**VOLUME 60, NUMBER 2** 

# **PERSPECTIVES on Science** and Christian Faith

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In This Issue ...

The Challenge of Islam's Critique of Technology

Optimistic Evolutionists: The Progressive Science and Religion of Joseph LeConte, Henry Ward Beecher, and Lyman Abbott

Artificial Intelligence and the Soul

Human Evolution: How Random Process Fulfils Divine Purpose

Staying on the Road Less Traveled: Fulfilling a Vocation in Science

A Compass for Christian Graduate Students

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

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   E-mail: leeg@calvin.edu. Submissions are typically acknowledged within 10 days of their receipt.
- 2. Authors must submit an electronic copy of the manuscript formatted in Word as an email attachment. Typically 2–3 anonymous reviewers critique each manuscript submitted for publication.
- 3. Use endnotes for all references. Each note must have a unique number. Follow *The Chicago Style Manual* (14th ed., sections 15.1 to 15.426).
- 4. While figures and diagrams may be embedded within the Word text file of the manuscript, authors are required to also send them as individual electronic files (JPEG or TIFF format). Figure captions should be provided as a list at the end of the manuscript text. Authors are encouraged also to submit a sample of graphic art that can be used to illustrate their manuscript.

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### **Editoria**

# Faith and Scientific Practice



Arie Leegwater

eligious faith, primarily in the active sense of believing, is both a gift and a blessing from God, and a "sure knowledge" of certain basic and deepest realities. In faith we know who God is. We know that we are fallen, but redeemed creatures. We and all other creatures are part of God's good creation, which though fallen, is being redeemed through the work of Jesus Christ. Thus we may have a deep trust and quiet confidence in the "givenness" of God's initial address to us in his revelation in the Scriptures and creation. God's address invites us to patiently listen with bated breath. This address or promise elicits a posture of receptivity, of listening, rather than first (subjectively) seeing. If God's revelation is primary (original), it should animate our faith response and allow scientific practice to retain its relative, limited, but frequently necessary and fascinating, place in our lives.

God's loving address to us also asks for our heartfelt response in deeds that display his glory. A human response which, when seen in the Christian tradition, is as expansive and deep as all creation. In the myriad of relationships in which we find ourselves – parents, engineers, scientists, consumers, etc. – we strive to embody this faith, knowing that God will usher in his kingdom, while allowing us to be his cultural agents and representatives.

In our scientific practice and technological work, our faith allows us, in fact encourages us, to explore God's creation; to delineate, as well as we can, lawful, regular patterns of behavior; and even to attempt to describe chaotic events. We, therefore, must take God's revelation in creation seriously. However, we should not consider the Scriptures to be a "recipe book" as to how to develop, for instance, detailed biological theories about patterns of speciation or quantum mechanical theories of chemical bonding. The Scriptures may help to orient us and to direct our scientific inquiries within a broader context, but they seldom present us with answers to scientific questions or experimental procedures. God invites us to work out our salvation in fear and trembling, responding to all of his revelation to us. The continual challenge before us is one of reformation: our own thought and worldviews will repeatedly have to experience substantial revision both in their premises and terminology.

This persistent challenge goes far beyond wishing to merely integrate faith and learning. Nicholas Wolterstorff in a 1983 essay entitled "The Mission of the Christian College," comments: [P]eople have come to see that scholarship itself is conducted out of differing perspectives and that the integration of faith and learning which beckons us does not consist in tying two things, independently acquired, but consists of practicing scholarship in Christian perspective.

Rather than ordinarily assuming we have faith, on the one hand, and learning, on the other, we must hold that it is of greatest importance, first, to view the Christian's task as a vocational one in God's kingdom, and then, secondly, to find out where that calling leads us in a specific scientific or technological arena. Being faithfully busy in our vocation may lead to situations where there are distinct differences between what Christians hold and what others hold, e.g., about the nature of human beings, about the relative importance of deterministic or indeterministic approaches in quantum physics, or about the nature of religion and its impingement on our scientific activity.

Our scientific work may also lead to situations, at least at a superficial glance, where differences are extremely difficult to detect. In other words, there are no simple solutions or formulas that spell out how to practice our Christian calling in science. We constantly need to remind ourselves that the differences are not primarily what drive or motivate us. It is the call to be faithful to the one who has placed us in this world, who calls us to be his witnesses also in the arena of the sciences and technology. Scientific practices and technological innovations are some of the noblest responses to God's good, but broken creation. Yet they require a perspective which is governed by a vision of shalom.

Besides the "givenness" of creation and the primary human stance of listening to God's revelation in creation, we must acknowledge the dynamic development of creation. All creation finds its origin and existence (life) in God and exists for him (Rom. 11:36). The creational setting of our world, the cosmos, is therefore not a static one. It is continuously upheld by God and dynamically directed toward the eschaton (Rev. 4:8, 11).

The centrality of creational revelation for work in the sciences has received far too little attention. Yet it is fundamental to any Christian scientific enterprise or any responsible analysis of the history of science. No creature is on its own; each has a radical dependence on its Maker. That I take as an important confessional insight: i.e., all things within our horizon of experience carry the marks

### **Editorial** Faith and Scientific Practice

of creaturehood. All things, as creatures, have a certain "latitude" to respond; they, in their own patterned law-like way, express their respective individuality.

