naively and dogmatically. Its attempt to explain consciousness, like those made by other philosophers, is an obvious failure, for how can the motion of senseless particles produce consciousness...

With a final reference to Dampier we can see both the attraction that naturalism holds for the scientific community as well as the inherent risk of naturalism being esteemed more highly than science can justify. He says:

> For rough, everyday use, it has its advantages, indeed it is necessary for each detail of science, but there is always the danger that it should be taken as the necessary philosophy of science as a whole, and, as a philosophy, gain the prestige which the success of detailed science inevitably gives.[51]

With this statement we come back to where we started. Science operates on naturalistic presuppositions. But many, including scientists, are not aware of the line of demarcation between the true discoveries of science and the assumed truth of naturalism. And with the blurring of that line comes the misguided tribute to naturalism as though it were in the same category as, say, the discovery of the polio vaccine. If there is to be any legitimate harmonization in the modern debate between science and theology, we need to understand and be aware of the difference between what is fact, what is faith and what is philosophy.

The Proposal Applied

Before we conclude, it will be beneficial to briefly demonstrate how this proposal might be applied to an actual instance of disagreement between science and theology. The most well-known and visible debate is undoubtedly that between naturalistic evolution and the Biblical account of man's creation by the direct work of God. How might the suggestion of philosophical presuppositions be applied to this particular controversy?

An initial observation we could make is that history plainly records that Darwin's theory of evolution was not a discovery made from observing nature, but a preconceived and prevalent idea (philosophy?) brought to his observations of nature. It is believed by some scientists that the fossil record supplies virtually incontrovertible evidence for the truth of the theory of evolution.[52] However, not only was this not true in Darwin's time, as he himself admits in his *The Origin of Species*,[53] but it is not true today after the evidence has been hard sought for over a hundred years by an army of paleontologists. Dr. David Raup, one of the world's most respected paleontologists explains:

> Darwin predicted that the fossil record should show a reasonably smooth continuum of ancestor-descendent pairs with a satisfactory number of intermediaries between major groups. Darwin even went so far as to say that if this were not found in the fossil record, his general theory of evolution would be in serious jeopardy. Such smooth transitions were not found in Darwin's time, and he explained this in part on the basis of an incomplete geologic record and in part on the lack of study of that record. We are now more than a hundred years after Darwin and the situation is little changed. Since Darwin a tremendous expansion of paleontological knowledge has taken place, and we know much more about the fossil record than was known in his time, but the basic situation is not much different. We actually may have fewer examples of smooth transitions than we had in Darwin's time, because some of the old examples have turned out to be invalid when studied in more detail. To be sure, some new intermediate or transitional forms have been found, particularly among land vertebrates. But if Darwin were writing today, he would still have to cite a disturbing lack of missing links or transitional forms between major groups of organisms.[54]

Until the line of separation between facts and philosophy is candidly acknowledged and carefully considered, there can be no meaningful harmonization of Christian faith with modern science.

What does all this tell us? We can see that the philosophy of naturalism had been adopted by some of the scientific community before Darwin came along. It was the framework, "paradigm," in which his own thinking operated. Further, the philosophy was applied to observations of nature as opposed to nature determining the philosophy. The most important body of evidence pointed to by science for the substantiation of evolution is the fossil record. And yet, instead of being unequivocal and conclusive, the evidence provided by the fossil record re-

mains a controversial issue even among non-theistic, evolutionary paleontologists.

Many of these scientists, no longer able to hold to a traditional Darwinian view of slow, continuous evolution, have formulated a new theory known as punctuated equilibrium. This version involves an amendment to the traditional view at a fundamental level. It sees evolution taking place in momentous growth spurts involving relatively short periods of time with no change thereafter for long periods until another sudden surge takes place. This modification has been seen by many (on different sides of the debate) as a significant move toward a view of the fossil record that resembles what one might expect to find based on a view that espouses creation.

It will probably be decades, if not longer, before a consensus is reached concerning the fossil record. But assuming that the traditional evolutionary view will continue to lose supporters, even among those who would like to see it established, the parallels between some of Kuhn's observations and the actual developments in this area of science over the last hundred years are rather interesting. And in light of these developments, is the theist really without justification when he or she says that the traditional evolutionist, when it comes to the fossil record, may be "forcing nature into the preformed and relatively inflexible box that" naturalism has supplied? It would seem not.

This example is necessarily an extremely superficial examination of the larger conflict between some areas of science and theology. Nevertheless, it enables us to see at least one application of what has been set forth in this paper. Its application would seem even more reasonable when considered against the thinking of contemporary social sciences. By starting out with naturalistic assumptions (i.e., there is no God and everything can be explained according to natural causes), these disciplines have systematically rewritten major fields of study. The formulation of comparative religion by anthropologists is one prime example. And the list could go on.

Admittedly, the disagreements between scientists and traditional Christian theologians cannot be fully resolved solely by an appeal to presuppositional biases. Nevertheless, the significance that those biases play has, more often than not, been disregarded by even well-meaning scientists and laymen alike. Until the line of separation between facts and philosophy is candidly acknowledged and carefully considered, there can be no meaningful harmonization of Christian faith with modern science. Philosophical presuppositions are a first step, but a fundamental one. *

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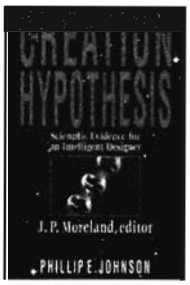

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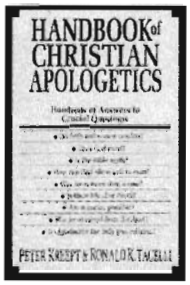

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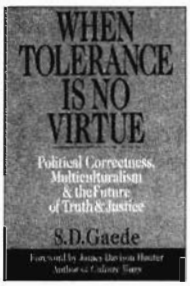

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Communication

Nicolas Berdyaev's Critique of Technics

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Nicolas Berdyaev ranks among the most astute and original thinkers of the twentieth century. He was a prophetic figure, who proclaimed certain spiritual truths about modern humanity at a time when doing so was often unpopular. He also predicted the demise of Western civilization. One area in which he was particularly insightful, but has gone largely unnoticed and unappreciated, is his critique of technics and the modern mechanization of life. Berdyaev diagnosed the arrival of technics as a form of spiritual malaise so that it is both intriguing and enlightening. I found that Berdyaev's critique of technics is especially applicable to an analysis of Holocaust phenomena and other forms of totalitarian evil in the twentieth century; that the Holocaust can confirm that his insights into the preconditions, which made totalitarian evils possible, are valuable and illuminating.

The Spiritual Dynamic of Berdyaev's Critique

For Berdyaev, the arrival of technics in the modern period opens up a whole new chapter in humanity's relationship to the cosmos.[1] With technics the relationship of spirit to reality (matter) is involved.[2] The creative human spirit relates to nature as it invents machines and technology out of physical elements; thus, the arrival of technics is a phase in humankind's spiritual development. Yet the arrival of technics also signals humanity's enslavement to objects in the world. This is true as far as humanity has abandoned spiritual aims and values. It has begun to look to the earth and the miracles of applied science to provide life with an ultimate meaning and happiness.[3] A novel reality has entered history. It is human organization. Because it is neither organic nor inorganic reality, technics poses a challenge to human existence.[4] Having separated itself from God and spiritual values, modern humanity pridefully turns exclusively to the construction and organization of its material world to find meaning, happiness, and security. Technics is precisely the means by which modern humanity, apart from God, and by its own devices, seeks to achieve desired beneficial ends for itself.

In modernity, several autonomous spheres of existence seek to dominate exclusively the whole of life, and technics is one of them.[5] Since modern humanity discarded the medieval worldview, with its religiously integral view of reality, it has sought integrality of being in one of several spheres of life. Technics is a part of these spheres. Specifically, technics must reckon with the spheres of statism and economics. Berdyaev perceives a pernicious development in modernity in which collective forces (the "masses") look to the state, economics, and technics to provide them with total happiness and well-being. Like Dostoevsky, from whom he gleamed many insights, Berdyaev thinks that humankind's appeal to technics, statism, and economics for total well-being only leads to human self-enslavement. Thus, humanity illustrates Dostoevsky's dictum that when humans abandon God, they (unknowingly) abandon or betray themselves as well.

Berdyaev explains more specifically that humankind has experienced certain periods in history when different relationships of spirit to matter are suggested. The ultimate outcome of the arrival of technics depends upon whether the human spirit can attain sufficient moral control over the machine to avoid a total domination and destruction by the ma-

chine. Berdyaev cites four such epochs, or periods in this development.

- In the first period, humans are submersed in cosmic life. They are dependent upon nature. Their personalities are not yet developed. The relationship of spirit to nature is defined in terms of magic and myth.
- The second period finds humans freed from the power of cosmic forces, spirits, and demons of nature. The struggle of ascesis, rather than technics, brings this freedom.
- In the third period, we find the mechanization of nature, its scientific and technical control accompanied by the development of industry with capitalism. The emancipation of labor is accomplished.
- The fourth period finds cosmic order disrupted by the discovery of the infinitely small and large. A new organization for life distinct from organic and inorganic bodies is formed. Life is mechanized and enslaved with technics.

While these periods are topological and not strictly chronological, human history has generally developed away from the "telleurgic" epoch of the medieval period to the technical age. The results have been a loss of an organic and spiritual core of being, and a participation in a totally secularized life broken down into several autonomous spheres. Because modern life has become fragmented in this way, human beings have lost the integral image they long for, and once partially possessed. They misdirectedly seek a regained integrality in the technical reorganization of life.[6]

The specific logic of abused technology, according to Berdyaev, has its inception in "technique." Technique leads to the organization of life, which then leads to the mechanization and dehumanization of life, with the outcome resulting in the final mechanization of the organizer.[7] Given the nature of this internal logic in the development of technology, religion and ethics must take seriously the arrival of technics as a spiritual problem which leads to the enslavement of human beings.

One cannot remain neutral on the question of technics. Although its arrival does arise in part out of a creative, spiritual effort by humanity, technics threatens to destroy the human image and even the physical world in the twentieth century. Berdyaev considers technics the most crucial problem of modernity that will prevail over humanity, if humans do not address its pernicious development and intensify their spiritual relationship to the cosmos.

Berdyaev expresses astonishment that no one has developed a thorough philosophy and critique of technics. He exhorts the Christian community to redress this issue with urgent concern. Responsible Christian thinkers will not, however, simply condemn technics and scientific application. They will take a concerned perspective beyond either the neutral, indifferent viewpoint or the reactionary, romanticist rejection of all technical achievements.[8]

The History of the Spirit's Relationship to Matter and the Arrival of Technics

Berdyaev explains that, since the breakup of the medieval worldview with its organic and hierarchical structure, humanity has sought integrality of being in the cosmos itself. The latter phases of the Renaissance caused the emancipation of human creative energies from God. A type of assertive humanism, estranged from God, developed that was doomed to failure at the outset. Berdyaev agrees with Dostoevsky that such misdirected humanism was bound to lead to the self-enslavement of humanity (which Dostoevsky's "underground man" grapples with in the twentieth century). Only the restored image of God in humanity can rectify this situation (especially through the God-man, Jesus Christ). But over against that other great Russian thinker Tolstoy, who longed nostalgically for the organic wholeness of a premodern era, Berdyaev objects to the reactionary rejection of Romanticism in its attempt to counter the advancing march of science and technics. Romanticism was a futile stopgap measure to return unrealistically to a lost organic past, and therefore, an inadequate attempt to address the problem of technics.[9]

Modern human beings, Berdyaev tells us, having lost their organic past and undergone the failures of humanism and romanticism, collectively turn to technics and statism for a sense of purpose and direction in life. Having turned away from God, they are doomed to be enslaved to the products of their own humanistic imagination, especially to technics and statism. Only if a reversal of human loyalties takes place, *away from* scientism, statism, and economics, and *toward* spiritual values, can humans reverse this enslaving process and free themselves from the necessity to adapt to the world of objects (which has collectively occurred in Western history). Only with such a reversal of spiritual priorities can humankind regain control of its future and restore the lost image of God, which gives freedom and dignity to human existence.

Berdyaev's Critique of Technics in Totalitarian States and in Nazi Germany

With specific regard to the role played by technics in the Holocaust, Berdyaev explains that the sinister use of technology arises out of a concurrent development of technics and statism in the modern period. In his quite prescient work, *The Fate of Man in the Modern World* (1935), he says that the pernicious use of technics in Germany arose out of the distorted need for a pagan mentality to implement racist aims, especially against the Jews.[10]

The racially motivated German masses had already been demoralized by war and collectivist ideologies. They felt the burden of the already-present "power of technics" dominating over their lives. Thus, they psychologically projected onto the nation-state their distorted ideals for racial superiority. These racist goals were translated into nationalist policy, and then were implemented by means of technics. Thus an idolatrous statism developed around totalitarian goals at the expense of individual personhood and freedom.[11]

Technics comes to define both the *ends* (aims) of human existence, and the *means* by which mass humanity executes its collectivist, totalitarian goals for a racially superior society. Berdyaev is very perceptive in recognizing this conjunction of human self-interests in technics and nationalist aims, and how they are coordinated in the twentieth century to produce collectivist evils.

Besides this dialectic between technics and nationalism, Berdyaev understands that, in Germany, technics played another specific role in the generation of Nazi devotees. That is, the German racist romanticism, pagan in its inception, created Nazism in part as a reaction to the arrival of modern technical society (although, ironically, technics was then used in carrying out Nazi atrocities). Berdyaev finds no contradiction in his analysis on this dual role of Germans both using and rejecting technics, since the real contradiction lies in humanity's perfidious misrelationship to the world of objects, in which two seemingly contradictory forms of expression emerge – one that exploits technology for evil ends, the other that narrowly rejects it for romanticist reasons. This misrelationship to the cosmos is the plight of modern humanity estranged from God and nature, which sadly produced the tyranny of a Nazi state. This state centered on racist and romanticist notions of blood and soil, and a fanciful apocalyptic expectation of a millennial kingdom (which instead produced twelve years of hell).[12]

One final diagnosis of Berdyaev's critique of technics involves modern humanity's misplaced confidence in, and loyalty to, science and technocrats. Technics comes to replace religious miracles since technics seems to produce veritable miracles of its own. Humanity has always wanted, in defiance of God, to produce such miracles. The arrival of technics makes this dream possible. Technics might be viewed then, as not just a means of Nazis to achieve racist ends during the Holocaust, but as the most inordinately respected, idolatrous domain of the human enterprise, and part of a Western Promethean revolt against God and spiritual values.

Given the absence of such spiritual values, especially Christian personalist values, before and during the Holocaust, modern Europe possessed no adequate values foundation from which to contest successfully the onslaught of Nazism, totalitarian states, and secularist ideologies inimical to human dignity. Berdyaev thinks that Germany's specific demise, as manifested in its espousal of racist and nationalist goals, suggests that Germany had not allowed Christianity fully to penetrate its life and thought (and thus Germany never really overcame its pagan roots).[13] He confirms this observation with the fact that, despite the attainment of the zenith of German culture with Kant, Goethe, Hegel, Schiller, and Fichte (among many others) prior to the Holocaust, this great cultural flowering did not prevent the end of Germany in the Nazi period. This downfall from great cultural heights to decadent Nazi civilization must be seen in spiritual terms as the loss of transcendent energies and values, so that Germany came to participate in its own demise and self-enslavement.[14]

An authentic Christian faith would not allow such an idolatrous exaltation of race, soil, and nationhood. Like Paul Tillich, Berdyaev understands that Christianity is fundamentally at odds with the particularism and narrow provincialism of Nazi racism and nationalism; that Christianity espouses equality, universal and ethical expansiveness in its authentic expression of love and regard for justice and freedom.[15] Yet, in reality, as Berdyaev readily acknowledges, a historical "deformation" of Christianity has occurred in Western civilization, and this deformation contributed to the success of Nazism.[16]

Like several outstanding interpreters of the Holocaust, Berdyaev did grasp the specific ways technology was abused during the Holocaust period, and in the most perfidious ways imaginable (sterilization programs, developments in Eugenics, so-called "euthanasia projects," poison gas usage, an elaborate railway system leading to fixed killing cen-

ters, Mengle's experiments with twins and other psychological experiments, and new, more effective ways of killing people with phenol injections, and breeding experiments, among many other examples).

The Jewish thinker, Irving Greenberg, cites the problem of modernity with its belief in the "secular absolute." He explains how the loss of a sense of transcendence and ultimate values, issued in the modern ethos of decadent thinking and living, contributed directly to the arrival of the Holocaust. Greenberg blames secular humanism and moral relativism for their pretensions of a value-free science and objectivity that "created unparalleled power," but weakened the moral limits of the "secular city."[17] Thus the "Lord of Science and Humanism" was erected idolatrously for the "Lord of History and Revelation," and with devastating consequences.[18] Like Berdyaev, Greenberg considers this modern scientifically-based ethos *the* alternative to a Judaeo-Christian ethic and worldview. Berdyaev explains that this modern scientific ethos has displaced the organic and hierarchical view of life of the medieval period, which, despite its many problems, maintained (in part) an integral view of humanity in relationship to God and the cosmos.

These two insightful observers of our time—one Jewish and the other Christian—seek to enlighten modern humanity to the dangers of technics and the ethos of "scientism." This worldview claims the ultimate loyalty of modern humanity with devastating consequences. What the Holocaust can do is to serve as a foil for the discussion of this issue. The Holocaust can remind modern humanity of its need for a cultivated ethic and spirituality that can resist enslavement to technics; and can also put a check on our zealous and often unqualified enthusiasm for science as a human enterprise.