The Creator/creature distinction highlights the human, and thereby limited, dimensions of the scientific enterprise. Echoing biblical language, laws, principles, and ordinances are God's will or word for his creation. They hold for reality and undergird it, but are not coincident with it. Our responses and formulations are more or less accurate, more or less correct, and do in fact change in time. This relativizes our work without causing us to fall prey to historical relativism; i.e., it accounts for the provisional character of science without succumbing to a viewpoint which denies all structural features or holds that any discussion of structural matters can at best be heuristic or pragmatically useful. Acknowledging a Creator/creature distinction is also a liberating perspective. We work in the sure confidence that God is faithful to what he has made, and thus we do not have to cling to our theories at all costs, imagining we have a complete theoretical grasp of reality.

Our scientific practice is best viewed as an exploration of a given creation which has a built-in fabric or texture and possesses potentialities for novelties and dynamic development. The central metaphor is one of "listening": we should be listening intently to God's revelation. In turn, creation is not passive, but responds in its own way, revealing God's glory. Our ability to acquire (limited) knowledge of nature should not be equated with God's general revelation, nor is general revelation to be equated with a natural theology.

Why should we be concerned in developing a Christian scholarly enterprise in the sciences? First, the creaturehood of nonhuman creation is good, deserves our respect, and is worthy of cultivation. Secondly, good, articulate Christian scholarship can be of genuine service to the body of Christ, as well as be a blessing to others. For these and many other reasons, we should view our scientific work as a calling infused by a faith that invites allegiance and is open to the wonders of God's world. That sense of wonder and joy in exploring creation is what we need to convey to students. They need to be receptive and simultaneously critical of received theories, to be historically sensitive of the traditions embodied in their scientific textbooks. We need to help them identify issues and problems where Christian insights may bear fruit. These are issues related not only to the (ethical) application of science or focused on questions of distributive justice in science's technological offspring, but also involve issues that are at the very heart of theorizing and experimentation.

In brief, we should not just be reactionary, but rather be thetical and positive. Minimally we need to display a concern for the following themes:

1. Be open to a critical examination of the sciences: are the sciences as disciplines, and the manner in

which they are taught and applied, in need of reform or reformation?

- 2. Scientific practice is creational: It has its own integrity and empirical basis. It is not deficient in the sense of being religiously shortchanged or devoid of philosophical or worldview issues. Science has presuppositions, which are ultimately religious in nature and which may become apparent.
- 3. Scientific practice and science policy, in particular, are holistic. We need to look critically at efforts that attempt to reduce our complex reality to a few explanatory principles or assume that scientific solutions to societal problems are necessarily the last or best answer.
- 4. Raise questions of ethics, social justice, and steward-ship in our scientific practice. Science is far more than abstract theorizing. Scientific practice is deeply embedded in our culture; its social, political, and economic features are all too evident.

Arie Leegwater, Editor



If variety is the spice of life, this issue of *PSCF* should be to your taste. Articles range in content from Islamic and Christian assessments of Western technology (Egbert Schuurman), a reading of several nineteenth-century optimistic evolutionists (Mark Kalthoff), an extended assessment of potential conflicts between AI and biblical givens about the status of humans (Russell Bjork), to an analysis of genetic mutational events and the inferences we can draw for human evolution (Graeme Finlay). Geographically speaking, they come from three different continents and display the international reach of ASA.

Also included are two communications offering advice to students and early career scientists (Keith and Ruth Miller, and Mark Strand), an essay book review (Jack Haas), twenty book reviews (many engaging books that promise to make a mark), and three letters written in response to previous submissions. Enjoy!

Written "in exile," from Pohang, Korea **Arie Leegwater**, *Editor* 

# The Challenge of Islam's Critique of Technology

Egbert Schuurman

Eshert Schurgen

Egbert Schuurman

he Western world and the world of Islam share a history but they also differ greatly. The rise of terrorism has once again made us fully aware of that. In these tense times, I would like to consider a question that is rarely raised today, yet which may be very relevant and very revealing: What attitude do these two worlds take toward technology?

When you examine this question in historical perspective you cannot get around the religious background of technology, both in the Islamic world and in the West. This theme is very popular today: there is a renewed interest in the vitality of religion around the world and in the arguments regarding its influence on culture,<sup>1</sup> and especially in the historical development of technology.

Let me be clear about what I mean by the term "religion." When the media pay attention to "religion," they usually treat it as one of many factors or variables in human life, distinct from, say, sport, politics, or science. However, if we look carefully at religious communities and various types of societies around the world, we can see that religion is not just a typical function among others, but is, rather, the root from which the different branches of life sprout and grow and from which they are continually nourished. Religion is of *radical* and *integral* importance: it concerns the deepest root of human existence and integrates human life into a coherent whole. I hope to show this once again in our topic for this afternoon.<sup>2</sup>

My exploration will consist of the following steps. First, I shall briefly sketch the history of technology in the Islamic world, after which I shall try to clarify the background of the mounting tensions between Islam and the West. We shall review several Islamic ideologists in whose thinking science and technology play a big role.<sup>3</sup> Islamic critique of technology comes from two sides: from the spiritual, peace-loving Muslims and from the radical, violent branch of Islam. I shall try to clarify the challenges this poses for the West by looking at the internal tensions in Western culture itself. These turn out to be related especially to technology.

The tensions have been present for a long time, but they have been growing in intensity ever since the former Christian culture was secularized under the influence of the Enlightenment, an intellectual movement which wanted to have nothing to do with religion yet which, nonetheless, has an integrating effect of its own, and whose relation to Christianity has become increasingly strained. The Enlightenment represents the religion of the closed material world that is blind to the nonmaterial dimensions of reality. I say this in order to help us gain insight into the nature of the tensions between Islam, Christianity, and the Enlightenment in connection with technological development. This will enable us to analyze the problems accurately and to give a start to lessening our cultural quandaries.

The tensions (between Islam and the West) have been present for a long time, but they have been growing in intensity ever since the former Christian culture was secularized under the influence of the Enlightenment.

**Egbert Schuurman** (1937) studied civil engineering at the Technological University of Delft as well as philosophy at the Free University in Amsterdam. He is professor emeritus in Reformational Philosophy at the Technological Universities of Delft and Eindhoven and at the former Agricultural University of Wageningen. His chief publications in English are Technology and the Future (Toronto: Wedge, 1980; reprint, Paideia, 2008), Faith and Hope in Technology (Toronto: Clements, 2003) and The Technological World Picture and an Ethics of Responsibility (Dordt College Press, 2005). He also co-authored Responsible Technology (Grand Rapids: Eerdmans, 1986). Several of these publications have been translated into Korean, Japanese, Chinese, and Portuguese. Dr. Schuurman received an honorary doctorate from North-West University, South Africa, and a Templeton Award for his work as an educator in religion, science, and technology. He has served as a senator in the Dutch parliament since 1983. He and his wife Lydi have three children and nine grandchildren.

<sup>\*</sup>translation by Harry Van Dyk

#### The Challenge of Islam's Critique of Technology

Both the critique of technology provided by Christian philosophy and the critique of technology found in Islam challenge Western culture to change. A turnabout is needed in the West's dominant cultural paradigm—in the ethical framework within which Western culture is developed. Such a turnabout is crucial because we are dealing with worldwide problems. It may also lessen tensions with several currents within the Islamic world. Islamic terrorists, however, will not be satisfied with that, because their attitude—as they themselves tell us—concerns a nonnegotiable religious position. At best it will take the wind out of their sails by overcoming evil with good.

#### Technology in Islam

What place does the Islamic world assign to science and technology? After the death of Mahomet in the year 632, early Islam was strongly influenced by the Greek-Hellenistic world. This created an atmosphere conducive to the development of a distinctively Islamic pursuit and promotion of science.<sup>4</sup> The pursuit of science was viewed as taking place within the universe created by Allah, a universe that displays order and equilibrium and thus constitutes an aesthetic unity. The philosophy and science based on this view experienced a long period of florescence that lasted for more than five hundred years, reaching its zenith in the Arab civilization of the ninth and tenth centuries and becoming further enriched by knowledge imported from Persia, India, and even as far away as China. This growth was in keeping with the lifelong duty of every Muslim to increase in knowledge. Islamic scholars were already well acquainted with scientific experimentation and technological research. In pursuit of these activities, care for nature was deemed as important as a man's care for his family. It gave a boost to the economic sector such as trade and commerce, which in turn fostered further progress in science and technology. Historians speak of a symbiosis at that time between the Islamic religion and (applied) science, as graphically illustrated by the construction in desert countries of monasteries, mosques, schools, and irrigation works.

It is clear that in the Middle Ages, the Islamic peoples led the West in science and technology. At the start of the Middle Ages, Islam even mediated between the ancient world and the West. In other words, the West owes a great deal to the Arab world for its scientific development.

Following the eleventh century, however, the pursuit of science in the Arab countries entered a time of stagnation. For a variety of reasons – mostly political and socioeconomic – it went into decline. Since then, the Islamic world has increasingly been characterized by traditionalism and isolationism, attended by a loss of political power and a decline in material prosperity. The earlier, positive appreciation of science and technology even turned into a negative judgment of them.<sup>5</sup> In later times as well, during the industrial and postindustrial eras, Arab countries contributed little to science and technology apart from improving the exploration and marketing of crude oil and refining the weapons technology imported from other countries. There are, however, Islamic scholars today who—as we shall see in a moment—wish to promote modern science and technology in the light of Islam's own past and its original sources.<sup>6</sup> Their critique is not so much directed at science and technology as such, but rather at the "technological culture" of the West—in other words, at the Western *ethos* of technology.

# The Influence of the Enlightenment in the West

Meanwhile, the West, under the influence of its belief in progress, particularly in the Age of the Enlightenment, fueled the prejudicial view that the Islamic world, per definition, erected more and more roadblocks to arrest science and technology. This action was blamed on Islam's contemplative nature and Arab fatalism. That ethos, although at variance with its original attitude, did indeed acquire much influence in the Islamic world. It even reinforced Islam's resistance to Western science and technology. Since the twelfth century, the Islamic world is more oriented to the past than the future. A reversal did take place in the twentieth century as a result of the process of globalization. Arabic universities were established, borrowing heavily from the West.<sup>7</sup> However, it seems that modern technology is appreciated only insofar as it can be made to serve Islamic religion. Science and technology, it is said, must be brought under the Islamic banner. This goal has not been entirely successful: Western technology comes hand in hand with Western ethos. This continues to meet with resistance, just as in the case of the active belief in progress that forms the backdrop of Western ethos. Acceptance of scientific and technological knowledgemodernization-stands in sharp contrast with resistance to Westernization, secularism, materialism, and Western profanity.8 Islam will have to furnish modernization with a moral compass.9

#### Reactions inside Islam

It is important, meanwhile, to distinguish between different reactions within Islam. In the case of more than one Muslim country, those reactions go back to the period of colonialism. There is first of all the radical, violent, fundamentalist current which rejects science and technology as well as Westernization – the ethos of the Enlightenment. Another current accepts both elements from the West. It is mostly found among those who have political and economic power, but sometimes also among Muslim scholars.<sup>10</sup> Understandably, the first current also attacks those who accept the second current. This is the reason why terrorist activities occur just as often in Muslim states as in Western countries. Then there are what Huntington calls the reformists.<sup>11</sup> Others see them as spiritually minded and peace-loving. They accept modern developments in science and technology short of the dominant Western ethos. They hold that as the Islamic world embraces Western science and technology, a thoroughgoing process of rationalization will have to be accompanied by profound spiritual convictions.<sup>12</sup> Often they advocate a similar approach to adopting a Western-style democracy.<sup>13</sup>

Ideological differences and growing tensions between these three currents may well cause violent protests against the West to escalate as well as heighten cultural tensions within the West, which is being populated by Muslims in ever greater numbers. The choices of the smallest group, the fanatical Muslims, pose a violent threat to Western culture. Their urge to destroy casts a somber shadow over the world.