Regarding the ultimate outcome of modern humanity's misuse of science and technical applications, especially in the Holocaust, I am reminded of Elie Wiesel's ascription of the "Kingdom of Night" to the Holocaust event.[19] Berdyaev has a statement, which from our retrospective viewpoint today, strikes us as particularly insightful. He says, in his book, *The Realm of Spirit and the Realm of Caesar*, that with technics warfare ceased to be localized and became a matter of nations against nations, states against states, moving the world into a state of "rationalized darkness."[20] Berdyaev avers that such a world will lead either to a "new day of creation — or a *new night*" (italics mine).[21] Obviously, as Wiesel's works so eloquently remind us, the path taken by modern humanity thus far has been Berdyaev's "new night." This path involves a novel approach to killing humans on a massive, unprecedented scale. Society rationalizes this mass murder by thinking humans are mere "vermin" to be eliminated with poison gas and other devices available to modern technology.

Although the arrival of technics does not fully explain this attitude toward human beings as vermin or a disease (and other factors should also be considered), its arrival helps explain how the negative preconditions were set which made it possible for a Holocaust to occur; that racist, nationalist, totalitarian, political, economic, and religious factors conspired with technics to cause the evils of Nazism. Berdyaev's critique is especially insightful in demonstrating how technics was involved in more than just the provision of means for massive murder and dehumanization. Technics also constitutes a major form of modern idolatry from which humans seek to find totally adequate ends for life and happiness, and by which they establish a false relationship to the cosmos. The mass organization of modern Western life had a spiritual root in the misplaced human longing for integrality of being and happiness, which led to collectivist means of enslavement, dehumanization, impersonalism, apathy, and indifference. This was illustrated in the Holocaust when masses of indifferent people contributed to the death of millions of human beings, and immoral brutes with Ph.D's used advanced technical skills to dispose of human beings.[22]

For those readers aware of the role of ideology in contributing to the Holocaust, Berdyaev's insights are particularly relevant. He avers that modern humanity transferred its loyalties from God and its organic sense of self to collectivist entities and to ego. This process evolved from the telleurgic period to modernity, as seen in the subjective selfhood of Kant, then in the panlogism of Hegel, then especially with the Ego in Fichte, and finally in Nazism.[23] German idealist philosophy tried to provide a compensation for the loss of a cosmic framework for individuals that had existed in the medieval worldview. But German idealist philosophy also inevitably produced an ideological framework conducive to the Promethean instincts of a will to power (as can be seen in Nietzshe, Rosenberg, and then in Nazism). Eventually this will to power built the idol of a state power, replacing the ego (and integral self) asserted by Fichte and others, and this issued in a statism inimical to personal and human values.[24] Thus the technical epoch culminates in a subordination of spirit to collectivism, to rationalized scientism, and to a resulting dehumanization and depersonalization of modern humanity. Into such an objectivized, enslaved world, humans enter the modern period.

Instead of expressing an active spiritual protest against such a demeaning plight, humans opt for conformity and display indifference in the face of radical evil (as Wiesel never tires of saying, "the opposite of love is not hate, but indifference").

Conclusion

Does Berdyaev's critique leave us on a note of despair regarding the ultimate outcome of Western civilization? Those readers familiar with Berdyaev's writings will know that he is a person of persistent hope, grounded in a Christian conviction of the anticipated victory of good over evil. Thus Berdyaev does not arrive at a totally negative assessment of modern humanity and its use of technics. Although Berdyaev offers hope, he makes a positive outcome for Western humanity contingent upon thoughtful and responsible human action and decision-making, specifically in subordinating technical interests to spiritual ends and values.[25] Only realistic "intensification of spirit," he says, will adequately subordinate the goals of technology to the ends of spirit and humanity; will appreciate science but reject idolatrous scientism. The arrival of technics presents humanity with an unprecedented challenge and opportunity for spiritual awakening and intensification. The whole positive relationship of humans to nature, and of God to the cosmos, has to be reconceptualized. Thus the final significance of the technical epoch is its opening up of a new spiritual reckoning with reality itself, especially considering the failure of previous ideologies to sustain humankind.[26]

Writing after the Holocaust and his personal, wartime endurance of hardships in France, Berdyaev was still able to maintain hope for the future. Such hope entails nothing less than the total spiritualization of life.[27] Thus Berdyaev anticipated a transformation of the technical ethos into a spiritual epoch that uses science only for constructive human ends. The Holocaust reminds us constantly of the ominous implications of the issue regarding the role of technics in human history, an issue we can appreciate was earlier addressed by Berdyaev, but one which still awaits a successful resolution at the close of the twentieth century.

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A Note on Sources Used and Works of Berdyaev Abbreviated in the Text

Abbreviation, Full Name of Work, Original Publication Date

Destiny of Man, *The Destiny of Man*, 1931
Fate of Man, *The Fate of Man in the Modern World*, 1934
Meaning of History, *The Meaning of History*, 1923
Realm of Spirit, *The Realm of Spirit and the Realm of Caesar* , 1949
Slavery and Freedom, *Slavery and Freedom*, 1939
Solitude and Society, *Solitude and Society*, 1934
Spirit and Reality, *Spirit and Reality*, 1937
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Notes

[1]*Spirit and Reality*, pp. 69-71; "Man and Machine," pp. 43-44.
[2]Ibid., and "Man and Machine," p. 53.
[3]*Spirit and Reality*, pp. 69-71; "Man and Machine," p. 31.
[4]*Realm of Spirit*, pp. 50-51.
[5]Ibid., p. 54.
[6]*Realm of Spirit*, p. 47.
[7]"Man and Machine," pp. 33, 37, 39-40, esp. 40; *Fate of Man*, p. 37.
[8]Berdyaev particularly chides Tolstoy and John Ruskin for the unrealistic, romanticist rejections of technical advancements that simplistically long for a premodern era. Indeed, the arrival of Romanticism has to be understood in context of the more ominous arrival of technics as a reaction to it. See "Man and Machine," p. 49.
[9]"Man and Machine," p. 49; and *Meaning of History*, pp. 133-147, esp. p. 136. Romanticism is a perennial option for humankind in its rejection of scientific progress.
[10]*Fate of Man*, pp. 83-85, 94-96, 98, 104.
[11]Ibid., pp. 8-10, 19, 26, 30-31, 71-73, 77, 81-83, 93-94; and *Realm of Spirit*, pp. 51-52. Berdyaev says technics is always opposed to an individuality and "is pitiless" toward human personhood. Although technics developed concurrently with capitalism, materialistic communism tries to organize life according to social demands also antiethical to human welfare (see "Man and Machine").
[12]*Fate of Man*, pp. 25-31, 84-85, 102.
[13]*Fate of Man*, p. 62, 68, 84-85.
[14]Ibid., pp. 96, 181-182.

[15]Ibid., pp. 84, 87, 88, 98, 102.
[16]*Fate of Man*, pp. 122, 125, 130; see also Berdyaev, "The Worth of Christianity and the Unworthiness of Christians," in *Bourgeois Mind and Other Essays* (New Hampshire: Ayer Company, Publishers, Inc., 1992), p. 109. Barth and Bonhoeffer would agree with Berdyaev on this deformation of Christendom.
[17]Irving Greenberg, "Cloud of Smoke, Pillar of Fire," in Holocaust: *Religious and Philosophical Implications*, ed. John K. Roth and Michael Berenbaum (New York: Paragon House, 1989), pp. 305-345, esp. p. 320.
[18]Ibid.
[19]A phrase used frequently by Wiesel, as in his book *Night*.
[20]*Realm of Spirit*, pp. 54-55.
[21]Ibid., p. 51. Berdyaev suggests that likely the situation will present the latter—a new night, although he holds out hope for a new, "eighth day" of creation.
[22]*Realm of Spirit*, pp. 54-55. Cf. *Meaning of History*, pp. 133-147.
[23]See "Man and Machine," p. 47; *Meaning of History*, 142; and *Solitude and Society*, 37-41, 177-179; and *Fate of Man*, p. 96.
[24]See "Man and Machine," p. 49; *Meaning of History*, p. 142.
[25]*Realm of Spirit*, p. 56; "Man and Machine," p. 55; *Slavery and Freedom*, p. 110. One might even question how Berdyaev can be optimistic given his negative assessment of modern forms of malaise.
[26]*Realm of Spirit*, pp. 52-53, 56.
[27]Ibid., pp. 48, 56; *Spirit and Reality*, pp. 70-71; and "Man and Machine," pp. 59, 62.

Books Received and Available for Review

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

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John Barrow & Joseph Silk, *The Left Hand of Creation: The Origin and Evolution of the Expanding Universe*, Oxford, 1993
Marcia Bartusiak, *Through A Universe Darkly: A Cosmic Tale of Ancient Ethers, Dark Matter, and the Fate of the Universe*, Harper Collins, 1993
Don Boys, *Evolution: Fact, Fraud, or Faith*, Freedom Publications, 1994
Thomas Campanella, *A Defense of Galileo: the Mathematician from Florence*, Notre Dame University Press, 1994
D. L. & J. T. Carmody, *In the Path of the Masters: Understanding the Spirituality of Budda, Confucius, Jesus, & Mohammed*, 1994
M. A. Corey, *Back to Darwin: The Scientific Case for Deistic Evolution*, 1993
Donald B. DeYoung, *Science and the Bible: 30 Scientific Demonstrations Illustrating Scriptural Truth*, Baker, 1994
Larry Dossey, *Healing Words: The Power of Prayer and the Practice of Medicine*, Harper Collins, 1993
Thomas Gabor, *Everybody Does It: Crime by the Public*, Toronto University Press, 1994
Fred Hoyle, *The Origin of the Universe and the Origin of Religion*, Moyer Bell Press, 1993
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Harry Robin, *The Scientific Image: From Cave to Computer*, Freeman
Colin Russell, *The Earth, Humanity, and God*, UCL Press, 1994
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John Zachary, *Scientific Evidence for the Second Coming of Christ*, Harvard House, 1993

Essay Review

New Physics = New Religion?

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David Bohm's World: New Physics and New Religion *by Kevin J. Sharpe. Cranbury, N.J.: Bucknell University Press, 1993. 168 pages, notes, references, index. Hardcover; $32.50.*

It seems that the talk about the influence of science on theology, and of theology on science, reaches a greater volume with each passing day. Some of the most creative minds have become involved in this task; it promises to be the focus of intellectually-respectable reflections on science and theology. It is especially important that the members of the ASA be informed and cautious about statements that are currently being made. Several years ago, I wrote,

> The ASA will be walking a philosophical tightrope between these various pitfalls of pseudoscience, pseudotheology, and their mystic synthesis in the years ahead. At the same time the ASA is committed to maintaining the fundamental truths of the biblical revelation. It will be easy to be misled, to be drawn into visionary expectations without realizing that one is cutting out the ground from under one's feet. We must exercise great love, patience, care and discernment if we are to be true to our fundamental charter of upholding authentic science and authentic biblical theology.[1]

A great deal of confusion can be avoided if we are careful about the definition of the terms that are used in such a discussion. What are we to think of phrases that are constantly being tossed around like "scientific reformulations of theology," or "putting God into science"? Do the authors really mean that the essentials of theology derived from biblical interpretation should be changed because of scientific input, or do they mean only that religious attempts to describe the workings of the natural world need to be reformulated? Do they really mean that "God" should be thought of as a mechanism in scientific theory, or do they simply mean that the search for complete scientific descriptions may fail when no authentic scientific description is adequate? Do they really believe that a scientific description that is complete on its own level, without leaving gaps for the nonscientific intervention of God, actually rules out the existence and activity of God? Do they adequately discriminate between testable scientific hypotheses and metaphysical speculations that may arise from someone's involvement in science, but which do not have the testability demanded by authentic science? Is the whole affair a battle of words, or is there some really basic substance? The unwary individual entering this area is well advised to be cautious and not to assume that what seems to him or her to be the meaning of terms and ideas is actually what is intended by the various participants in the discussion.

Can our theology affect our science? Yes and no. The answer is yes, if by this question we mean, "Can theology give us inspiration, motivation, and guid-

ance in carrying out scientific research and in choosing the problems for such research? Can theology make us cautious about conclusions for which the support of science is claimed when they contradict theological insights?" But the answer is no, if by this question we mean, "Can theology provide us with scientific mechanisms that we can know are valid and can accept as givens in our science?"

On the other hand, can our science affect our theology? Yes and no. The answer is yes, if by this question we mean, "Can science inform us about the mechanisms of God's activity in the universe and thus enable us to avoid inappropriate conclusions about such mechanisms? Can science provide us with a physical framework within which to relate the spiritual insights given to us through theology?" But the answer is no, if by the question we mean, "Can science provide us with theologically valid insights into the character of God and his relationships with human beings — insights that are either unknown to us through God's revelation, or that contradict that revelation?"

The most important recognition implicit in these statements is that all charges that these answers result in a separation, a compartmentalization of science and theology, are misguided. When properly expressed, we understand that science can provide us with valid insights into what reality is like, and that theology can also provide us with valid insights into what reality is like. Both science and theology provide us with *descriptions* of what reality is *like*, not *explanations* of what reality *is*. Our task is not to keep these insights separate, but to *integrate* them! This integration needs to be carried out in such a way that neither the valid insights of science nor of theology are lost. This is the most authentic simple formulation of a set of "complementary" descriptions.

For several years the acceptability of Christian theology was damaged because it was viewed as being antithetical to a growing scientific view of the universe. It became part of the post-Christian subconscious to believe that science had done away with the need for God and with the intellectual respectability of believing in God. We may have passed into a post-scientific day, in at least the simplistic sense of this understanding of science, as the only revealer of truth. But the authority of science maintains strong public appeal, and today we frequently see this authority still exalted, now not to directly discredit Christianity, but to provide insights into "a new and fuller understanding" of Christianity than could ever be known from the biblical revelation.

David Bohm is a brilliant physicist, who started his career in the 1950s and grew up in a Jewish household. His name has been linked in science with the attempt to develop a theoretical perspective to replace traditional quantum theory. He has been successful in providing a variety of stimulating perspectives different from those of the traditional theory, which when put into theoretical form, are able to predict the same experimental results as those predicted by the usually accepted quantum theory. To date, however, no uniquely testable situation has been devised that is able to discriminate between Bohm's theory and traditional quantum theory, and his ideas remain speculative and generally unaccepted.

The motivation for this book, however, is the examination of the claim that Bohm's ideas are based upon his metaphysical and religious convictions, that, as stated on the cover jacket, he takes "the theories and concepts of religion as hypotheses for physics," and that his "religious convictions provide the motivation to pursue the physical theories and hypotheses." A basic question is, "Can one develop Bohm's metaphysics into a theology?" And — just what would this mean?

The author of this analysis is Kevin J. Sharpe, professor in the Graduate School of the Union Institute, Cincinnati, where his specialty is in science and religion. He has served as Executive Officer of the Institute on Religion in an Age of Science, and is also the founding editor of *Science & Religion News*. He provides a detailed analysis of many aspects of Bohm's thought and of the analysis that has been made of them, developing 19 pages of notes, and providing 45 pages of references. In the comments that follow, the quotations are from Sharpe's writing in this book unless specifically indicated otherwise.

Sharpe's comments about Bohm's ideas in the Preface are promising. He says that "Bohm's writings move from physics to history, education to philosophy of science, biology to religion, art to linguistics." What characterizes Bohm's thought is his opposition to thinking about the world as a machine, which takes form in his "organismic" approach. Sharpe quotes Ian Barbour's characterization of an organismic approach: "(1) the organism is a whole, an integral whole, (2) a hierarchy of levels makes up the organism, and (3) the organism influences its parts." The essence of the perspective can be summed up in, "The whole is greater than the sum of its parts." Once one realizes that this use of the word "organism" does not necessarily imply a *living* entity, this description seems sound and has been widely accepted by many. There is absolutely nothing in

it that necessitates "a scientific reformulation of theology." Sharpe points out that many with a mystical or Eastern religious perspective have embraced Bohm's views, but his critique is that "excessive and uncritical enthusiasm typifies this interest."

Bohm's principle initial attack was directed against the accepted probabilistic interpretation of quantum mechanics. He attempted to replace such an interpretation with a deterministic description involving "hidden variables," which would remove the appearances of probability if they were known. "So far there is no conclusive experimental support for the superiority of Bohm's approach over the usual one." Subsequently, Bohm and others have attempted to develop forms of this theory further and with different emphases, while retaining the initial goals. "The hidden variables theory then took on the 'quantum potential' name by members of the Birkbeck School. (Birkbeck College in the University of London is where Bohm and many of his coworkers have held positions)." The quantum potential is an additional term, added to the basic classical equation, which gives a clear picture of events at the quantum level. The quantum potential emphasizes quantum wholeness, need not vanish for particles far apart, and depends on the whole system. Bohm believes "everything connects to everything else, that one of the world's basic properties is its wholeness." Still, "members of the Birkbeck School acknowledge that the existence of the quantum potential is an assumption with no solid foundation." Although it is very much alive today, and gives the same predictions as the usual quantum physics, "the Birkbeck theory leads to no new experimental results and has no experimental support to help it lever out the usual theory."