#### Enemies of the West

This destructive urge is explored in a recent study by Buruma and Margalit.<sup>14</sup> They use the term "occidentalism" to refer to the demonization of the West as painted by its enemies. The West, led by America, has blanketed the globe with industrialism, capitalism, and economic liberalism. The fanatic Muslim regards this "Americanization" as a machine civilization that destroys cultures. And globalization only reinforces this destructive civilization of machines, which is cold, rationalistic, mechanical, and without a soul. Granted, the spirit of the West is able to develop technology and raise it to ever higher levels for realizing ever larger economic successes; but it cannot grasp the higher things of life because it is woefully lacking in spirituality. It is helpless and hopeless in the very things which humanly speaking are important, nay, all-important. What the spirit of the West exports is *scientism* – the belief in science and technology as the only way to acquire knowledge.<sup>15</sup> In the eyes of Muslims, the religion of the West is materialism, and this religion militates against the worship of the Divine spirit.

The hostility that is directed at the West, according to Buruma and Margalit, is rooted in this resistance to the "technological culture." The Western spirit suffers from a grave mental illness: it is arrogant, shallow, irreverent, merely efficient, like a computer. Western culture, accordingly, is a spiritless, superficial, materialistic culture of technological presumption, power hunger and greed – a brutish and decadent culture, a culture that deserves to be destroyed. Suicide terrorism has catapulted this hostility against the West to new heights. The suicide bombers, as worshipers of the Divine spirit, send the worshipers of earthly matter to their death with this slogan on their lips: "Death for the sake of Allah is our supreme ambition."<sup>16</sup> Their war against the West is a holy war.

# Islamic Terrorism and Dialectic Tensions in Western Culture

As they analyze Occidentalism, Buruma and Margalit try very hard to understand the enemies of the West. They write: "Unless we understand why they hate the West so much, we need not nourish the illusion that we can keep them from destroying mankind."17 More than once, as I studied their analysis of Western culture and their search for the reasons behind the undying hatred of our culture, I was reminded of what Reformational philosophy has come to see as the dialectical tension within Western culture. It is striking how often these authors look for an explanation in the internal tensions within Western "technological culture" itself. Ever since globalization set in, these tensions have been felt worldwide. Whereas until recently reactions against this culture were confined to the West itself, counter-movements are today found around the world. Jihad terrorism is only the most powerful and the most dangerous expression of it. It often uses critiques of culture borrowed from Western writers. Popular with many radical Muslims, for example, is the critique of "technological culture" leveled by Martin Heidegger.<sup>18</sup>

But what exactly is meant by "dialectical tensions" in Western culture? My first inaugural oration dealt with the cultural tension between technocracy and revolution.<sup>19</sup> Since that time, the dialectical tension or inner conflict in culture, with its constantly altering forms, has been a recurring theme in my lectures. Identifying the dialectic allows us to see what is going on in our culture at a deeper level. It helps us not only to see the inherent problems and their gravity, but also – knowing their origin and historical development – how they can be, and must be, contained.

Dooyeweerd located the origin of the Western dialectic in the pretended autonomy of humans: the person who is sufficient unto self, the person without God. This has resulted in experiencing reality as a closed, humancentered world, and history as a purely man-made process. Because our culture is closed shut to the transcendent God, humans are thrown back onto a "this-worldly" reality. This dependence, which can occur in a variety of ways, ultimately leaves an orientation to this world as the only option. We in the West attempt to realize the idea of selfglorifying autonomy by means of science, and subsequently to confirm it by means of technology. The idea takes hold that modern technology can bring us the perfect human and the perfect world. This whole development has called up forces that have created tensions of gigantic proportions. The ideal of unprecedented material wellbeing may have been realized in part, but at the same time, it is clear that this prosperity has been attained at the price of human freedom and at the expense of the biosphere, and that with all our prosperity, we are standing on the edge of a volcano that is about to erupt. Western culture

The Challenge of Islam's Critique of Technology

is a culture that is internally divided. Absolutized freedom is in tension with the absolutization of scientific-technological control, and vice versa. It is a tension that shapes the history of our time.

### The Development of Dialectical Tensions

Initially, the dialectical tensions-which are fundamentally religious in nature-were confined to philosophical theories. But under the growing influence of the Enlightenment, they have entered culture under full sail. It is entirely in the spirit of the Enlightenment, after all, not only to understand reality in terms of rationality, but also to shape the world rationally. The Enlightenment project aims at using the instrument of reason to create a society in which human freedom can be enjoyed to the fullest. The actual situation, however, is that the objective structures, which autonomous reason designs and then implements, take on a life of their own, independent of humans, and as such turn against cultural freedom. That threat is all the more menacing as the forces to contend with are developing with accelerating dynamics and increasing complexity, so that people can no longer size them up, let alone alter them.

Throughout my course, "Currents in Modern Philosophy," I have demonstrated how the powers of science, technology, and economics have been recommended and reinforced by dominant philosophical currents like positivism, pragmatism, and systems theory. These currents are influential especially because they think newer technologies are needed to solve the cultural problems created by the technologies that are now outdated. Opposed to this way of thinking are the philosophical currents representing the dialectical counter-pole. Thus existentialists point out that in a technological society, human freedom suffers as a person is reduced to an object for technical manipulation. Neo-Marxists call attention to the fact that the ongoing development of science and technology augment and affirm the influence of economic and political powers, threatening humans as bearers of culture and agents of politics. The advocates of environmentalism demand attention for the oppression of nature and therefore argue for technologies that protect the environment against pollution and destruction. New Age thinkers protest against materialism and argue for a more spiritual stance in life. Finally, naturalists ("deep ecologists") emphasize the meaning of nature as an integral whole, over against the impersonal, artificial, and abstract nature of technology.20

All the while, there is not one person living in the technological culture who does not feel the tension, mentally and viscerally. The tension is mounting by the day between infinite technological expansionism and the finite nature of creation and its inherent potentials.

### The Primacy of the Scientific-Technological Ideal of Mastery and Control

Why is it that humankind's pursuit of mastery and control always seems to win out over that other pole in the cultural dialectic, namely the ideal of freedom? The reason is that the mastery pole utilizes the *objective* powers that manifest themselves in new scientific and technological possibilities such as systems theory, information science, computer technology, and genetic manipulation. And economic powers only reinforce that process. However much the critiques are mounting, a turnabout of culture has become almost inconceivable. The cause of that lies especially with economic powers that know no bounds, and a public that is caught in consumerism and repeatedly takes the side of the dominant cultural trend in the hope and belief that even more blessings of science and technology will come their way.

### The Gravity of the Current Dialectic

It is essential that we emphasize the increasing seriousness of this historical process. Modern technology and the wholesale application of what it can do is going through unprecedented growth and taking on a despotic character. Its mastery and control of the whole world not only curtails human freedom but also threatens to deplete natural resources, pollute the environment, and damage nature beyond repair. Of late, increasing attention is being paid to climate change as well. The unbridled scientifictechnological dialectic defies natural, ecological, social, and energy limits, causing clashes which, owing to the absence of sufficient concrete outlets for the rising tensions, can rapidly escalate into open conflicts.<sup>21</sup> The impact of globalizing technical and economic development in the Third World often gives rise to deep feelings of political impotence, combined with a sense of ongoing economic neglect. It does not take long before people experience this as a direct form of humiliation. Western science and technology, riding the current of globalization, put enormous pressure on other cultures. The dialectic easily translates into culture wars, ethnic strife, and international standoffs. Thus political catastrophes may boil over and cultural cataclysms may detonate.

The *new* element in the current situation of the cultural dialectic consists of two components. Thus far, as we saw, resistance remained confined to *subjective* resistance. Because people did not have objective cultural power at their disposal, their resistance could not succeed in changing – at best, only in adapting – the "technological culture." Now, the first new component of that resistance to the "technological culture" is coming from the outside, from Islam. But it has nestled itself, as it were, inside Western culture, and at the same time – this is the second new component – it makes use of *objective* cultural power.

Terrorism is all too real. A Western philosopher like Waskow, a revolutionary utopian, was still able in the sixties to exclaim that the technical culture had to be violently overthrown,<sup>22</sup> but he could get no further than words. Present-day terrorists have a great deal of cultural power at their disposal, including technical possibilities, and form a worldwide network by means of technology – for example, the Internet – precisely the kind of thing they oppose. The attack on the Twin Towers makes clear that they are able to destroy technology with other technology. Events like these are rightly a grave cause for concern. How do Muslim ideologists react to the current cultural situation?

#### The Critique of Islamic Ideologists

One of the most influential Islamic thinkers of the past century, the Egyptian writer Sayyid Qutb, championed a pure Islamic community as a defense against encroaching Americanism which he interpreted as the empty, idolatrous materialism of the West.<sup>23</sup> In the course of his life, the behavior of the West made him more and more bitter, causing him to be opposed to every form of accommodation. Like all dreams about purity, his ideal of spiritual communion was a fantasy which bore within it the germ of violence and destruction. Qutb became the founder of an Islamic ideology that challenged the main ideologies of the West. His rejoinder to Western arrogance was Islamic intolerance.<sup>24</sup> His objectives were the purity of Islam and the destruction of the West. Qutb is a representative of radical Islam which does not flinch from the use of violence in opposing the West, in fact, advocates it!<sup>25</sup> In him, the cultural dialectic has become the engine of destruction.

Fortunately there are also reformists, Muslims who aim at harmonious co-existence. One of them is Mohammed Iqbal, a writer from Pakistan. Iqbal is no occidentalist. He critiques the West from a Muslim perspective, in particular, the unbridled development of science and technology, the financial power of capitalism, the inherent forms of economic exploitation, and the secularism attendant upon it. He blames Western influence for detaching people from Allah-thus putting his finger on the worst effect of the Enlightenment-and causing them to serve idols of their own making. Hence he is very critical of Western arrogance, Western imperialism, and public morality in the West. Nevertheless, Iqbal does not take distance from science and technology.<sup>26</sup> On the contrary, for his ideas on that score, he takes as his basis the familiar Muslim concept of the Unity of Allah. That unity has to be reflected in human society in the form of harmony, expressed in justice, equality, solidarity, and care for nature and the environment. Thus, in keeping with the spirit of early Islam, he advocates important reforms in science and technology, hoping in this way to reduce the cultural tensions.<sup>27</sup>