Why then, all of the talk about "new physics and new religion"? In further elaborations of his theory, Bohm "expresses his philosophical or metaphysical ideas, one of whose themes is the unending depth of nature .... Such continuing thrusts into controversial physics may appear as a guiding light for many philosophical, religious, or spiritual people. Like the hidden variables theories, however, the world of physics does not thoroughly support them." Sharpe is very fair in his comments, balancing each set of positive or supporting arguments with corresponding negative or non-supporting arguments. In this case he points out that Bohm himself gives the warning. "We may want to think of everything connected to everything else regardless of their separations in time and space. The evidence, however, does not support doing this." And — we might ask at this point — even if the world of physics did support them, would there be any necessary profound significance or relevance for theology?

Three terms describing Bohm's concepts are unbroken wholeness, implicate order, and holomovement. "The holomovement model for reality comes from the properties of a holographic image of an object .... any portion of a hologram contains information on the whole object imaged." The major contribution to the hologram involves movement; thus the term holomovement emphasizes the dynamic nature of interactions. "The holomovement is the basis for reality and is an unbroken and undivided whole. All forms of it merge; we cannot separate them." Reality needs to be described as an implicate order, meaning that "everything folds into everything ... any portion of implicate reality involves every other portion and contains the total structure of the universe, the whole." The implicate order unfolds into what we recognize as the explicate order. At this point, half way through the book, enters the first use of the word God, "In most contexts the implicate order does not fully become an explicate order ... This contrasts with the Cartesian view where some all-including intelligence (God) can in principle embrace everything at any moment."

The author continues with a discussion of the five major ingredients in Bohm's metaphysics: reality has an endless depth; parts of reality relate to each other; reality is constantly in movement; the movement of reality is creative; and reality divides into levels that are in systems of hierarchies.

To these may then be added Bohm's religious ideas, influenced at least to some extent by an interest in Eastern mysticism: consciousness is a material process in the implicate order; the consciousness of humanity is one; the holomovement is the life energy; consciousness is affected by fragmentation that is the source of human self-deception; and the significance of "the beyond."

> Beyond the explicate and the implicate, beyond the holomovement, there is something about which we can say nothing except that it is. We cannot in any way approach, measure, or know it. It eludes the grasp of thought, but is the source for all. For Bohm, the beyond is the domain of the sacred, the spirit, the holy, God. Compassion, intelligence, love, insight, he believes, comes from this beyond.

We are limited in how much we can know and understand, but insight can come from the beyond to change brain matter.

> For Bohm insight is the supreme intelligence. To move toward relieving the chaos of fragmentation

> in our world requires insight to reorder people's minds. In particular, several close insightful people need to set up a single mind from their collective individual minds.

Finally, we come to the bottom line.

> To perceive what is beyond the implicate and explicate orders and therefore beyond thought, Bohm states that thought must go.... To do this is the first step of religion; it is the aim of meditation. Meditation transforms our minds and moves them beyond the implicate order. According to Bohm, consciousness can break free of its constraints by leaving thought behind to become something quite new.

Sharpe considers whether process philosophy might be an adequate way to describe Bohm's ideas, but concludes that it probably is not. He considers Capra's attempts to relate quantum theory with Eastern mysticism[2] and decides that it is a case of Capra's religious belief influencing his science. Finally he argues that Bohm is using his religious ideas in physics. This is especially true of his idea of "undivided wholeness," which "has its roots in religion or mysticism, and it may or may not be useful in physics." Stephen Hawking has been especially critical of such an approach, and Sharpe quotes Hawking as saying, "(it) is absolute rubbish ... The universe of Eastern mysticism is an illusion .... A physicist who (tries) to link it with his (or her) own work has abandoned physics."[3]

Sharpe's comments at this point are perceptive:

> Bohm proposes it as a physical theory, but it is still subject to the testing ground of physics. Religion can make a second contribution: it can strengthen believers' dedication, enthusiasm, and tenacity to try to have their ideas accepted as physical theory.... Many religions, including Christianity, have much to say about the nature and direction of the physical world. They should not be afraid of bringing these ideas in appropriate forms, to the sciences. As hypotheses they are still, of course, in need of factual support.

Whether or not Christianity has anything to say about the nature of the physical world can certainly be debated. But note that all of these comments have to do with the use of religious ideas to guide scientific theory. They do not become accepted science because of their religious appeal. They are valid only if they result in science that can be experimentally tested. Nor do they deal with the issue of science leading to changes in theology.

Before proceeding to this latter topic, Sharpe takes a break to consider the relationship between science and theology in general. He points out three common categories into which most such relationships can be placed: conflict, compartmentalization, and complementarity.

Sharpe is uneasy about complementarity and complains, "Writers often use complementarity carelessly. They seldom ask the key question: 'Does this model for the science-theology relation picture them as necessary *and also as relevant for each other?*'" He is anxious that science and theology not be pushed further apart, and argues, "To avoid this means emphasizing the relevance of science and theology for each other and actively exploring their points of contact. Conflicts need resolving, but not in ways that make them more irrelevant for each other." Most advocates of complementarity would agree with him, expressing their concern by their insistence on the need to integrate the two kinds of descriptions.

Sharpe next finds several problems with MacKay's model[4] for complementarity, concluding that his model is confusing. He is mistaken, in my opinion, when he says of MacKay that "complementarity for the science-theology relation also suggests they are completely different and mutually irrelevant," or that MacKay's "hierarchical complementarity stops theology from giving a science data, direction toward worthwhile areas of study, or criteria for accepting or rejecting a physical theory." Sharpe states that he does "not want to undermine the importance of MacKay's ideas," but concludes with the curious complaint, "MacKay also assumes theology and science have the same subject matter, namely, the world we experience. His removal of the other-world from the subject matter of theology is an example of the evangelical movement's adoption of secular thinking."

Passing from MacKay's complementarity with the parting remark that it does not make science and theology relevant for each other, Sharpe proceeds to the complementarity picture of Reich.[5] Here again some dubious critiques are offered, e.g., "Using a scientific explanation for a situation virtually rules out a theological one. The same holds in reverse." Perhaps a misuse of "explanation" at this point, instead of the more appropriate "description," leads to this mistaken conclusion, but it does not adequately describe complementary scientific and theological descriptions. When Sharpe says, "In general, I seek to understand the relevance of science and theology for each other, and their integration," I would agree completely. But then I can't imagine why he also says, "An evangelist's insistence that God stopped a hurricane hitting an area may conflict with a meteorologist's explanation."

As an alterative to complementarity, Sharpe proposes "a ladder model." "Science and theology are the two vertical poles of the ladder... The rungs depict what science and theology have in common in their knowledge and assumptions." Sharpe feels that Bohm's integration of his physics and religious beliefs "typify the ladder model." It is interesting that he then concludes by saying,

> My hope is that the ladder model upholds the intentions of the complementarity model. First, science and theology have the real world as a common reference. The challenge is to admit this and to investigate the extent of their similarities. Second, they are different because their definitions and the way they use concepts are not the same. These points are probably what MacKay intended with his model.

I would simply say that MacKay not only intended this, but actually achieved it.

In the final chapter of the book, Sharpe indicates that he intends to discuss several "questions raised by Bohm's physics and metaphysics for Christian theology." In an amazing illustration of the language mysticism with which this review started, Sharpe turns to quote from Barbour and Russell,[6] saying that Bohm's work

> ... is ripe for theological interpretation, because concepts such as cosmos, wholeness, fragmentation, and implicate order are extended as integrating metaphors to all of experience. Through it can come new language for God and human nature, for estrangement and community, for religious experience in contemporary culture.

What are these striking advances that come to us through Bohm's metaphysics? Sharpe names three: (1) Bohm's theology assumes there is a beyond completely inaccessible to us; (2) is the holomovement a product of the creator God, or is it the same as the creator God; (3) is there a purpose or development in the movement of the holomovement? He says that Bohm's perspective encourages interdisciplinary studies because it says no one perspective can provide the complete understanding, and each depends on the others.

Next Sharpe gives a summary of Russell's[7] evaluation of Bohm's perspective, which is too extended to be summarized here. When Russell proposes that Bohm's ideas could provide a new way of understanding a divine purpose in the world, Sharpe replies, "I am not as optimistic about this as is Russell because no strong picture of a purpose for the universe shines out of Bohm's writings." After giving Russell's interpretation of God's activity in nature, Sharpe comments,

> Unfortunately, Russell does not make it clear how God acts in or on the world, be it within the implicate order or otherwise. Neither is it clear what God does in these assumed actions. Further, suppose God's actions occur in otherwise unused levels in Bohm's infinity of levels. It would then be difficult to avoid a situation in which God is irrelevant for explanations."

In perhaps the strangest section of the book, Sharpe next considers "God in Bohm's Metaphysics." Using Russell once again as a reference, Sharpe says that Russell

> also looks at defining God to be the implicate order or the holomovement ... God so defined, Russell notes, need not be personal .... On balance, Russell concludes, Bohm is probably closest to a panentheistic image of God. God contains the universe.

Sharpe, however, is quick to point out,

> Russell has an incorrect understanding of the divine in Bohm's metaphysics. Bohm does not believe God is the holomovement or that God contains the holomovement, but rather he thinks the divine is beyond the holomovement, beyond all implicate orders. God is beyond them in ways that defy our ideas. In Bohm's scheme, the holomovement is part of the created order.

Sharpe then introduces the thought of Peters,[8] who felt that the "idea of a single reality probably attracts Bohm. Bohm would thereby deny two points: he would not make a distinction between God and the universe, and he would deny that the universe depends entirely on God." But again Sharpe disagrees. "Peters' interpretation of Bohm appears incorrect ... he errs in saying Bohm thinks there is only one reality ... Bohm's response to Peters makes this point quite clear: that the universe is not divine is especially important." Sharpe summarizes by stating that "Religious thinkers will and have equated the implicate order, the holomovement, with God, despite Bohm's intentions." To top it off he says, "Bohm might respond that the beyond is not a concept; it is a reality experienced through meditation and insight, in ways words cannot describe. I disagree."

The final section of the book is entitled, "A Holomovement Theology." At last we hope to find something positive that science is contributing to theology. Sharpe concludes the section by saying,

> Although Bohm does not think God is the holomovement, I found this idea a useful starting point from which to begin a theology.

He considers the holomovement idea as a model for God.

> There are two traditional ways of talking of God as creator. The first is that God created out of nothing at the beginning. The second is that God continually creates the world and all that is in it, moment by moment. Both forms of creative activity are present in the holomovement model of God.

Well and good. What has been shown at most is that the holomovement model may be considered in such a way as to be consistent with the traditional ways of talking about God as creator. What new insights has the science given us?

> The holomovement model says how this mechanism works, thereby describing how God operates. Scientific laws are descriptions of the way God works. They do not have any power themselves, nor do they refer to Platonic-like powers that exist as part of or at another level from the world. They describe the action of God.

We can agree with this statement totally. We agreed with this statement on biblical grounds long before the holomovement model came along. What new insights has science given us?

> Another attribute of the holomovement God is that God is personal ... we can move quite beyond Russell's conclusion that the holomovement God need not be personal .... God has to do with all personal traits. It also is possible to think of God as transcending personal attributes .... Thus God could relate to us personally. Whether this happens and, if it does, what form the relation takes, are subjects for theology to ponder.

Well and good. We believed this on the basis of the biblical revelation a long while ago. What new insights has science given us?

Now, science *has* given us new insights about many things that the biblical revelation did not do. It has informed us in many ways of how God acts in the world and of the ways in which God's actions are carried out, and it has helped us to understand some of the theological terms of the biblical revelation in physical terms that describe the outliving of those terms in the natural world. But science does not provide us with the basis for reformulating theology.

This is a valuable book to read or to share with someone else if they really believe that there are bright new days on the horizon when our biblical concepts of God and His relationship to us and the world will all be reworked in a scientific mode. Careful understanding of exactly what these revolutionary advances of science are should be a compelling antidote to non-biblical excesses.[9] *

Notes

[1]R. H. Bube, *Perspectives on Science and Christian Faith* 43, 273 (1991)
[2]F. Capra, *The Tao of Physics*, New York: Bantam Books (1977)
[3]J. Boslough, *Stephen Hawking's Universe*, New York: William Morrow & Co. (1985)
[4]D. M. MacKay, *The Clockwork Image: A Christian Perspective on Science*, London: Inter-Varsity Press (1974)
[5]K. H. Reich, *Zygon: Journal of Religion and Science* 25, 365 (1990)
[6]I. G. Barbour and R. J. Russell, Zygon: *Journal of Religion and Science* 20, 107 (1985)
[7]R. J. Russell, *Zygon: Journal of Religion and Science* 20, 135 (1985)
[8]T. Peters, *Zygon: Journal of Religion and Science* 20, 191 (1985)
[9]R.H. Bube, *Putting It all Together: Seven Patterns for Relating Science and Christian Faith*, Lanham, MD: University Press of America (1994)

God's Scientists Under the Microscope

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God's Own Scientists: Creationists in a Secular World *by Christopher P. Toumey. New Brunswick, New Jersey: Rutgers University Press, 1994. 280 pages, index; hardcover, $45.00; paperback, $15.00.*

This interesting work seeks to open up the mind of modern creationism to those who stand outside conservative Christianity. ASA readers, while knowledgeable concerning the religious faith and the history of the movement, can also profit from this "outsiders" sociological analysis of creationism's roots and the detailed case study of a creationist study group based in the North Carolina research triangle. Openly Catholic and evolutionist, anthropologist Christopher Toumey gained a remarkable rapport and understanding of these creationist activists who welcomed him to their meetings, freely opened themselves to his questions, and asked him to offer prayer. Toumey's evenhanded report provides a needed corrective for the stereotypes that generally accompany the movement. His work complements Ron Number's magisterial *The Creationists: The Evolution of Scientific Creationism* (1992).

Toumey argues that modern creationism is a system of cultural meanings about both immorality and science that helps conservative Christians make sense of the realities, anxieties, changes and uncertainties of late 20th century American life. Creationism links these feelings to the problem of evolution. The point is aptly made in a cover graphic which depicts biological evolution as a tree trunk linking roots of sin and unbelief with limbs of philosophical evolution whose fruits include hard rock, inflation, abortion, crime, secularism, dirty books, feminism, etc. Scientific creationism is depicted as an ax cutting through a tree trunk to destroy this evil influence. Scientific creationism is more than a debate over the interpretation of early *Genesis* in spite of the fact that the immediate response of anti-evolutionists is to point to ways that evolution undercuts the Bible. Toumey's picture accurately portrays the national oracles of creationism and grass-roots Christian thinking.

The author argues that modern creationism has turned earlier anti-science fundamentalism on its head by using the authority of science to support creationism — as God's own scientists. He offers a picture of the changing American Protestant views on science during the 19th and early 20th Centuries which ended in estrangement from any link with science. By the late 1930's science and religion were seen as separate spheres engaged in philosophical conflict. The ASA (1941) emerged as the sole evangelical group willing to grapple with science-faith issues — but "with troubled ambivalence."

Toumey identifies the publication of Whitcomb and Morris's *The Genesis Flood* (1961) as the point at which conservative Christianity invoked the authority of science to support young earth creationist claims. The rebirth of an activist anti-evolution movement, its organizations, leading figures, political and legal struggles and, finally, the counterattack of the scientific establishment in the 1980s are a familiar story to ASA readers. Toumey notes that in a 1981 nationwide poll response 76% of adults felt that both the "theory of evolution" and the "biblical theory of creation" should be taught in high schools — a major creationist triumph. Other triumphs were later muted by legal challenges based on the Establishment Clause of the Constitution. One

vexing problem lies in the lack of serious interest on the part of most conservative Christians. Although they are anti-evolution to the core, the complexity of science and more emotionally held issues such as abortion, values, and school prayer have forced evolution from their center stage. Creationists have great influence in Christian academies and among home schoolers.

North Carolina activists saw little success in projecting creationism into the public schools in spite of a plurality of Baptists in the region. Baptist diversity and a lack of effective leadership were major factors preventing political action.

The creationist group that Toumey studied met at the home of a science professor at a major university. Most of the group were employed in science or medicine. They were led by another science professor who faithfully promoted the line of Henry Morris. The meetings generally involved packaged presentations of the Institute for Creation Research which received little critical evaluation. Toumey found the individual members to be flexible in their private judgements and even in group discussion yet adamantly supportive of Morrisonian orthodoxy in public. Typically the scientists in the group worked on projects that were devoid of creationist/evolutionist implications. Toumey details evidence that two of their number underwent job discrimination because of their creationist views.

Toumey makes many apt statements about the beliefs of the creationists he interviewed. He was amazed by their diversity of views in spite of public support for Morris. He found little understanding of the philosophical and historical roots of the creation-evolution controversy.

In such a far reaching work it is easy to dispute individual observations. In the main this is an accurate and enlightening achievement. I feel that it would have been improved by attention to the writings of David Livingston and Jim Moore on the earlier history of the debate. Morris and company were hardly the first to argue for a biblical view of creation on scientific grounds. The abdication of intellectual responsibility by conservative Christianity in the early decades of this century cut off what had been an earlier, albeit modest, scientific debate.

I doubt that one can make the generalization that *The Genesis Flood* singlehandedly "reversed the popular painful assumptions ... since the Scopes trial ... that science and conservative Protestantism stood against each other in philosophical conflict." This appeal to the conflict theory does not stand up to the rhetoric of those who opposed evolution in that period or explain the absence of evangelicals in academic science in the second quarter of this century. The experience of young Irwin Moon in responding to a call to the ministry rather than enter a career in science was characteristic of many talented Christian youth who felt it more important to 'go into full-time Christian work' than become a historian, an economist, or a scientist. Moon's later career change to establish the Moody Institute of Science (and influence the founding of the ASA) was part of an evangelical mid-century move to re-enter the cultural main-stream.