In the same vein, Pakistani Muslim Mohammed Abdus Salam, a winner of the Nobel Prize for physics, has made a plea for accepting technology. In a very readable paper of 1983, he states that Allah has placed everything on earth "at the service of" humans.<sup>28</sup> Muslim scholars are to acquire insight into the world and thus into Allah's plan. Science must be an integral part of the human community for the purpose of promoting material well-being. Accordingly, Salam orients himself to the universality of science and technology. Their successes should be a cause of gratitude to Allah and of greater conformity from now on to Allah's will. In order to learn about the proper motives for pursuing science and technology, Salam wants to go back to the early beginnings of Islam, when the torch of scientific and technical development was passed on from generation to generation. For him, therefore, Islam is essential for the correct motivation and ethics of science and technology. In this way, this Muslim scholar has spoken about the relation or interaction between religion and technology in words which are new in the present-day Muslim world and which are seldom if ever heard in the Enlightenment thinking of the Western world.

# Christian Philosophy and the Critique of Technology

That said, reformist Muslims do have a one-sided opinion of Western culture. It is a matter of historical record that the Enlightenment has Christian roots. But this intellectual-spiritual movement, which arose in the eighteenth century, has increasingly taken distance from Christianity, has in fact more than once repudiated it. Accordingly, it is not right of Islam to make little or no distinction between the influence of Christianity and that of the Enlightenment, as if the two would necessarily lead to a similar ethics for technology.<sup>29</sup> On the contrary, Christianity, as I have shown, levels a profound criticism at the dialectic tensions inherent in the Enlightenment worldview.

In the course of the twentieth century, both ideals of the Enlightenment – the ideal of human freedom and the ideal of scientific-technical control – have reached a crisis which may have disastrous consequences for global culture. Dialectical tensions in culture are building up. Radical and violent Islam is offering ever stronger resistance. In other words, Western culture is increasingly being exposed to threats by internal and external forces alike. No less a person than Habermas, at heart an Enlight-enment philosopher, has recently shown that the "failed Enlightenment" needs religion.<sup>30</sup> Huntington argues that the clash between Islamic and Western civilizations is due to the weakening of Christianity as the central component of the West.<sup>31</sup> The question is pressing: Can a culture that has lost its religious roots survive?<sup>32</sup> A renewal of Western

#### The Challenge of Islam's Critique of Technology

culture would mean that Westerners return to the religious well-spring of the Christian religion and that Christianity embraces its cultural calling and actively pursues it. Christianity, on the basis of a powerful conviction, ought to appeal earnestly and emphatically for a turnaround of Western culture. Thankfully, that call is being answered today from all sides. I am thinking here of the effort of theologian Hans Küng to arrive at a "global ethics" for science and technology.<sup>33</sup> World organizations of churches, too, have published reports in which developments in Western culture are heavily criticized.<sup>34</sup>

There is much that is valuable in these calls for change. I do think, however, that they trace the problems and tensions of our culture too much to a disruption of economic relations and view them too little against the backdrop of the twin ideals of the Enlightenment. Those ideals are in tension with each other. How can that tension be eased? By replacing autonomous freedom with a freedom that answers to values like order, discipline, authority, respect, trust, mutual help, human solidarity - thus a freedom that is linked to responsibility. As well, there must come a new motivation for science and technology. Dominating power must make way for serviceable power with a view to global justice. The norms and values for technology should no longer be derived from the scientific-technological worldview, which leads ultimately to developments without purpose or direction. This realization is essential, because it is precisely technology that lies at the basis of many cultural activities. And to resort without question to technological solutions for problems occasioned by technology is to pre-program, as it were, new problems and threats. That is why a different view of technology opens up the possibility of reducing or even resolving our cultural problems. The lofty flight of technology needs a transcendental anchor. But how?

What we need to do, first of all, is to acknowledge God as the origin of all things and to recognize people as responsible creatures, made in the image of God and commissioned to unfold God's creation with all they have, including science and technology. Such a recognition makes the meaningfulness of science and technology subservient to the divine meaning and purpose of history, namely the coming of the kingdom of God.35 In the place of the dominant worldview of the Enlightenment must come an orientation to the unfolding of creation in a disclosure of its potentials, a historical process that began in a garden and will end in a garden-city.<sup>36</sup> A sustainable and durable society cannot do without religion and spirituality. In short, in its desire for a transformation of "technological culture," Christianity opposes the "religion of matter" as much as does reformist Islam.

For that matter, happily, there are plenty of people outside Christianity and Islam who are keenly aware that Western culture is in need of a fundamental change, a radical shift in direction. A radical change is needed, as we saw, because of gathering clouds within and threats from without, like those from radical Islam. As we work toward this goal, we may expect additional help—despite big differences with Christianity—from reformist Islam on account of its ethos, its care for nature and the environment, and its concern for social justice. Mutual support of this kind could be very useful in bringing about the much needed *paradigm shift* away from "technological culture."

# The Paradigm Theory of Thomas Kuhn

To make the notion of a "paradigm shift" clearer, I shall give as an example Thomas Kuhn's paradigm theory of scientific development. Kuhn has demonstrated on the basis of the actual growth of science in history that scientific theories can ultimately be explained in terms of sociological, psychological, economic, and even religious factors. His theory explains not only the continual growth of scientific knowledge but especially also its development in spurts. The continual development of science exhibits stability and consensus among scientists. Whenever it reaches a crisis, however, the basic framework-or paradigm-within which science is practiced alters. That is to say, the reigning paradigm will be exchanged for one with greater explanatory power. Not until the new paradigm is firmly established will the crisis in science be resolved, followed by a new period of "normal" scientific work. In the meantime, along with the paradigm shift, the truth claims of science are considerably relativized.<sup>37</sup>

Kuhn shows that during crises in the formation of scientific theories, big fundamental questions are abruptly pushed to the surface. The old scientific beliefs are shaken to their foundations. Old assumptions are questioned. Community among scientists erodes. Consensus about values crumbles. The "tacit knowledge" shared by likeminded scholars begins to totter. The old paradigm has had its day. A new development gains ground.<sup>38</sup>

Could the necessary change in the cultural paradigm be analogous to Kuhn's view of paradigm shifts in science? Analogies can be helpful but they also have their limitations. Science, for example, is only a branch or component of culture. Culture comprises so much more than science. Yet I feel we have good reason, precisely because our culture is more and more seen as a "technological culture" or a "scientific culture," to allow ourselves to be inspired by Kuhn.

#### The Transformation of "Technological Culture"

One wonders: a relativizing of the current cultural paradigm, leading to its transformation—could it happen in the present cultural development? The reigning paradigm

#### Egbert Schuurman

poses many problems in the West. And we are trying to solve these problems by the same means and the same methods that have called them into being in the first place! The solutions turn out to be, owing to economic and political support, part of the problem. Slowly, but surely, we are beginning to realize that this cannot go on. Is there a possibility that the crisis will help us find the way to a new phase of culture in which the problems of "technological culture" can really be pushed back?

Any cultural revolution or turnaround, by analogy with a scientific revolution, will be accompanied by tense discussions which will ultimately hark back to what people believe and what they consider to be true. The part that religion plays in all this will become unmistakably evident. Religion, or religions, will offer different critiques of culture or technology, as is the case with Christianity and reformist Islam. The challenge will be to come up with a different cultural paradigm that reduces the cultural dialectic and curtails or even resolves present problems and threats. That will not be easy, because the representatives of the old culture model will not give it up so quickly. They will hold on to it with a kind of grim stubbornness. I am speaking of economic, political, and cultural counterforces. Yet at the same time, the longer current developments continue, the clearer their weakness will become. Surely this is patently evident in the mounting consequences that stem from current scientifictechnical-economic thought and are threatening the whole world

## The Conflict between Industrial and Organic Farming

Nevertheless, there are possibilities. One concrete example today of a cultural transformation, both in the West and in the Muslim world,<sup>39</sup> is the contest-successful or not, convincingly argued or not-between organic farming and industrial agriculture. The latter is giving rise to more and more problems. Chances are that these problems will be taken more seriously and solutions pursued more earnestly as a growing number of opponents of industrial agriculture and proponents of organic farming enter into dialogue with each other and an increasing number of successful alternatives are realized within the as yet vague contours of a new paradigm. Conversely you hear defenders of industrial agriculture arguing for more environmentally friendly ways of farming. Either way, it is evident that people are facing up to existing problems and are searching for new, more sustainable methods of agriculture.<sup>40</sup>

#### Cultural Turnaround

Similar turnarounds should address the whole of "technological culture." Owing to looming problems, we are witnessing a growing interest among politicians and economists in cultural alternatives, sustainable development, and socially responsible corporate behavior. The socioeconomic climate is becoming more favorable for drastic change. Recent reports to government from the world of business state that more needs to be done to tackle environmental pollution and climate change.<sup>41</sup> Another catalyst for developing new cultural alternatives is the latest UN Report on Climate, compiled by a global consortium of 2,500 researchers who finger humans and their technology, economics, and consumption as the chief culprits of the enormous emissions of greenhouse gases, with all the risks that this entails.

Attention to climate change, rise in sea levels, shifting climate regions, disruption of ecological systems, loss of biodiversity, new tropical diseases, and so on – all argue for a change in our cultural ethos. So do the activities deployed by men like Bill Clinton and Al Gore. Nor should we underestimate the impact of the many years that the Greenpeace movement has been active. More and more eyes are beginning to see the need for a new cultural paradigm. More and more people are realizing that modern society with its patterns of producing, mastering, and consuming is inherently, not coincidentally, unsustainable.42 These emerging factors are now undermining the very cultural patterns that exist at the moment. And to the degree that governments work seriously toward levels of sustainability – by introducing the precautionary principle, for example-and thus do not allow sustainability to become a mantra or a myth, to that degree the public will begin to doubt whether the prevailing culture is at all sustainable. In this way, politics can contribute positively toward a change in the attitude of many toward culture. And if, in addition, consumers begin to realize how new approaches can help them escape certain dangers and how their quality of life can be improved, conditions will be favorable for a cultural crisis. The much needed cultural turnaround will then become a realistic prospect, with greater attention for the life of future generations and for the rich variety of countless fellowcreatures, hence for true sustainability. A realistic prospect as well will be that more attention will be paid to the promotion of justice in the face of the injustices intrinsic to current trends in globalization.

Accordingly, it is of paramount importance that the post-industrial culture assist in reducing and resolving the problems and threats of industrial culture. That will have to be a learning process of small and large steps, a process in which serious attention is paid to things that have been blithely ignored in the past or are conveniently being overlooked in the present. I suspect that the heightened interest in religions at the moment has everything to do with it. It is from those religions that long-neglected but fundamental questions are back on the table. What is the essence of human life? What is the meaning of culture, technology, and economy? Proceeding from these funda-

#### The Challenge of Islam's Critique of Technology

mental questions – from the religious roots of cultures – the consequences are being examined for all culturally formative sectors. In Kuhn's terminology, we can speak by analogy of the great need of a "gestalt switch," a "turnaround," a "revolution." What is needed is nothing less than a "leap." Justly so, for it is "time to run." The cultural experiment that was grounded in the Enlightenment – it is patently clear everywhere – has failed. We need not deny the many good things it has brought us to conclude that, as a whole, it is leading us to disaster. The tensions and menaces need to be turned back if civilization is to survive. For that to be possible, a firm basic orientation, a fixed anchor – in other words, a meta-historical compass – is required.