While *The Genesis Flood* would articulate the gospel of modern creationism, the emergence of the movement owes much to the increasing openness to evolution that was taking place in the ASA in the early 1950's. The willingness of Larry Culp, Frank Cassel, and Russ Mixter and a "brash young [Walt] Hearn" (Numbers, p. 178) and other Ph.D's to discuss the unthinkable and the publication of the Darwin Centennial volume, *Evolution and Christian Thought Today* (1959) edited by Mixter, precipitated the split that led some ASA members to form the Creation Research Society for which *The Genesis Flood* became a confession of faith.

The issue for Whitcomb and Morris lay not in the interpretation of science "but simply what God has revealed in His Word concerning these matters." (Numbers, p. 207) The pages of *Perspectives* amply demonstrate the passion with which the place of scripture and science in the question of origins continues to be discussed.

Author Toumey seems a bit overimpressed by the scientific credentials of the Research Triangle group and other creationist activists. The relation between the scientific backgrounds of Creationism's leadership and the fields they seek to critique is weak. Creationism is caught in a strategic bind in arguing its scientific case. The cost and time required to mount a serious research program forces the movement to primarily argue alternative interpretations of existing data or attack the philosophical foundations of evolution. The need for quick results to serve a fickle support network inevitably results in rash statements which not only do disservice to their cause but embarrass the greater cause of Christ.

One fuzzy part of Toumey's approach is found in his attempt to link order in engineering, order in creation, and moral order in society under a premillenial rubric where sin is equated to entropy. For these engineers God's creation is a *closed* system flawed by sin; their denial of a difference between

open and closed thermodynamic systems is thus based on theology rather than science. Toumey's attempt to deconstruct the creationist mind on thermodynamics is interesting but unsupported by any literature citations. First, not all creationists are premillenial. Secondly, creationists do not openly tie their thermodynamics with theology; in fact they seek to state their case on scientific grounds *alone*.

Toumey's generalizations about protestant attitudes and social groupings suffer from his outsiders stance. This is seen in his attempt to lump conservatives into Southern Baptist, Moral Majority, Evangelical and Seventh Day Adventist groupings. There is a huge group of independents and baptists of many stripes as well as confessional conservatives who don't fit comfortably into these pictures. The complex variety of social and cultural factors in American Protestantism defies analysis.

The author effectively explodes the fallacy that modern U. S. anti-evolutionism is but one story or and that its exponents base their case exclusively on biblical grounds. However, we must not forget that the creationist movement is founded in religious belief and the ancient notion that the books of God and nature will tell the same story when each is properly understood. Current strategies combining science, philosophy, and political action are the most recent of several centuries of apologetic approaches designed to promote the Gospel. Toumey has done a service in opening up the North Carolina group to view. Further, he has accomplished his goal of contributing to comprehension rather than condemnation, yet in holding up the inconsistencies of the movement he offers believers one more chance to repent of their ways.

A recent Christians in Science conference on creation and evolution closed with one observer noting that "the conclusive right answer still eludes us." This continues to be the case for many in the ASA community. In the end it was the Christian character of the North Carolina creationists that most impressed observer Toumey; that is as it should be.

Toumey's work deserves space on ASA shelves. *

THE EVANGELICAL ENGAGEMENT WITH SCIENCE

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MARCH 30 – APRIL 1, 1995

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Book Reviews

CREATION AND TIME by Hugh Ross. Colorado Springs, CO: NavPress, 1994. 187 pages, notes with bibliography, indexes. Paperback; $10.00.

Ross tackles the central issues of the age-of-the-universe debate in his latest book, *Creation and Time.* It departs from his two previous works, *The Fingerprint of God* and *The Creator and the Cosmos,* in that it is intended primarily for a general Christian audience rather than a secular one. He is more than qualified to discuss the theological and scientific evidences pertaining to this controversy. Ross, who has a Ph.D. in astronomy, worked as a post-doctoral fellow at CalTech for several years before creating the evangelical organization Reasons to Believe. He travels the country giving lectures mostly to scientists and participates in many debates with so-called "young earthers."

After reading through a concise historical summary of the age-of-the-universe debate going back 2000 years, we get to the meat of the book with the chapter entitled "Biblical Basis for Long Creation Days." Many of the arguments in this chapter are expanded versions of those in *The Fingerprint of God,* including the standard analyses of the word Yom, the events of the sixth day, and the uniqueness of the seventh day. Taken together, the nine arguments form a strong case for the old-universe interpretation of Scriptures. In the chapter describing the theological implications of long creation days, Ross attempts to respond to the many objections raised by young-earthers. He bases most of his theology on the dual revelation of Scriptures and Nature, citing 23 verses from the Bible supporting this view — five more than in *The Fingerprint of God.* Noteworthy is the amount of space devoted to a discussion of the issue of death and decay before Adam's sin. This is not surprising considering that this is one of the most significant points of contention between old- and young-earthers.

The other important chapter in the book is the one dealing with scientific evidences for an ancient universe. Not surprisingly, Ross's three strongest points all come from astronomy: the expansion of the universe, stellar burning rates, and abundances of the radioactive elements. He spends the remainder of this chapter and the next one refuting supposed young-universe evidences. Overall, his refutations are quite strong with the exception of Robert Gentry's work with ^{218}Po haloes. While he does discuss the rarely cited work of geologist Jeffrey Wakefield, who showed that Gentry obtained his samples from young dikes rather than from Precambrian granites, he fails to offer an adequate alternate explanation of the formation of the ^{218}Po haloes. He states "... since one of the three 'mysterious' classes of radio haloes has now been explained in terms of normal (old-earth), known physical processes, it is reasonable to conclude that the same will eventually be accomplished for the two remaining classes, including Gentry's polonium 218 haloes." This is nothing more than wishful thinking. He also fails to mention Gentry's work with polonium haloes in caliphate wood, which has a more direct bearing on the age-of-the-earth debate.

One of the most memorable passages in the book is the following:

With odds as remote as 1 in $10^{100,000,000,000}$, the creation time-scale issue becomes irrelevant. Whether the earth has been around for ten seconds, ten thousand years, or ten billion years makes no difference. Nor does the size of the universe matter ... Given these numbers, how absurd for Christians to argue about a mere factor of 10^6 (the difference between a universe created ten thousand years ago compared to 10 billion years ago)!

His point is simply that natural biological processes fail utterly to account for life in the universe, and that just because someone is an old-earther does not mean he is a biological evolutionist. This is an important point, since young-earthers frequently label old-earthers as evolutionists.

In summary, Ross presents a strong defense of the old-earth position, providing extensive notes and citing the recent scientific literature. Rather than increasing the conflict between old- and young-earthers, I hope this book will bring the two groups closer together. He ends the book with a "proposal for lasting peace" between the two factions in the age-of-the-universe debate. He proposes forming a council, similar to the first-century Jerusalem council, which would lead to a settlement of the disputes. I highly recommend *Creation and Time* to anyone even slightly interested in this topic.

Reviewed by Guillermo Gonzalez, Post-Doctoral Research Astronomer, University of Texas, Austin, TX 78712.

MYTHOLOGY'S LAST GODS: Yahweh and Jesus by William Harwood. Buffalo, NY: Prometheus Books, 1992. 416 pages, appendix, index, bibliography; $24.95.

This book is based on the author's Ph.D. dissertation from Columbia Pacific University. The book was twice accepted for publication in 1980 and again in 1985, but the first publisher went out of business, and the second died before the book could be produced. From the author's perspective, these delays could not have been the acts of divine providence, for as the title indicates, Yahweh and Jesus are mythological ontological reality.

The book runs through (and over!) the entire Bible, purporting to prove to any open-minded, intelligent reader that the Bible is fiction from beginning to end, and that therefore God does not exist. The author seems to believe that if he can rid the world of Yahweh and Jesus, the world will be done with religion forever. The author seems especially determined to expose biblical taboos concerning sex so that free, recreational sex can be restored to humankind.

While the book claims to be based on pure scholarship, and therefore its conclusions must surely be beyond dispute, the author approaches the material with an attitude of total skepticism. It is quite evident that his skepticism overwhelmed his scholarly integrity time and time again. While he does have a bibliography, the author repeatedly makes statements which are pure opinion, with no footnotes to back up his conclusions. For instance, even as late as Roman times, the execution of Jesus the Nazarite for rebellion was retroactively hailed by his followers as a sacrificial substitute for the deserved death of a multitude of "sinners" (p. 43). "But the most vicious portrayal his god as a vengeful psychopath was painted by Jesus the Nazarite and is to be found in the Christian gospels" (p. 45). "Yahweh was a mass murdurer ..." (p. 235). He refers to the Apostle Paul as "a nominal disciple of the Nazarite messiah" (p. 246). "Essene moral and ethical teaching, which later became Christian teaching, was self-contradictory" (p. 247). "Jesus ... was particularly vehement in his denunciation of family ties and private property" (p. 249). "... Joseph and Mary were Galileans ... who never visited Bethlehem in their lives" (p. 259). Sadly, such statements abound throughout the book. Every statement quoted above is an example of the author's bias, having nothing whatever to do with scholarship.

The author's handling of pre-Christian religions in the earlier sections of the book suffer from this same defect. Statements are made which are nothing more than the author's opinion, having nothing to do with scholarly conclusions. An honest scholar tries to present alternative interpretations, but one finds little of that in this book. Christian interpretations and understandings are summarily dismissed. One searches in vain for a statement saying, "Some Christian scholars can make a strong case for a different conclusion ...," but such statements are not to be found.

Since all Christian scholarship is dismissed as biased and unreliable, the author in effect undercuts his own credibility. He, too, is biased against the truth claims of Scripture as revealed in his numerous outrageous statements, and if having a bias discredits one's scholarship, then Harwood must discredit his own book in order to be consistent.

The author has utterly failed in his goal of demonstrating the falsity of religion once and for all. Such a goal is far too ambitious, for to "prove" once and for all the non-existence of God is to attempt to prove a universal negative, a task beyond the limits of human ability. He has succeeded only in revealing his own personal dislike for the Bible, Yahweh, and Jesus. For those interested in reading a fine example of anti-Christian propoganda, I recommend the book. For those interested in a scholarly discussion of religious truth claims, save your money.

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

WITH LIBERTY AND JUSTICE FOR WHOM? The Recent Evangelical Debate over Capitalism by Craig M. Gay. Grand Rapids: Eerdmans, 1991. 276 pages, index. Paperback; $19.95.

With Liberty and Justice for Whom? first took shape as a doctoral dissertation under Peter Berger. The book reflects that start with careful documentation and a sociological perspective. In a debate that is often acrimonious, Gay is scrupulously fair to each examined author. His purpose is "to get to the bottom of the evangelical debate over capitalism, an attempt to determine just how it is that evangelicals, who share a fairly broad range of theological commitments, can have arrived at such radically different assessments of one of the more central institutions in modern American society." After an extensive analysis of scholars under three major headings of left, right, and center, he concludes that evangelical scholars have to various degrees been co-opted by the class conflicts of wider society. For many, their perspectives have been shaped and polarized more by the secular discussion than by the Christian tradition.

His analysis relies heavily on the sociology of knowledge. Gay writes that all knowledge is social knowledge, functioning within socially constructed constraints. Class interest does not explain the content of all held ideas, but it can help explain interest in particular concerns. People tend to focus on what addresses their needs and bolsters their case. In this discussion, one side speaks almost solely of personal liberty and the other almost exclusively of distributional justice. Compounding the lack of dialogue, neither side agrees on what justice or liberty actually is. According to Gay, this foundational conflict is a manifestation of the wider society's conflict between the new middle class and the old middle class. The "new class" thesis is that since the second world war the main class conflict in American society has been between the old middle class associated with business manufacturing and distribution, and the new middle class that owes its wealth and status to the dissemination of information, as in education and media. The New Class owes much of its power to the modern welfare state and so is interested in expanding it.

Gay believes many evangelical scholars have been unduly influenced by the new and old classes, reflecting more class concern than specifically Christian insights and commitment. Further, both left and right have granted too much importance to economic life. God's kingdom is not dependent on the triumph of capitalism or socialism.

After such a ringing indictment, Gay does not leave the reader without any economic system. He recognizes that we do have to live within some economic structure. Subtly evaluating the predominant choices in the closing chapter, Gay concludes that with all its limitations, a basically market system of free exchange serves the goals of justice and liberty better than any alternative.

The book serves as an insightful summary of a wide spectrum of evangelical thought on economics, ending in a call to distinguish what is of the gospel from what is merely a reflection of group interest. It is highly recommended both as a detailed overview of the debate and for its gracious, yet incisive, discernment.

Reviewed by James C. Peterson, Assistant Professor of Religion and Philosophy, Director of the Program in Religion, Ethics, and Technology, Wingate College, Wingate, N.C. 28174.

FAKES, FRAUDS AND OTHER MALARKEY by Kathryn Lindskoog. Grand Rapids, MI: Zondervan Publishing, 1993. 288 pages. Softcover.

According to the dust jacket, the author has been uncovering fakes and forgeries since she was eighteen. One of her books, *The C. S. Lewis Hoax* (1988), exposes forgery and fakery related to the famous author since his death in 1963. To help the reader who would like to know more about the subject, the book closes with a list of sixty-two recommended readings.

The book has eight chapters, each with an introduction and three sections. There is a "Hoaxer's Epilogue" and an appendix, "Biblical Wisdom about Deception." The subjects covered range from childhood pranks to deceptions of the worst kinds. After reading a chapter or so, one wonders if anyone is honest. The book is amusing but distressing at the same time.

Following are brief versions of a few of the accounts included in the book. In 1917 a Brooklyn art dealer had bought several copies of a "modest" nude painting. The sales were very disappointing, so the dealer had a friend set up one of the copies in an attractive window setting. Next he hired several young boys to stand in front of the window and take it all in. He then reported this immoral situation to the authorities, resulting in the arrest of the art dealer. The trick was so successful that seven million copies were sold, and the original is now in one of the nation's leading art museums.

Stories about dishonest medicine peddlers are not new, but the next illustration shows how far some will go. In 1987 an American pharmacist produced 1201 bottles of Naprosyn. It cost him $21,285. He unloaded them on the drug trade for $192,680, claiming that he was overstocked. When a druggist discovered that the pills were mostly aspirin, the man fled to London where he mounted an even larger scam selling what he claimed were three major drugs. Fortunately he was caught and put in jail.

Sometimes plagiarism can lead to a happy outcome. In the mid-1700's a writer for *Gray's Inn Journal*, not feeling like writing his column that day, translated an article from a French journal. After it was published in his English version, he discovered that it was by Samuel Johnson who had written it originally in English. He rushed to Johnson's home, confessed his crime, and became a close friend of Johnson's for more than twenty years.

Some accounts of fraudulent behavior center on whistle blowing. One of the contestants on the television game show, "The $64,000 Question," learned that he was being fed answers in advance, so he reported it to several of the major media. No one believed him until another contestant made similar charges. Rather than being commended for his revelation, he felt ostracized by his friends and acquaintances.

Practical jokes often involve harmless deception. In March, 1860, many London residents were invited to view the annual ceremony of washing the white lions. Admittance would be at the white gate only. Many carriages arrived, but there was no white gate and no ceremony.

Hoaxes can be expensive. A bogus murder confession was carried on a Los Angeles radio station in 1990. The Sheriff's Department searched for months for the fictional murderer and spent some $12,000, before learning that it was a hoax.

The book would do well on a coffee table, because it can be read in any order. Also it might be a good source of illustrations for sermons or lectures. The appendix, "Biblical Wisdom about Deception," might be very helpful to the pastor or teacher. There is no index, so the reader may wish to make his or her own for future reference.

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

OUT OF THE DARKNESS: Coping With Disability by Robert Lovering. Phoenix, AZ: Associated Rehabilitation Counseling Specialists, Inc., 1993. 138 pages. Paperback; $7.95.

Lovering contracted polio in 1946 at the age of 18 and has been confined to a wheelchair ever since. He graduated from Northwestern College and was ordained in 1957. Because of his disability he was drawn into counseling the severely disabled and those who have been diagnosed as having some potentially crippling disease such as multiple sclerosis. This counseling not only involves the disabled person but also the parents, spouse, children, friends, and relatives both at the time of the crisis and later, dealing with the ongoing problems that result from severe disability. His insights come not only from such counseling but especially from the problems he himself has faced as he has sought to live a reasonably normal life with a family and children while a paraplegic in a wheelchair.

The cover has a striking photograph of the author in a wheelchair, mounted on a battery powered lift with a trowel in hand laying bricks on a wall of his house. This indomitable spirit shows through in his writing but he warns friends and family not to insist that the disabled person can do anything if he\she tries hard enough. This can put an unneeded burden on the handicapped person.

The reviewer himself has experienced a traumatic disability by a head wound during World War II which left him paralyzed on one side. The insights that the author gives in dealing with the crisis and the ongoing disability ring true. This book should be helpful for persons who have had a crippling accident or have been diagnosed as having a potentially crippling disease. The author had earlier published another book on disability: *Out of the Ordinary: A Digest on Disability*, (1985).

Reviewed by Deryl Johnson, Professor of Biblical Studies, retired, Warner Southern College, Lake Wales, FL 33853.

THE NEW GENESIS: Theology and the Genetic Revolution by Ronald Cole-Turner. Louisville, Kentucky: Westminster/John Knox Press, 1993. 127 pages, index. Paperback; $12.99.

This is not the best, nor yet the worst book attempting the marriage of the topics indicated by the subtitle. If you haven't read such a work, you should, and this one would serve. There are no figures or diagrams. He gives an eight page list of references, (which mistitles Lynn White's famous article) and a three page list of recommended reading. *Perspectives* doesn't occur in either. (*Zygon* does.) What would strike most of the readers of *Perspectives* as a much more fundamental problem is illustrated by this quotation from the chapter "Redemption & Technology":

> In story after story, Jesus is portrayed as a compassionate healer. Yet is it [sic] precisely on this most obvious and unanimous point that modern theology has experienced great difficulty. Miracles are widely seen as impossible since they are thought to violate the laws of nature as understood by science. Since miraculous healings are impossible, modern theology largely agrees that they could not have happened as the Gospels claim. (p.80)

In spite of my own problems with Cole-Turner's view of scripture, I don't disagree much with what he says about the genetic revolution. He is advocating a responsible role, in the fear of God. The chapters include: "The Age of Genetic Engineering," an introduction to the techniques and their uses; "What Are We Doing?", an attempt to put genetic engineering in cultural context, where culture includes religion; "The Purpose of Genetic Engineering"; "Responding to the New Situation," a summary of the views of theologians, namely Rahner, Ransey, Brungs, Shinn, Nelson and Schwarz, and church bodies, namely the World and National Councils of Churches, and some other ecumenical and denominational groups; "Redemption and Technology;" and "Participation in the Creation." In these last two chapters, the author gives his own analysis of what religion says about technological intervention, from which I extract the final three sentences of the next-to-last chapter:

> Theology does not produce certainty or banish ambiguity. This fact, however, should not keep us from seeking to serve God's redemptive purposes through our technology. It should serve rather as a humbling reminder that redemption must always be taking place in us even as it takes place through us. (p. 97).

Reviewed by Martin LaBar, Central Wesleyan College, Central, SC 29630-1020.

BEING CHRISTIAN TODAY: An American Conversation by Richard John Neuhaus and George Weigel, (Eds.). Washington, DC: Ethics and Public Policy Center, 1992. 308 pages, 33 pages of notes, index of names. Hardcover.

This book is based on the conference, "To Be Christian in America Today," which took place in Washington, D.C. in April 1991. About ninety individuals participated in the conference with representatives of evangelical Protestant, liberal Protestant, and Catholic thought. Evangelical participants included Os Guinness, Carl F. H. Henry, Mark A. Noll, Ronald J. Sider and James W. Skillen; of these only Mark Noll is a contributor to this book. The editors are Richard John Neuhaus, president of the Institute on Religion and Public Life in New York City and editor-in-chief of the monthly journal *First Things*, and George Weigel, president of the Ethics and Public Policy Center in Washington, D.C. and frequent commentator from a Catholic perspective. Difficult questions are considered in the book, such as those related to abortion, individual liberty and the nature of the community, poverty and the crisis of urban poor, and America's world role after the Cold War.

The book consists of nine chapters on the following topics: "Catholicism and the American Future" (George Weigel), "Liberalism Revisited" (Max L. Stackhouse), "The Scandal Of Evangelical Political Reflection" (Mark A. Noll), "Protestants and Natural Law" (Carl E. Braaten), "The Spirit of Freedom" (Glenn Tinder), "Abortion" (Jean Bethke Elshtain), "The Lay Vocation" (Christa R. Klein), "Christians and The New World Disorders" (J. Bryan Hehir), and "The Democratic Capitalist Revolution" (Michael Novak). Each chapter is followed by a response by two other participants. The book concludes with an Afterword: "Can Atheists be Good Citizens?" by Richard John Neuhaus.

Any attempt to summarize in this review the large number of issues discussed in this book would be unsuccessful simply because of the variety involved. A review of the book printed on the back cover describes it as "a model of urban and incisive dialogue." If there were any criticism to be brought against the book as a whole, it

would be that perhaps it is just a little too "urbane." Perhaps issues that really matter require a little more passion and a little less urbanity. Of particular interest to readers of this review might be the following contributions.

Mark Noll pinpoints four elements in the evangelical framework for political reflection and action in the twentieth century: "moral activism, populism, intuitionism, and biblicism." He proceeds with a perceptive analysis of five periods of political reflection among evangelicals: (1) 1896-1925, the age of Bryan; (2) 1925-1941, the age of Fundamentalism; (3) 1941-1973, the age of Beginnings; (4) 1973-1989, the age of the New Right; (5) 1989 - , the Post-New Right age. Particular handicaps to evangelicals for effective political reflection and action are said to be biblicisms like dispensational premillennialism, and "anti-intellectualism, the God-and-country reflex, and the denial of contemporary American pluralism."

In the Afterword, Richard John Neuhaus shows some passion in treating his topic, "Can Atheists Be Good Citizens?" Perhaps to the surprise of many, he concludes that the answer to this question is "No". On the way to this conclusion he treats early Christian "atheists," political atheism, the ersatz god, attempts to preclude "God talk," deconstruction and self-construction, debunking autonomous reason, and citizenship and a higher truth. He writes, "An older form of atheism pitted reason against the knowledge of God. The new atheism is the atheism of unreason."

This book touches only indirectly on the interaction of science and Christian faith, since its main concern is in the political realm. It could well be used, however, both as an opportunity for personal understanding, and as the basis for a series of group discussions, giving the members of the group the opportunity to share their responses to these articles.

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

COSMOS, CHAOS AND THE WORLD TO COME: The Ancient Roots of Apocalyptic Faith by Norman Cohn. New Haven, Connecticut: Yale University Press, 1993. 271 pages, index. Hardcover: $30.00.

When you see the title of the book you may think of (mathematical) chaos theory research into the cosmos and its future. Or, maybe, you think that the writer will thoroughly treat the future of the cosmos as seen by some Christians. You will be wrong in both respects. Only the last thirty pages talk about Christian faith and the future Christians expect.

The main thesis of the book is that all religions in Asia and Europe derive from myths which originated on the steppes of Central Asia. Judaism took much from Baalism. The writer claims that Zoroaster influenced Christianity very much. Scientists may feel that the reasoning is very weak. The book is full of assumptions which will irritate scientists. It seems that the writer started out with an assumption and works toward that by further assuming the necessary hypotheses. Only if you are interested in myths will you enjoy the book, as I did in many parts of the beginning of the book.

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

THE BOOK OF SCIENTIFIC ANECDOTES by Adrean Berry (Ed.). Buffalo, NY: Prometheus Books, 1993. 239 pages, index. Hardcover; $29.95. Paperback; $15.95.

Adrian Berry, science correspondent of Britain's *Daily Telegraph*, has written two science-fiction novels, several computer software programs, and six non-fiction science books. This book is a collection of some 65 anecdotes and historical accounts of inventions, discoveries, and other activities such as explorations and murders.

In spite of the book's title, less than one third (18 out of 65) of the anecdotes truly deal with science; the rest are strictly non-science. I counted 26 scientists and 39 non-scientists in all the anecdotes. Half of the anecdotes are not really interesting to me; in fact, about one third are not interesting at all. Generally speaking, anecdotes are best if they are short. Of the 65 anecdotes, about one third are too long.

The book has not been thoroughly proof-read. Misspelled words and missing words appear throughout the book. The name Leo Szilard is consistently spelled as Slizard five times (pp. 173, 174). Is the latter the British spelling or Hungarian spelling? The author does not tell.

The book has 12 interesting cartoon-like illustrations and four serious illustrations. It also has an extensive bibliography.

Members of the American Scientific Affiliation may enjoy reading many, but probably not all, of the anecdotes in this book. The science in this book is about that of high school level.

Reviewed by James Wing, 15212 Red Clover Drive, Rockville, MD 20853.

ONE LONG ARGUMENT: Charles Darwin and The Genesis of Modern Evolutionary Thought by Ernst Mayr. Cambridge, MA: Harvard University Press, 1991. 195 pages, index. Paperback; $10.95.

As the title suggests, the subject of this book is Charles Darwin and his influence on the development of evolu-

tionary thought. The author points out in the preface that this particular book was not intended for specialists in evolutionary biology, but rather for "students and lay people broadly interested in the role of Darwin's thought on the history of ideas." To this end, the author has accomplished his task.

From a very brief introduction to Darwin himself, the author moves quickly to the history of evolutionary thought from 1859 to the present. The main topics of discussion are speciation and natural selection, but other ideas of Darwin are also mentioned. Mayr explores the opposition to Darwin's theory as well as the effects which it had upon philosophy, ideology, theology, and the various branches of science.

One particularly interesting aspect of the book is Mayr's discussion of the personal development of these ideas within the mind of Darwin. Mayr describes in some detail, for example, Darwin's loss of his Christian faith and the replacement in his mind and his theories of design and the supernatural with nondirected natural processes.

Most of the discussion centers around the period immediately after 1859 until about 1900. The author discusses the effects which the theory had upon various areas of biology as well as other areas of science. Mayr also examines the "modern synthesis" and briefly mentions current ideas such as punctuated equilibria.

The book is fairly readable and more accessible than some more specialized books in this area. It contains a detailed glossary of the more technical terms and also an extensive list of references for those interested in further reading.

Reviewed by Phillip Eichman, University of Rio Grande, Rio Grande, OH 45674.

THE CONTEMPORARY CHRISTIAN: Applying God's Word to Today's World by John Stott. Downers Grove, Illinois: InterVarsity Press, 1992. 432 pp., index of names, index of subjects, 29 page study guide. Hardcover.

This book is a companion volume to *Issues Facing Christians Today*, previously authored by John Stott and published by Revell. This earlier book explored questions of social ethics, while the present book relates to questions of doctrine and discipleship under the five headings: "The Gospel," "The Disciple," "The Bible," "The Church," and "The World." Since the principal purpose of *Perspectives on Science and Christian Faith* is to deal with issues relating to the interactions of science and Christian faith, the earlier volume is clearly more directly related to the specific concerns of the ASA. On the other hand, this book provides a useful and comprehensive theological basis on which to make the decisions required by such interactions. The brevity of this review is therefore dictated by the specific orientation of the content of this book in comparison with the ASA's objectives, and not at all by the quality of that content.

In these circumstances I can hardly do better than quote from the review of this book by revered teacher and author J. I. Packer published in *Christianity Today* (Feb. 7, 1994). "So the book is an expository treat. It is really a pastoral essay, a sermon on paper aimed at changing people rather than the advancement of learning as such. Bible based and well researched, intimate and magisterial in style, passionately calm and generous to a fault, this is a finely arranged and beautifully written contribution to what Stott calls 'BBC': "balanced biblical Christianity."

The book is characterized by an outstandingly balanced treatment, following what Stott calls "double listening": listening to God's Word and listening to the men and women of this world. His perspective is well summarized in the following: "Are we obliged to choose between retreating into the past and making a fetish of the present, between reciting old truths which are stale and inventing new notions which are spurious? Perhaps the greater of these two dangers is that the church will attempt to recast the faith in such a way as to undermine its integrity and render it unrecognizable to its original heralds. I propose to focus on this problem now; the rest of the book is addressed in different ways to the complementary problem of relevance" (p. 18).

This book would make an excellent resource for use in adult education classes, covenant groups, and pastoral sermons. Who would expect otherwise from a book by John Stott?

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

RISEN INDEED: Making Sense of the Resurrection by Stephen T. Davis. Grand Rapids, MI: Eerdmans Publishing Company, 1993. 220 pages. Paperback; $16.99.

In this book, Davis examines the Christian doctrine of bodily resurrection. Basing his judgment on what he knows about history, the Bible, and philosophy, Davis concludes that faith in this doctrine is logical. Davis deals with a variety of issues including reliability of the resurrection accounts, preservation of personal identity, soul-body dualism, and literal vs. spiritual resurrection. However, his central theme is that Jesus was raised bodily from the dead and that Christians will be raised from the dead, too.

The book is divided into ten chapters and includes an index and a bibliography. Some of this book has appeared in previous publications. The book is intended for both scholars and laypeople. The author, a member of the Claremont Graduate School faculty, has written dozen of articles and seven books. His academic interests are philosophy and religion which he has taught in seminaries.

While Davis believes that faith in the resurrection is rational, he does not believe that rational argument can either verify or falsify the resurrection. Davis aligns himself with the majority of philosophers who think that David Hume's argument against miracles is overstated. An admirable quality of this book is its ability to be fair and open in its treatment of opposing views. Davis does not overlook arguments against the resurrection, but deals with each one in a kind way. Davis believes that most people who believe in the resurrection hold to supernaturalism (there is a God) while those who do not believe in the resurrection hold to naturalism (there is no God).

Davis correctly points out that the naysayers to the resurrection speak with vague expressions that make no sense and that do not accurately reflect the New Testament resurrection accounts. For instance, even advocates of existential theology might have trouble comprehending what one reductive theorist means when he says that Easter morning provided a way "to know Jesus as ultimacy in the historicity of the everyday" (p. 36).

There are, according to Davis, four resurrection views held by contemporary Christians: bodily resuscitation, bodily transformation, spiritual resurrection, and reductive resurrection theories. Davis believes "the New Testament accounts of Jesus' resurrection can best be understood on a bodily transformation model." Davis concedes that the arguments against the empty tomb are interesting and thoughtful, but they are not convincing.

The arguments against an empty tomb are presented along with a plausible response to each. While to the skeptic "historical criticism has made the empty tomb a dubious factor and the conclusions of natural science have rendered it suspect," to Davis "Jesus' tomb was empty. The arguments against it are not convincing, and the strongest arguments for it have not been successfully answered."

Other interesting topics which Davis relates to resurrection include dualism, physicalism, judgment, apologetics and meaning.

This book is on an interesting and relevant topic presented in a readable and engaging fashion. Davis is not pedantic; his presentation of his prolific ideas is consumer oriented. For those who look forward to a future life, and for those who wonder if there is one, this book will provide reassurance and enlightenment. I highly recommend it to those who look for "scientific" evidence that there was and will be a resurrection of the dead.

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

HOLY SCRIPTURE: Revelation, Inspiration and Interpretation by Donald G. Bloesch. Downers Grove, IL: InterVarsity Press, 1994. 384 pages. Hardcover.

Donald Bloesch is professor of theology emeritus at Dubuque (Iowa) Theological Seminary. In *Holy Scripture*, the second volume in a projected seven-volume systematic theology, Bloesch attempts to present an evangelical understanding of the pivotal doctrines of biblical revelation, inspiration, and interpretation that avoids both "evangelical rationalism" on the right and "liberal experientialism" on the left. He argues for a view of biblical authority that sees scripture as the *written* Word of God and yet stresses that it becomes the *living* Word of God through the illuminating presence of the Holy Spirit.

The author wishes to argue for a "sacramental" understanding of biblical truth and authority, in which that absoluteness of divine revelation is mediated through the relativities of the human witnesses. Our modern technological society tempts us to see truth in terms of accuracy and precision rather than wisdom and depth of insight (p. 291). In the ultimate sense truth, according to the author, is not so much a conforming of the mind to objective reality (correspondence theory of truth), but rather the "refocusing of the mind by the Spirit of God, who breaks into our reality from beyond" (p. 287). One might ask at this point, of course, whether one needs to choose between conforming the mind to objective reality and having the mind refocused by the Spirit. Can not both be experienced concurrently?

Bloesch prefers to speak of the "truthfulness or veracity of Scripture rather than of its inerrancy" (p. 116). There may be "innocent factual inaccuracies" (p. 117). Bloesch clearly does not wish to identify himself with the understanding of inerrancy represented by Charles Hodge, B. B. Warfied, J. I. Packer, Carl F. H. Henry and others, but his references to these writers do not exhibit a substantial interaction with their theological and exegetical arguments.

In the matter of scripture and tradition Bloesch places himself in the historic mainstream of Protestant teaching. Against those who would make scripture subservient to the authority of the church, he affirms with Karl Barth that "Scripture is in the hands but not in the power of the church" (p. 147). On the matter of the Apocrypha he makes the helpful observation that while these writings are not doctrinal norms for the church, they are of value insofar as they "provide an understanding of the spiritual climate into which Christ came" (p. 170). He interacts with a broad range of scholarly literature in this area, although the important work of the evangelical scholar Roger Bechwith, *The Old Testament Canon of the New Testament Church*, seems to be omitted.

Issues of great interest to readers of *Perspectives* such as creation, human origins, and the extent of the Flood are treated only tangentially in *Holy Scripture*. Bloesch advocates a "hermeneutics of realism" in such matters, but he does not pursue these issues in any great depth, for he seems to have relatively little interest in matters of science and religion *per se*. He believes that the Bible is not to be treated as a source for paleontology or ethnography, though its affirmations "have important implications in all these areas" (p. 361, n. 81).

Pastors, seminarians, and graduate students who are looking for an informed discussion of biblical authority by an evangelical scholar who interacts with a broad range of theological scholarship can derive much insight from Bloeash's work. Those who are looking for more detailed discussions of biblical interpretation bearing directly on issues of science and religion would do better to consult the works of writers such as Wolfhart Pannenberg, T. F. Torrance, Henri Blocher, and Howard J. Van Till.

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WHEN TOLERANCE IS NO VIRTUE: Political Correctness, Multiculturalism and the Future of Truth and Justice by S. D. Gaede. Downers Grove, IL: InterVarsity Press, 1993. 119 pages. Paperback, $8.99.

What are the foundational premises of the political correctness and multiculturalism advocates, and how well do these premises lead to truth and justice in our society? Gaede (provost of Gordon College and author of many books and articles, including *Belonging* and *For All Who Have Been Forsaken*) systematically and succinctly examines this question and then issues a call to Christians to establish truly inclusive congregations that follow Jesus in the continuing search for truth and justice.

Our present situation is one in which everyone calls for tolerance but there is no agreement on the meaning of tolerance or the nature of truth and justice. Christians exhibit the same confusion as the secular world and are "mostly parroting the arguments of the day" (p. 15). Gaede devotes a chapter each to the tolerance and multiculturalism promoted by the political correctness movement and finds them seriously lacking. As means to the goals of truth and justice, tolerance and multiculturalism are necessary and good. Unfortunately, modern science has made them ends in themselves and therefore perverted them. The heart of political correctness is the conviction that no one ought to say or do anything that is offensive to anyone else. However, the breakdown of community with its unquestioned traditions combined with the rise of a very pluralistic society has produced a situation where everyone selects personal values from a smorgasbord of wildly divergent norms. Since people choose their own values according to their personal judgment and taste, they feel free to change these values at any time. This results in a "privatization of conviction," with no commonly recognized authority. Since each group decides what is offensive to itself, truth and justice have become a matter of brute power.

Gaede promises no easy panacea. Although he argues from American history to demonstrate that truth and tolerance can co-exist with reasonable harmony, he leaves it at that. Christians must become a community that is socially, economically, and ethically a cross section of the total society and they mush follow the examples and teaching of Jesus to support truth and justice (and toleration!), because this is the right thing to do in our pluralistic society.

A substantial portion of the book consists of two appendixes. One presents a more formal overview of the process by which society has lost truth and made tolerance the ultimate virtue, and the other argues that the nineteenth century was a time in the United States' history when, in spite of the problems and inconsistencies, truth and tolerance did successfully coexist.

This is a small but powerful book with a compelling argument and a refreshing call to arms. It is accessible to any educated person yet profound enough to instruct and stimulate the academic. The structure and shortness of the main body lessens the negative impact of the lack of an index. The provision of even a one page bibliographic essay would have been quite valuable, but the end notes to the two appendixes do provide the intellectually curious a start into the literature for most of his ideas. Everyone will grow spiritually and socially by reading and interacting with this book.

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

THE EVOLUTIONARY TALES by Ronald L. Ecker. Palatka, FL: North Bridge Books, 1993. 212 pages, notes, bibliography, index. Paperback.

This book, patterned after Chaucer's *The Canterbury Tales*, presents "evolutionary theory and the pseudoscientific nature of 'creation science'" in rhymed iambic pentameter verse. The setting is a company of ten travellers (Astronomer, Biochemist, Biologist, Cosmologist, Geologist, Paleoanthropologist, Paleontologist, Philosopher, Physicist, and Scholar) on a field trip to a creationist seminar in Dayton, Tennessee, home of the Scopes "monkey" trial. After a general prologue, each traveller tells a tale in verse essay of "evidence for evolution and the fallacies of creationist claims." The bibliography has over 350 books and articles dating mostly in the 1980's with some as recent as 1992.

Ronald Ecker, who also wrote *Dictionary of Science and Creationism*, believes that God created life, which then evolved. He also considers science and religion to be separate realms and states that evolution, "for which there is overwhelming scientific evidence, is not incompatible with religion or the concept of a Creator." The last two verses in the book read: "Creation, evolution: both are true. I'll have my cake, by gum, and eat it too." In the Astronomer's tale, Ecker writes:

I'll read the Bible for its moral view
And not because I think it's really true.

In the last chapter, the Scholar's tale, he considers the creation accounts in Genesis to be myths adapted from the Babylonians and their neighbors rather than a literal account revealed by God. Ecker strongly objects to the mixture called "creation science," which he considers a pseudoscience, being promoted to a scientifically illiterate public and taught in the public school as science.

Although Ecker does briefly mention other versions of origins such as apparent-age creation and punctuated equilibrium, the main focus is on Darwinian gradualism versus young-earth "creation science." He briefly mentions early in the book that microevolution is factual and that macroevolutionary theory is inferred but makes little or no distinction thereafter. Ecker repeatedly criticizes the "creation science" of Henry Morris, Duane Gish, and the Institute for Creation Research (ICR) severely.

In spite of some oversimplifications and lack of precision in using terms such as evolution and creationist, this book is generally accurate, moderately technical, and thorough for its size. *The Evolutionary Tales* should have special appeal to anti-"creation science" evolutionists who would enjoy 155 pages of iambic pentameter.

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THE BEAT OF A DIFFERENT DRUM: The Life And Science of Richard Feynman by Jagdish Mehra. New York: Oxford University Press, 1994. xxxii + 630 pages, index. Hardcover; $35.00.

When I saw this volume listed in the "Books Available for Review" section of *Perspectives*, I wondered what it was doing there. I still do. This wonderment is not a reflection on the quality of the book, which accomplishes its purpose very well, but on that purpose itself, which is well summarized by the subtitle, and a worthwhile purpose, but has little to do with the usual contents of our periodical. This is a good summary of the life and science of Richard Feynman.

Who was Feynman? He was a Nobel laureate in physics, a member of the commission which investigated the *Challenger* accident, the source of the influential texts *The Feynman Lectures on Physics*, and a lifelong critical thinker. (He was also a good self-taught drummer.)

Mehra, a physicist who knew Feynman for 30 years, seems well qualified to write about the physics that interested Feynman. He is also qualified to write about Feynman's life, having been given extensive interviews.

As this book has been and will be reviewed elsewhere, I shall concentrate on what it has to do with the interaction between science and Christian faith, which isn't very much. There is so much science in the book that I must confess that most of it is beyond me as I am not a modern physicist. Mehra has tried to explain every aspect of physics that Feynman was interested in, including quantum electrodynamics, superfluidity, and weak interactions. Some pages bristle with complex equations, and reading them is not for the faint-hearted, if they have little background in the subject under discussion. Such pages can be studied hard of course, or skipped. There is still plenty of book left. (Gleick's *Genius*, or the compilations nominally by Feynman himself, namely *Surely You 're Joking, Mr. Feynman*, or *What do You Care What Other People Think* are biographical without covering the science so thoroughly.)

Feynman was unique and had many admirable qualities. Many people have probably tried to model their lives after him. No one person, save Christ, should serve as a model for the life of another. Trying to emulate Feynman would be especially disastrous. A person trying to be Feynman would be as doomed to failure as one trying to be Michael Jordan, unless he or she had the God-given abilities that Feynman or Jordan did, and hardly anyone does. (This is not to deny that Feynman and Jordan have worked hard with the abilities God gave them.) Feynman also must have had his dark side, although this book is written as if he didn't.

The book touches occasionally on matters having to do with the interaction between science and religion. Feynman was brought up as a non-believing Jew, and remained an atheist throughout his life. However, he sometimes spoke respectfully of religion, somewhat as Einstein did. He gave a talk and wrote a paper on the interaction between science and religion, which is excerpted in the book. The contents are unexceptionable.

I have another confession to make. I read this book concurrently with Mary Midgely's *Science as Salvation*, and with Charles Colson's column in the current *Christianity Today*. Colson states what I hope is not true, but I fear is, namely that the very idea of absolute truth is disappearing from campuses. He says that faculty are teaching that historically prominent Caucasians were black, or that there really is an earth goddess, not because they believe these things to be true, but because their audiences need them to be true in some sense. And if there isn't any absolute truth, why not say that they are true? Why not, indeed? I hope that the sciences will serve as a bulwark against that type of thinking. Feynman was, above all else, dedicated to destroying hypocrisy and untruth, whether these were in the social customs that surrounded him, in inadequate physical theories, even those of prominent persons like Bohr, or in government-industry failures in producing textbooks for students in California, or in building the *Challenger*. However, without knowing the author of creation, professors of science aren't going to be a bulwark against anything for long.

Freeman Dyson, who interacted with Feynman occasionally, and is mentioned on 25 pages of the book, according to the index, is also almost a central figure in Midgely's book, *Science as Salvation*.

Her theme is that to believe in the beauty and order of the universe as a whole requires faith. Up till now that

faith— that conviction of a universal order—had been backed by, and expressed in belief in God. Without that, what remains is just the conviction of scientists that the world must finally conform to science— that doubts and confusions will eventually give way, revealing an underlying order. But might not that faith be mere wish-fulfillment Is there any real guarantee that the partial order we have seen so far is not a misleading varnish on hidden disorder? Or that, even if it has been real so far, it will not stop next week?

Had Feynman, who sought order in the physical universe so diligently, any assurance, outside of belief in God, that such order existed, or would be accessible to us if it did? No. Midgely tells of the absurdities that Dyson proposed as a horrible example of what can happen when science has lost its moorings. It is fortunate that Feyman mostly stuck to his physics without thoroughly examining underlying epistemology. Or maybe it isn't. Maybe he would have found the Author of physics if he had thoroughly examined its foundations.

Reviewed by Martain LaBar, Central Wesleyan College, Central, SC 29630.

BIBLICAL CREATIONISM by Henry M. Morris. Grand Rapids, Michigan: Baker Books, 1993. 276 pages. Hardcover.

Morris, with degrees in civil engineering and geology, has written extensively on subjects such as creationism and flood geology. His book, *The Genesis Flood*, with coauthor Dr. John C. Whitcomb, an Old Testament scholar, has challenged many to think again about such subjects.

Biblical Creationism is obviously the result of much study of the Scriptures by a man with a deep respect for God's Word. As the title suggests, it considers only Biblical, and not scientific, data relating to creation. Most of the book is spent discussing all Bible passages relating to events of Genesis 1-11. Passages are dealt with in chronological order of revelation, then the final chapter systematizes and summarizes the findings. Appendices deal with "Creation in Extra-Biblical Writings" such as the Apocrypha, a variety of "Special Studies in Biblical Creationism," and a description of the author's related works. There are two pages of end notes, and no index. The book is written in a popular, rather than a scholarly, style.

Morris stresses the fundamental importance of the doctrine of creation. He spends much time on passages that show God's great power through creation. This is an area that would not be controversial to any orthodox Christian. On the contrary, we need to be reminded of the power of the Creator.

However, the book is not primarily devotional. Describing his motivation for writing, Morris says,

> When I was a young Christian engineer, struggling with the dogma of evolution versus biblical revelation, I kept trying to find some means of harmonizing the creation account with the day-age theory ... then the gap theory ... or some other theory,

but finally concluded that "none of these compromise systems seemed to work for either science or Scripture," and "that the Bible taught clearly and explicitly that all things were made by God in a six-day week of natural days" (p. 13).

I found that discussion of passages said to prove that creation took place in six 24-hour days disappointing. Grammatical and literary arguments in favor of six-day creation are presented, but in little detail and without supporting references. The argument the reviewer found most persuasive is the idea that there should be no death or decay in the world before the fall (pp. 27, 165).

The book also occasionally betrays a lack of expertise in biblical languages and theology. From Duet. 33:15 ("And for the chief things of the ancient mountains, and for the precious things of the lasting hills") and 33:27 ("The Eternal God [is thy] refuge, and underneath [are] the everlasting arms: and he shall thrust out the enemy from before thee; and shall say, Destroy [them].") Morris sees a contrast between the mountains, which are ancient, and God, who is eternal, and between the hills, which are lasting, and God's arms, which are everlasting (p. 61). However, both *ancient* and *eternal* translate the Hebrew *gedem*, which refers to an idyllic antiquity, the time of creation.[1] Both *lasting* and *everlasting* translate the Hebrew *olam*, which refers to a distant time.[2] Both God and the mountains have existed from a distant time. Thus, the contrast Morris sees arose in the process of translation and is not present in the original text.

On the positive side, Morris shows the importance of the doctrine of creation in the theological reasoning of Christ (p. 148) and Paul (pp. 164-169).

He also discusses the importance of the doctrine of creation in evangelistic preaching, giving examples from Paul and John. Paul's sermon at the Areopagus introduces God as the Creator (p. 154). However, this sermon does not seem to require a recent, six-day creation. Paul could preach in the same way if God made the world by means of the big bang.

Finally, the book can act as a stimulus to examine the scriptures and see whether one's ideas of origins really are consistent with the whole biblical record.

[1]R. L. Harris *et al. Theological Wordbook of the Old Testament*. (Chicago: Moody Press, 1980), p. 785.
[2]*Op. Cit.* p. 672.

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DISPUTED QUESTIONS IN THEOLOGY AND THE PHILOSOPHY OF RELIGION by John Hick. New Haven, Connecticut: Yale University Press, 1993. 198 pages, index. Hardcover; $22.50.

Hick is Fellow of the Institute for Advanced Research in the Humanities at the University of Birmingham, England, and Danforth Professor of the Philosophy of Religion Emeritus at Claremont Graduate School. The most recent of his many books, *An Interpretation of Religion*, won the 1991 Grawemeyer Award in Religion. *Disputed Questions in Theology and The Philosophy of Religion* explores further the reason for a religious pluralism with a personal note about author's own pilgrimage. It consists of eleven papers in slightly revised form, which were originally published in various books and journals from 1987 to 1992.

Part I discusses epistemological issue in two chapters. "Religious Realism and Non-realism" differentiates between religious realist who holds that there is an ultimate Real or Ground of Being, and non-realist (following Feuerbach, Dewey, Huxley, and persuaded by the twentieth-century positivist critique of religion) who considers that religion is a naturalistic conviction and God exists only as an idea in the human mind. Within realists, there are naive realists (fundamentalists) and critical realists who will not follow the religious doctrines blindly. Religious non-realists are different from atheists in affirming the value and contribution of religion to the human society. Hick is a critical realist. He criticizes the non-realist for being pessimistic and states that the realist always conceives God as infinitely good and kind. He admits that the universe can be interpreted in both realist-religious and naturalistic terms; however, he insists that there is no intermediate possibilities. "Religious Experience: Its Nature and Validity" explains that religious experience in all variety, theistic or non-theistic, external or internal, is a mode of consciousness when one is freely open and responsive to the immanence of the transcendent Reality and whose specific forms are provided by the experiencer's religious concepts and symbols. The validity of experience establishes the rationality of religious belief since the general empiricist principle affirms the right to form beliefs on the basis of experience. Although the claim to experience the Real is not intersubjective, nevertheless it is subject to an ultimate eschatological confirmation or disconfirmation.

In Part II, "Christ and Christianity," Hick devotes two chapters to criticizing the Church's belief in the deity of Jesus on either historical or logical grounds. "An Inspiration Christology" advocates that, based on historical study, Jesus himself never claimed to be God, or the Second Person of a divine Trinity, incarnate. Hick, as well as Harnack, Rahner, and Kung, understands Jesus as a divinely inspired human being who has made God real to millions. "The Logic of God Incarnate" turns to the logical problem created by the traditional Christology, especially that proposed by Thomas Morris recently. Hick points out the similarity of Morris's proposal with the monothelite heresy condemned by the Constantinople Council in A.D. 680. Hick states that the incarnational idea is essentially metaphorical, not rational. In Chapter 5, Hick explains his understanding of "The Non-absoluteness of Christianity." He denies the superiority of Christianity in its adoption of the ideals of human equality and freedom, manifest in democratic government.

In Part III, "Hints From Buddhism," learning from Buddha's teaching about the "undetermined question," Hick suggests that most of the conflicting truth-claims of the different religions are about unanswerable questions, and that it is reasonable for different human groups to live with different answers to such questions.

In the beginning of Part IV, "Religious Pluralism," Hick give a personal account of his conversion to Calvinist orthodoxy in his youth, subsequent disappointment with an anti-intellectual attitude in fundamentalist circles and involvement in the struggle against the Nazi National Front together with Muslims and Jews, Hindus and Sikhs, Marxists and humanists. Gradually, through participating in the worships of various faiths and encountering with people of other faiths in Britain, India, Sri Lanka, Japan, and the U.S., he was drawn into a conviction of religious pluralism. In the following two chapters, Hick explains his view that Jews, Christians, Muslims, and all other major religions are equally valid.

Finally in Part V, "Life and Death," Hick gives "A Possible Conception of Life after Death." Here, he adopts the reincarnation view from other religious traditions and proposes that such a series of lives gives the opportunity for the development of the deeper self so that all human beings will unite with the divine life eventually.

Hick provides a readable account of his evolved interpretations on modern disputed questions in theology and the philosophy of religion. Following Schleiermacher, Hick presents a theology of accommodation that seeks to build a unity between secular and religious wisdom which has the characteristic of post-modern relativism.

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B. F. SKINNER: A Life by Daniel W. Bjork. New York: Basic Books, 1993. 298 pages, index, notes. Hardcover; $25.

The behavioral sciences have existed for about 100 years. Some of the key figures who have shaped psychology and the wider culture include the prominent twentieth century theorists Sigmund Freud, Carl Rogers, and B. F. (Burus Frederick) Skinner. Their contributions included descriptions of their ideas about human nature. Each of these men held different beliefs about the make up and the potential of mankind.

Bjork, Professor of History at St. Mary's University in Texas, has written the first major biography of B. F. Skinner. Bjork, author of two books about the eminent psychologist

William James, was able to interview Skinner and his family and to have access to Skinner's collection of diary-like personal notes. He also reviewed the extensive Skinner archives at Harvard, the university which granted Skinner's Ph.D., and where Skinner concluded his academic career with retirement in 1974.

This biography paints a picture of a brilliant man who was irascible, relatively unsuccessful in personal relationships, an insightful inventor of experimental apparatus and one of the key apologists for the position of environmental determinism.

Skinner's story begins in the small northeastern Pennsylvania town of Susquehanna in 1904 and ends in Cambridge, Massachusetts in 1990, as a result of leukemia. From the beginning of the book, "Fred" is described by his biographer as having an antipathy for members of his family; this circle of people he dislikes grows to include many others (especially people with conventional societal values), eventually extending to his professors and then professional colleagues. Skinner is presented as something of a paradox. He often seems cold and detached, for example, even while observing the death of a younger brother and of his grandfather. And yet, he is also hot-blooded and passionate, as in his love for literature, and in his dedication to music. He wanted to be a writer, and received encouragement from Robert Frost to pursue a career as an author. His favorite composer was Wagner. He was active sexually before he left high school. He visited prostitutes while in college, and lived with a woman in Greenwich Village before he entered graduate school. He admits to affairs while a professor in the midwest after he had married.

Skinner's primary contribution to psychology and to the scientific enterprise is described as being his experimental work which illustrated the power of reinforcement to shape behavior. Although he gained his fame as an animal psychologist, his work is responsible for such developments as teaching machines, programmed instruction, treatment programs for special populations (such as juvenile delinquents, the mentally retarded, the autistic, and substance abusers), marketing techniques, and training procedures for athletes.

In 1945, his novel *Walden Two* was published. This is a story about a small utopian community where the techniques of behaviorism are applied to design an ideal environment. Property is held in common, competition is discouraged, children are raised by caregivers and belong to the whole community. There is little government and no religion. The economy is largely based upon agriculture. People are programmed to behave in ways which serve the common good. Skinner's distrust of the primary social institutions, ie, the family, religion, education, the economy, and the government, comes through "loud and clear" in this work.

In 1971, Skinner was featured on the cover of *Time* in connection with his newly published book *Beyond Freedom and Dignity*. He argues that nobody is truly free, and that the concept of freedom itself is a dangerous illusion. He said society would be better served if effort were directed toward designing an environment which would reinforce desirable behavior. Many interpreted him to be saying that human beings lack the capacity to be free agents and that they could best be described as pawns subject to a grand manipulation.

Bjork's biography of Skinner does an excellent job capturing the essence of the man. The information provided in biographical studies is helpful in interpreting theorists and social critics.

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LIVABLE PLANETS ARE HARD TO FIND by Irving W. Knobloch. East Lansing, Michigan 48823 (6104 Brookhaven Lane). Paper, $12.00.

According to the author, this is a book for those with minimal knowledge of science. It is intended as a correction to the criticism of the far right which sometimes hinders attempts to keep the globe livable. Topics include science methodology, current positions on the air, food, water, soil, tropical rainforest, extra-tropical development, overpopulation, the future of the earth, and strategies to help the earth. The author is a Fellow in the American Scientific Affiliation.

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LONELY HEARTS OF THE COSMOS: The Scientific Quest for the Secret of the Universe by Dennis Overbye. New York: Harper Collins Publishers, 1991. 430 pages, index. Hardcover; $22.50.

Author Dennis Overbye, science essayist for *Time* Magazine, has written a fascinating book which will appeal to the educated public and professionals in all fields of scientific endeavor. Overbye has written many essays and, in 1980, won the Science Writing Award presented by the American Institute of Physics. The book has no bibliography but does have 16 pages of photographs inserted between pages 216 and 217. It has a prologue, an epilogue, and is written in four parts, the titles of which provide no hint to the contents.

The author's purpose is to tell the story of the changing concepts put forth by cosmologists attempting to understand the cosmos and its ultimate destiny. Overbye wants the reader to understand how cosmologists work and talk,

so he has included scientific language (*sans* mathematics). He is frank in presenting the pride, prejudices, feuds, antagonism, bitterness, genius, and perseverance of rivals who hold different views of the cosmos. At the end of the 20th century we can say, as Arthur Eddington did near its beginning, "the universe is mysterious."

A great deal of space is devoted to the work and ideas of Allan Sandage, who presided over the 200-inch telescope atop Mt. Polomar. Sandage inherited the mantle of his mentor, Edwin Hubble, who died in 1953. Hubble was the first to promulgate the concept of an expanding universe and invented Hubble's Law, which states that a galaxy's distance from Earth is proportional to its red shift velocity. One needs to multiply the red shift value by the "Hubble Constant, H_0", to get the distance. (H_0 is measured as kilometers per second per megaparsec). The value of H_0 has changed with time, being 530 in 1930, then 180 in 1956, 100 in 1963 and 50 in 1972. A Frenchman, Gerard De Vaucouleurs, challenged Sandage's value of 50 for H_0, accusing him of improper techniques and computational errors. This type of feud is seen frequently in Overbye's story. De Vaucouleurs said the H_0 value was closer to 100 than 50, and that the cosmos is only 10 billion years old, not 20 billion as Sandage claimed.

The subtitle of the book is "The Scientific Quest for the Secret of the Universe." In the quest, cosmologists have struggled to find answers to the following questions: Will the universe expand forever, or finally collapse on itself? Did the universe begin with a big bang, or is it in a steady-state condition (continuous creation of matter)? Why should luminosity be a necessary property for matter? Who is it that observes the entire universe and where does he stand? Could the universe end for some observers and not for others? What is the value of the Hubble constant? What do we use for a "standard candle" to measure the luminosity of stellar objects? Can gravity be quantized? Why is the universe so relatively uniform? Why is Omega so close to one? (Omega is the ratio of mass density to energy density). Is the universe closed, open, or flat? (The answer to the last question depends on the value of q_0, defined as the "deceleration parameter." If $q_0 = 0.5$, you have a "flat" universe, one that coasts to a stop at infinity. If $q_0 < 0.5$, you have an open universe that would never stop expanding. If $q_0 > 0.5$, the universe is closed and would eventually end since the galaxies do not have sufficient energy to "get away"). After 60 years of work, there is no general agreement as to the answers.

Overbye has spiced his story with numerous anecdotes. Here are some examples to whet your appetite to read the book for yourself. Someone asked Hawking what went on before the big bang. That, said Hawking, is like asking what is a mile further north than the North Pole — it wasn't any place or time. Neils Bohr once remarked that a person who wasn't outraged on first hearing about quantum theory didn't understand what was said. Overbye once asked John Wheeler of Princeton, "Why bother trying to quantize gravity?" Wheeler replied, "Which would you give up, quantum theory or gravitational theory?" A Hawking quote: "... the universe is regular and lawful everywhere and everywhen; there is no place for God to poke his nose in."

I believe the author has succeeded in developing his purpose for writing the book. He has an imaginative and captivating writing style. He portrays the main characters as real people, "warts and all," and explains their theories in a lucid way. ASA members can share the cosmologist's concern about the fate of the universe. Does the universe have meaning? Biblically informed ASA members have an answer, but it is not derived from human observation and thought, but by divine revelation. All of us are indebted to Dennis Overbye for this valuable historical review of 20th century cosmology.

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Letters

The Crunch Is On, Maybe!

I was amazed to read Crenshaw's demonstration that scientists do not know what they are talking about (*Perspectives*, June 1994, p. 148). His claim struck me as something that belonged rather in the *National Enquirer*. One gross error he makes is the assumption that scientists give real definitions, whereas they only give instrumental descriptions. His demand for a proof of the "force of gravity" requires science to deal with essences. It can't.

An equally grave error assumes that a field erases a force. But the incorporation of three of the four fundamental forces (strong, weak and electromagnetic, but not gravitational) into a single unified field theory has not disposed of them. Even realization of the theorists' hope of including gravity in a grand unified theory will not eliminate any of these forces. In addition, in direct contradiction to Crenshaw's argument, Einstein's General Theory of Relativity does not alter the range of gravity.

A more subtle error is Crenshaw's unrecognized assumption that the universe is Euclidean. He seems totally unaware of the assertion, fundamental to both Newtonian and Einsteinian physics, that the path of a beam of light is a straight line — Euclidean for Newton, Riemannian for Einstein. A finite Euclidean geometry must have boundaries. A Riemannian may be finite and unbounded, which is the way Einstein's theory describes the universe. Neither Euclidean not Lobachevskian geometries can have this characteristic.

The simplest possible Riemannian geometry can be mapped onto the surface of a Euclidean sphere. Riemannian straight lines, in this mapping, are great circles, like the equator or the meridians of longitude of the earth. Just as one cannot reach the edge of the earth and fall off, so one cannot reach the edge of the Riemannian plane, even though it is finite. This variety of geometry, in four dimensions with some incredibly complex characteristics, underlies Jeans' reference, which Crenshaw cites. It precludes "bending space-time in numerous other ... directions."

It appears that Crenshaw has read some science popularizations, misunderstood them, added his own presuppositions, and produced nonsense. He violates a rule of thumb generally applicable to academic disciplines: If it sounds stupid, you've misunderstood it. A technical statement may be wrong, but it is not silly. No scientist, let alone an entire discipline, would have missed such obvious corrections, were they germane. Predictions of a "Big Crunch" must be decided by empirical measurements of the total amount of matter in the universe. The difficulties inherent in the determination leave the question open at present.

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Fischer Responds to Siemens

This is in response to a letter by David Siemens concerning Part I of "In Search of the Historical Adam" (*Perspectives*, December 1993, pp. 241-251). Some of the objections raised about the first article were addressed in the subsequent installment (*Perspectives*, March 1994, pp. 47-57), and so I will answer here only those questions not already resolved.

Siemens expressed reservations that "grave new problems" were raised as a consequence of this method of apology. However, many people believe that the Bible is totally out of step with the revelations of science and the historical evidence. I consider that to be a greater problem than the minor theological considerations that would result from an enlightened interpretation of a handful of Scripture verses.

Only an overall benefit can result by adopting this sensible, data-driven solution. My thesis allows for the ideas that Adam could have been a recent creation (ca. 5000 BC) from whom the Adamites and Semites descended, but due to intermarriages by Cain (Gen. 4:17); the presumed mortal "sons of God" (Gen. 6:1-2); and Noah and/or his sons (Gen. 5:32;6:9-10;7:13;8:16,18;9:21), even Semitic populations like the rest of us surviving hominids seem to have a long and intriguing ancestry going back four million years or so, or even beyond.

Langdon and Watelin, who excavated Kish in 1928-29, dated the bottom layer which amounted to about one foot in thickness to 3300 BC, although that was not the thickest layer. This seemed to lend support to Woolley's claim that he had "found the flood," though these dates were still 500 years apart.

Mallowan, who excavated the more northern city of Ninevah, uncovered several strata of mud and riverine sand totaling six feet in depth. He diplomatically called this not a flood, but a "pluvial interval," and placed it at the fourth millennium, similarly dated to Woolley's layer. But then, flood deposits at Kish, Shuruppak, Uruk, and Lagash were all considered, and a consensus opinion put these layers at almost a thousand years later than Woolley's renowned find, averaging around 2900 BC, the probable date for the flood.

It is questionable whether Ur would have contained any Adamite populations by 3800 BC where Wooley dated the lowest and thickest layer. The later deposits at Ur may have been part of the great flood that eliminated the Adamite populations. But it is also possible that no Adamites had ventured as far as Sumerian Ur by even as late as 2900 BC. Thus, the flood was judgment on the Adamite population, not the world population.

It might do well to point out that no area on earth has been excavated by archaeologists any more than the Near East and its immediate surrounds. No "flood deposits" of any kind have been found in Egypt or in the area of Palestine. The only layers of water-laid clay which may have been left by the flood of Noah's day are found entirely within the region of probable Adamite settlements in Mesopotamia.

By adopting this method of apology, I also mean to jettison tired methodologies that have adorned the pages of this revered journal since the inception of the ASA, specifically: the counter-productive young-earth creationism, the long-abandoned gap theory, the data-deficient theory of progressive creation, and the Bible-ignoring theistic evolution.

With that off my chest, one of the objections Siemens raised concerns dating the flood. Dating archeological digs in the absence of deposits of volcanic ash may lack precision, but nevertheless, the thick flood stratum Woolley found at the Sumerian city of Ur was placed at the early fourth millennium, about 3800 BC. Notwithstanding, a higher flood level was uncovered also, dated to about 2700 BC, but it had been discounted as being too little and too late.

I can see no reason why someone would have difficulty with the lack of precision in dating the Mesopotamian deposits, but have no difficulty with the complete lack of deposits found anywhere else, which is just as indicative of where and when the flood must have taken place.

Why did the ark not float out into the Persian Gulf? The eleventh tablet of Gilgamesh offers a solution. The Gilgamesh epic speaks of "punting," and includes a boatman. Long poles would afford a means of measurement.

(How did they know they were fifteen cubits high?) Some means of directing the boat might have been useful since it had to travel against the flow, though a raging south wind might have done the work.

The word for "mountains" and "hills" is the same in Hebrew. If the flooding was restricted to the region of the Mesopotamian valley, then the "mountains" submerged by the flood could have been just the lower mountains of the region surrounding the Mesopotamian valley, or it may signify nothing more than the lower foothills at the beginning of a mountain range.

How could "aboriginal Americans have flood legends?" When we examine the flood stories that permeate the mythology of remote populations, the differences more than offset any similarities. Byron Nelson's schematic of 41 flood myths shows that only nine of them relate to animals being saved at all.

It is tempting to attribute all those ancient stories to a one-time global catastrophe to line up with what has been the common interpretation of the Genesis flood. It should come as no surprise that floods should be part of the distant past of many present-day civilizations. A look at a map of the United States, with particular attention to the cities of the U.S., shows that early European settlers usually chose to locate population centers on rivers or at river junctions. The need for water to drink, for bathing, cleaning, irrigation, and transportation overpowered concerns for flooding.

Why should primitive men think differently? It would have been only natural for early tribes to camp along rivers, and to be swept away upon occasion. Indeed, besides tribal warfare, what other kinds of catastrophes could there have been in ancient days? It is to be expected that survivors would be most vocal to their following generations. The Interpreter's Dictionary of the Bible deflates the idea that flood stories from different parts of the world might be related to the biblical event.

At one time this widespread distribution of a flood tradition was considered proof of the historicity of the biblical account, which with some expected modification had spread throughout the world as people migrated from their original homeland in the Near East. This notion has necessarily been given up. We know, for example, that numerous peoples have no flood legends in their literature. Flood stories are almost entirely lacking in Africa, occur only occasionally in Europe, and are absent in many parts of Asia. They are widespread in America, Australia, and the islands of the Pacific. In addition, many of the known flood legends differ radically from the biblical story and stand independently of it and of one another. Many do not know a world-wide flood at all, but only a local inundation .... Often the heroes save themselves in boats or by scaling mountains, without intervention by the gods. Further, only a few of the flood stories give the wickedness of man as the cause for the Flood .... The duration of the Flood, if given, varies from a few days to many years. Facts of this kind disprove the claim that the biblical account is the parent of all flood stories.

Also, the impact of early missionaries on the mythology of primitive peoples has to be considered. The narrative of the great flood of Noah's time, as related by missionaries, may have been co-mingled with ancient tribal stories to produce hybrid myths that would more closely parallel the biblical account.

According to Gaster no flood story can be traced in Sanskrit until after elements of the Aryan civilization began to arrive in India. Further, the Nestorian Christian missionary attempts in China stand out as the source of the flood story among the Lolos people.

As Archer admits:

> The list of descendants in the respective lines of Ham, Shem, and Japheth as recorded in Genesis 10 does not permit any easy identification with the remoter races who lived in the lower reaches of Africa, Far East Asia, Australia, and the Americas. Particularly in the case of Australia, with its peculiar fauna indicating a long period of separation from the Eurasian continent, the difficulty of assigning either the humans or the subhuman population with the passengers in the ark has been felt to be acute.

In other words, the Bible is silent on any relationship existing between the descendants of Noah and the Black Africans, or the Mongoloid race, or the native Americans who descended from the Asiatics, or the Aborigines who populated Australia, or even the blond-haired Scandinavians, not to exclude any racial group. That squares exactly with what we know about the antiquity of those races of peoples who were far distant from the Mesopotamian valley by 3000 BC. From C. S. Coon:

> Since the beginning of agriculture no new subspecies (of man) have arisen; the principal changes that have taken place have been vast increases in the numbers of some populations and decreases to the threshold of extinction in others. All this points to one conclusion: the living subspecies of man are ancient. The origins of races of subspecific rank go back into geological antiquity, and at least one of them is as old by definition, as our species.

What are the theological consequences of our having no part in the Adamic or Noahic covenants? None that I know of. In Genesis 1:27, Adam was God's representative, having been "created in His own image." This status was passed down through the godly line of Seth (Gen. 5:3). Noah and his generations were God's chosen people, and thus were "in the image" (Gen. 9:6). This status as representatives of God was conferred upon the Israelites through the Abrahamic covenant (Gen. 17:1-8).

Those outside the nation of Israel apparently were outside the realm of accountability. This can be inferred from Matthew 23:15, "Woe unto you scribes and Pharisees, hypocrites! for ye compass sea and land to make one proselyte, and when he is made, ye make him twofold more the child of hell than yourselves." When one outside the Jewish faith was brought to the knowledge of God,

he was made accountable. Because of false teaching, he was condemned. This unique status as God's chosen people for Israel was rescinded, or at least modified, at the cross. Christ was appointed by God as His representative. The second Adam, Christ, was in the "image of God" (II Cor. 4:4) just as Adam was, and the mantle was passed to the followers of Christ. As Christians, we come under the new covenant.

God provided a covering after Adam and Eve sinned in the garden (Gen. 3:21). Did Adam wear clothes prior to that time? I tend to doubt that Adam would have made courting calls on potential help mates (before God created Eve) attired in his birthday suit. Sorties outside the confines of the garden in quest of a "significant other" would have necessitated suitable garb. But then, who knows what suitable garb for courting was in 5000 BC?

On a practical level, there would be no need for clothes within the confines of the garden where first Adam and then Eve were the only residents. And one cannot overlook the symbolism of Adam and Eve leaving a state of complete openness, even nakedness before the Lord to their entering a state needing garments to hide their guilt and shame.

There was no gold in Mesopotamia, that's true, but Havilah is shown on some maps to be more towards Arabia where the gold was renowned in ancient times. On other maps, Havilah is shown in North Africa.

As for my "tunnel vision," it probably comes from months spent riding the Metrorail to and from the Library of Congress where most of the research was done. Does the solution presented in the articles "encompass all the evidence?" Well, I think I have studied every proposed solution pertaining to man's origins to date, and have yet to find any other solution that maintains a high view of Scripture, even to the extent of endorsing the doctrine of inerrancy, and yet satisfies virtually every shred of geological, biological, archaeological, and anthropological evidence.

Still, perhaps on the horizon, there is a solution that works better?

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Unparadoxical Capital Punishment

Hancock and Sharp fail to make relevant distinctions in "The Death Penalty and Christianity: A Conceptual Paradox" (*Perspectives*, 46:1, pp. 61-65). This failure, along with the suppression of relevant biblical passages, produces paradox—and worse.

When they say that the "Supreme Court has not ruled on whether the death penalty is right or wrong for society" (p. 61), they seem to assume that government should establish morality, though they deny this later (p. 64). The state can only determine what is legal. We hope that it will not try to force its citizens to acts they deem immoral. But this expectation is nowhere guaranteed. The United States has been sensitive to this, for example in providing noncombatant and alternative service for conscientious objectors. But no government can accede to the principle implicitly espoused by many minorities: Let my conscience be your guide. It seems to me that something like this underlies the authors' claim that "states have failed to address the moral issues" (p. 62). Do they tacitly hold that those who have not reached their conclusion have not considered the matter?

They approvingly cite a couple authors who think that executions promote social problems (p. 62). They are correct that the criminal mind is warped. See, for example, Tony Parker and Robert Allerton, *The Courage of His Convictions* (Norton, 1962). Some will, as noted, twist everything to support their actions. Others care nothing for consequences. However, the threat of penalties does have an effect on the majority of human beings. I recall one converted robber who said that, during his entire criminal career, he never loaded his gun for fear of the gas chamber. I think everyone has noted how much driving improves when a police car is present.

The authors might have noted the failure of deterrence when penalties are neither swift nor sure. In the first place, a judicial system ought to strive for truth and justice. Granted, this is never guaranteed when human beings are involved. Mistakes will sometimes be made even by the well-intentioned. But this cannot nullify the attempt. Second, the proverbial "justice delayed is justice denied" is accurate. In contrast to these principles, courts in the United States depend more on procedure and obfuscation, with endless appeals and reversals on technicalities. The best criminal defense lawyers are those who can turn their mastery of sophistry and legal technicalities into acquittals, reversals, reduced charges or lesser sentences. Justice and truth are often hard to find in the legal morass.

The authors misguide when they quote scripture (p. 63). The source of "Thou shalt not kill" (Exodus 20:13; Deuteronomy 5:17) also commands that mediums, blasphemers, murderers, idolaters, adulterers, homosexuals, rebellious sons, harlots and those engaged in human sacrifice be put to death (Exodus 21:12, 15-17; 22:18; Leviticus 19:20; 20:2, 10-13, 27; 24:10-17, 21; Numbers 35:16-21, 30f; Deuteronomy 13:5-11; 17:2-7; 21:18-21; 22:20-24; see also Exodus 21:29; 22:19; 31:14f; 35:2; Leviticus 20:9, 15f; Numbers 1:51; 3:10, 38; 15:32-36; 18:7). The authors' view forces one of two conclusions. Either God is too confused to give consistent commands, or some megalomaniac claimed divine authority for his contradictions. The truth is different. The Sixth Commandment prohibits murder, the *unlawful* taking of human life. There is no contradiction between forbidding murder and commanding that criminals be executed. A malefactor may legally forfeit his life. "Whoso sheddeth man's blood, by man shall his blood be shed" (Genesis 9:6) seems reasonably clear.

If I deny the divine authority of scripture, I can join the critics in denouncing capital punishment as immoral.

But, if God is the revealer of the Law, executions are moral, for He is the ultimate source of right and wrong. Do Hancock and Sharp know better than God? Or are they merely claiming greater moral insight than what they hold to be the purely human enactments of ancient Israel? Lying about the Sixth Commandment surely demonstrates their ethical superiority.

When they turn to the New Testament, they try to make what is commanded to the individual Christian the principle for secular government. I am ordered not to retaliate against one who would defraud me. Indeed, when one sues me for my suit, I am to let him have my overcoat also (Matthew 5:40). Does this mean that the IRS must not prosecute those who cheat on their income tax? that the defense contractors who overcharged shall be given larger bonuses? A single moment of reasoning would have prevented such a nonsensical transfer of personal principles to public policy.

Does God's judgment on murderers (p. 63) preclude judgment in this life? Paul noted that the ruler bears a sword as God's servant to punish evildoers (Romans 13:4). Only incredible feats of twisted eisegesis can make a sword into a mere instrument of admonition and have Paul refuting Genesis 9:6. Further, the declaration of Genesis 9:6 immediately follows God's declaration that he will require an accounting (v. 5). It can hardly be more clearly stated. God's future judgment on murderers is compatible with their divinely commanded execution. This flatly contradicts the inference Hancock and Sharp make.

The reference to throwing the first stone (p. 63) also misleads. In the first place, what the mob was doing runs counter to the Law (see Leviticus 20:10; Deuteronomy 22:22). Second, Jesus called them to strict obedience, whereupon they slunk off. Third, in strict obedience to the Law, Jesus exonerated the accused woman (see Deuteronomy 17:6f; 19:15). Finally, John 7:53-8:11 is probably not authentic, for it is not found in the most ancient texts. This passage seems a favorite of those who would try to deny the relevance of the Law to modern life. But the attempt fails. Even if it were somewhat successful relative to the Mosaic enactments, it can hardly be counted on to dismiss the Noahic Covenant of Genesis 9. This latter was confirmed by the early church (compare Acts 15:19f, 29 with Genesis 9:4).

The authors perversely accuse Christians of forcing their faith into the current mold and thereby approving capital punishment. Reality is the opposite. The authors are trying to compel biblical faith to fit their Procrustean bed. They amputate Scripture to match their covert sentimentalism and rejection of standards. They even twist the fact that a minority will not be deterred into a claim that deterrence should be abandoned (p. 62). In this they take a novel tack. Propagandists usually belabor a straw man, whereas they have made it their authority. Consequently, their paper has neither empirical nor theological relevance. A full acceptance of the Bible requires the belief that God authorizes capital punishment.

These last statements do not solve the problems of jurisprudence, federal or state. Punishment, especially capital punishment, should be applied fairly. But it is not always even-handed. Racism sometimes biases sentences. So does fear of riots. The answer is not a quota system. That fewer women than men are charged and tried, and that a still smaller ratio are sentenced to death, does not statistically demonstrate sexism. The numbers primarily reflect the fact that males are more likely to engage in crime, especially violent crime. Cultural, economic and religious factors are similarly relevant. They all should be faced squarely, with no fudging for political correctness. I understand the fear that certain facts, if they are scientifically demonstrated, may be misused. But I am persuaded that ignorance has a far greater potential for mischief. I recall reading that the Nazis suppressed a report that the "master-race Aryans" and despised Jews reacted identically to noxious stimuli, and imprisoned the scientist whose results were ideologically wrong. I know that the great plant geneticist, Nikolai Ivanovich Vavilov, died in prison because his plants did not follow the official Marxist line. Ideologues, not honest citizens, fear truth and exposure. Only ideologues must misrepresent and suppress the truth.

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The Confusion of Evolution

I am appreciative of the critical comments by Ruth Douglas Miller (*Perspectives* 46:1, pp. 68-69) and Lawrence Lyons (PSCF, 46:2, pp. 146-147), in response to my article, "The Real Meaning of Evolution" (PSCF, 45:3, pp. 182-186). I would first like to agree, not disagree, with their position that God could have used chance and random processes in his creation of the world of living things. Not only is this consistent with Proverbs 16:33, but, as we (the authors) said in *Teaching Science in a Climate of Controversy*, "evidence of random chemical processes is not necessarily evidence for *philosophic* accidentalism" (p. 33, emphasis original). Whether God did create living things through random processes is a subject for empirical investigation. We should not however, let either the fear of anti-theistic interpretation or the fear of repeating the mistakes of Cardinal Bellarmine or Bishop Wilburforce influence our objective judgment.

Where I disagree with both Miller and Lyons is their claim that evolutionary theory is fully compatible with theism. Note that I am not claiming that evolution, properly defined, is incompatible with theism. My thesis is that evolution has, whether we theists like it or not, come to mean what Darwinist George Gaylord Simpson says it means in The Meaninq of Evolution: "Man is the result of a purposeless and natural processes that did not have him in mind. He was not planned" (1967, p. 345). It is this pervasive and consistent denial of purpose and the insistence that human beings are unplanned accidents, that the scientific establishment has adopted as the real meaning of "evolution."

To counter the lines of evidence I presented for this thesis, Lyons cited the writings of such scientists as Donald MacKay, Arthur Peacocke and John Polkinghorne. Perhaps Lyons is unaware that these distinguished theists are regarded as irrational, unbalanced "woolgatherers" by secular scientists (*Nature* 361, pp. 292, 362, 388; 1993). In fact, the official editorial position of *Nature* is to ridicule theology and religion as polluters of the rigorous scientific search for truth. Other than "research on the psychology of religious belief," ... "What other academic purpose can there be "for Cambridge University to explore the relationship between science and theology, with author Susan Howatch's one-million-pound endowed lectureship in *Theology and Natural Science* (362, p. 380; 1993). "The idea that religion may be a way of organizing one's appraisal of one's place in the world is not very different from what astrologers tell their clients. In other words, it may not be long before the practice of religion must be regarded as anti-science" (368, p. 185; 1994).

It is the views of Dawkins (Evolution has replaced God as our creator) rather than those of MacKay, Peacocke, and Polkinghorne that have been ratified by the scientific establishment. In the June 1994 "Evolution" issue of *Natural History*, S.J. Gould pronounces, "... the cancellation of our 'particular privilege of having been specially created' (in God's image, no less) ...." He further tells us that "... Nature was not made for us, or even with us in mind ... "Better to learn a stern truth about marvelous multifariousness (and cosmic indifference to us) than to persist in a myth of warm cuddliness or intrinsic harmony that might channel proper attention from own bodies and minds (true humanism) as the source of ethics and value."

What policies should ASA pursue toward countering such officially endorsed scientism? Number one on my list is agreement with Lyons that we should vigorously pursue implementation of ASA's resolution calling for the teaching of evolution *as science* (*Perspectives* 44:4, p. 251). The fact that this policy is meeting with irrational ad-hominem attacks and attempts at censorship (*Perspectives* 46:2, p. 128-132) demonstrates to me that we're on the right track. Until ASA's policy prevails, however, let's not naively pretend that theists control the meaning of that ambiguous and slippery word "evolution."

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NSTA Censorship

Thank you for the enlightening article by John Wiester, "Distorting for Darwinism" in the June 1994 issue. It details a sad chronicle of editorial politics in the distorted review of *Teaching Science* by Russell Aiuto in the Oct/Nov 1993 issue of *NSTA Reports!* and the suppression of appropriate responses to that review.

Perhaps it is time for editor Wild of *NSTA Reports!* to review the fundamentals of liberty in the Western critical tradition. John Stuart Mill's comment on the matter, for example, would be an excellent start:

> First: the opinion which it is attempted to suppress by authority may possibly be true. Those who dare to suppress it, of course deny its truth; but they are not infallible. They have no authority to decide the question for all mankind, and exclude every other person from the means of judging. To refuse a hearing to an opinion, because they are sure that it is false, is to assume that *their* certainty is the same thing as *absolute* certainty. All silencing of discussion is an assumption of infallibility (*On Liberty*, New York: W.W. Norton Critical Edition, 1975. p. 18) [Emphasis his]

Mill goes on to point out that, while such authorities will always acknowledge they are fallible, they rarely "think it necessary to take any precautions against their own fallibility ..." (pp. 18-19).

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Cause and Effect

Edward B. Davis' essay review in your issue of June 1994 shows how hard it is to establish cause and effect relations in intellectual history. Amongst other things he looks at the relationship between Christian thought and modern science, explored by Hookyaas, Merton, Foster and others.

Sir Fred Catherwood, Industrial Adviser to the (UK) Ministry of Economic Affairs, in *The Christian in Industrial Society* (Tyndale Press, London. 1964.) published figures for the national income per head for 34 nations in 1961, and looked at the results against the predominant religion in the nation's main period of economic growth. The results were that the top ten national incomes per head were all in nations with a predominantly Protestant Christian culture, except for number 10, which was Israel. The order of the first nine was: USA, Sweden, Canada, Switzerland, New Zealand, Australia, United Kingdom, Denmark, and West Germany. Number 11 was Norway; numbers 12 & 13 were Belgium and France. These facts indicate that there was a correlation between Protestantism and wealth from scientific technology. They are reminiscent of the link seen by Weber and Tawney between Protestantism and the growth of capitalism, and seem also to be consistent with the backgrounds of US scientists around 1960, which I recall were 45% Protestant Christian, 40% Jewish and 5% Catholic and Orthodox.

These days, the principles of wealth creation seem to be used best by non-Christian Japan.

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WHAT EXACTLY IS THE AMERICAN SCIENTIFIC AFFILIATION?

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

HOW DO I JOIN THE ASA?

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

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

Full-time students may join as Student Members (science majors) or Student Associates (non-science majors) for discounted dues of $20/year. Full-time missionaries are entitled to a complimentary Associate membership.

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

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

MEMBERSHIP/FRIEND OF ASA APPLICATION/SUBSCRIPTION FORM

(Subscribers complete items 1-3 only)

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

1) Name (please print) _____ Date _____

2) Home address _____

_____ Zip _____ Phone _____

Office address _____

_____ Zip _____ Phone _____

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

4) Place of birth _____ Date of birth _____

Marital status _____ Sex ____ Citizenship _____

Is spouse a member of ASA? _____ Eligible? _____

5) ACADEMIC PREPARATION

Institution	Degree	Year	Major

Field of study (major concentration) _____

Area of interest (20 character limit) _____

Recent publications _____

Please complete back of this form ☞

WHAT DOES THE ASA BELIEVE?

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

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

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

WHY MUST THERE BE AN ASA?

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

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

Church Affiliation _____

What was your initial contact with the ASA? _____

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

Name _____

Street _____

City _____ State _____ Zip _____

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

STATEMENT OF FAITH

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

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

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

Amount enclosed _____ Category _____

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

OTHER RESOURCES AVAILABLE FROM ASA

Teaching Science in a Climate of Controversy is a 64-page book that guides science teachers in presenting origins with accuracy and openess. (Now expanded in its 1993 (4th) printing!) It is available from the Ipswich office for: $7.00/single copy; $6.00/2-9 copies (sent to same address); $5.00/10 or more copies (sent to same address). Shipping included on prepaid orders.

Complete your set of *Perspectives!* Many past issues of *Perspectives* are available. Single copies are $6 each, plus $1.50 postage and handling.

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

Please enter gift subscriptions for:

Name _____

Address _____

City _____ State _____ Zip _____

Name _____

Address _____

City _____ State _____ Zip _____

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

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

AS A MEMBER YOU RECEIVE:

- ASA's bimonthly Newsletter.
- ASA's science journal, *Perspectives on Science & Christian Faith*, the outstanding forum for discussion of key issues at the interface of science and Christian thought.
- Discount on *Contemporary Issues in Science & Christian Faith: An Annotated Bibllgraphy*, the ASA Resource Book — a catalog of science books and tapes on current issues of concern.
- ASA's Membership Directory.
- Opportunities for personal growth and fellowship, through meetings, conferences, field trips, and commissions.

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The Canadian Scientific & Christian Affiliation

was incorporated in 1973 as a direct affiliate of the ASA, with a distinctly Canadian orientation. For more information contact:

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

The American Scientific Affiliation

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

Canadian Scientific & Christian Affiliation

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

LOCAL SECTIONS

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

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

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Vol. 16-19	(1964-1967),	Journal ASA	19,	126-128	(1967);
Vol. 20-22	(1968-1970),	Journal ASA	22,	157-160	(1970);
Vol. 23-25	(1971-1973),	Journal ASA	25,	173-176	(1973);
Vol. 26-28	(1974-1976),	Journal ASA	28,	189-192	(1976);
Vol. 29-32	(1977-1980),	Journal ASA	32,	250-255	(1980);
Vol. 33-35	(1981-1983),	Journal ASA	35,	252-255	(1983);
Vol. 36-38	(1984-1986),	Journal ASA	38,	284-288	(1986);
Vol. 39-41	(1987-1989),	Perspectives	42,	65-72	(1990);
Vol. 42-44	(1990-1992),	Perspectives	44,	282-288	(1992).

A keyword-based on-line **subject index** is available on 5 1/4" computer disks for most IBM compatible computers with a hard disk or two floppy disk drives. It includes all software and instructions, and can be ordered from the ASA Ipswich office for $20.

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

"Upholding the Universe by His Word of Power" — *Hebrews 1:3*

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