#### Content of a New Cultural Paradigm

But what should the new cultural paradigm look like? What would it be, essentially? It will have to differ from the previous one and yet incorporate the old in a process of transformation. In the old cultural paradigm, nature is seen as lifeless and, given that framework, is exploited by unbridled manipulation. Thus, if until recently nature, humans, environment, plants and animals were viewed from a technical perspective—the so-called "machine model"—now the overriding viewpoint in cultural formation will have to be the protection of *life*. Science and technology and economics should no longer destroy life in all its multiplicity and rich variety of shapes and forms but, on the contrary, stand in the service of it. When that is done, technology and economics will be able to answer better to their intrinsic meaningfulness.

Proceeding from different religious perspectives, Christianity and Islam, however widely they differ religiously and -I emphasize this-however unbridgeable these differences will remain, both also have much in common, enabling them to get along in working toward such a cultural turnaround.<sup>43</sup> The garden model suits both Christianity and Islam.<sup>44</sup> Both seem to concur with this confession: "We love all creation because of the Creator."45 Christian and Islamic culture, each in its own way, can contribute to a globalizing culture in which life is not threatened but enriched and in which greater justice and righteousness are practiced to ease tensions. For all their great differences, together they can work for greater social cohesion and mutual peace. Christians should be eager to promote forms of collaboration like this, for they are called to be peacemakers.<sup>46</sup> If, however, Christians lack the power of faith and fail to conclude a moral pact with reformist Islam, then a transformation of culture will not succeed. Then the battle between the competing claims of Enlightenment and radical Islam will intensify and Muslim violence will increase. Then there will be reason enough to remain pessimistic about the future.47

#### Summary and Conclusions

Technical thinking predominates in industrial society. Virtually everything is viewed in terms of the technical model or – more broadly – the machine model. Neither of these models has any room for life as a fundamental and decisive factor. They have guided the application of the power of technology in a tyrannical way. Huge problems have been the result. Today we can see how the "technological culture" threatens *life* itself, to the point of destroying it. A solution to these problems of modern culture is impossible so long as we continue to think and act within the parameters of the technical model.

In the new phase of culture and civilization, however, we shall not say farewell to technology as such but we shall have to put it in the service of life and human society. Reality must no longer be viewed as providing mere objects for technical manipulation but must instead be received in love as a prior given, as a divine creation, as a gift from God. Such an attitude will require respect and awe for the Owner of all things; it will call for openness, humility, meekness, wonder, reverence, and care. Our appreciation of technology will change completely if the will to power and master is exchanged for respect for all that lives, in all its multi-colored variety and multiplicity. It will also alter our attitude toward our fellow beings and foster love of the worldwide community of humankind. The aim of technology should not be to break down in order to master and control, but should be to unfold and cause to flourish. For a healthy disclosure of the creation, both Christianity and reformist Islam must nurture the perspective of the living and vibrant gardencity, of a culture that takes care of nature and the environment. The preservation of life and well-being is worth more than material prosperity.

A culture whose basic categories are life and love and whose mission is to promote and strengthen the cause of justice and righteousness in the world will orient itself to supra-subjective normative limits. This will make possible a more balanced, sustainable, peaceable, and also richly varied development. When people learn to practice moderation, tensions and threats will subside, not only within the West itself but also in Western relations with Islamic culture. Given its ethos, it must be possible to win over reformist Islam for a turnaround of culture. To the extent that radical, violent Muslims refuse to go along with this development, political measures will have to cut them off from the objective cultural powers of science, technology, and economics; from financial funds and subsidies; and from weapons. In light of this perspective, world problems and global menaces can be pushed back, terrorist threats can be combatted more effectively, and a more durable and just global development can be realized as we move toward the second decade of the twenty-first century. +

#### Notes

- <sup>1</sup>Jürgen Habermas, Zwischen Naturalismus und Religion (Frankfurt am Main: Suhrkamp Verlag, 2005).
- <sup>2</sup>This article is the text of my ex-augural address delivered in the auditorium of the University of Wageningen on September 20, 2007, on the occasion of my retirement from the endowed chair in Reformational Philosophy. The translation is by Harry Van Dyke.
- <sup>3</sup>I thank my student and fellow philosopher Mohammed Balali from Iran for his critical comments on the text and for his advice about recent Islamic literature on the subject.
- <sup>4</sup>Ansgar Stöcklein et al., eds., *Technik und Religion* (Düsseldorf: Georg-Agricola Gesellschaft, 1990), 102.
- <sup>5</sup>Ahmad Y. Al-Hassan, "Factors Behind the Decline of Islamic Science after the Sixteenth Century," epilogue to *Science and Technology in Islam* (UNESCO, 2001); Pervez Hoodbhoy, "Science and the Islamic World – The Quest for Rapprochement," *Physics Today* (August 2007): 49–55.
- <sup>6</sup>N. Abu Zayd, *Reformation of Islamic Thought: A Critical-Historical Analysis* (Amsterdam University Press, 2006), 31–5.
- <sup>7</sup>Samuel Huntington, *The Clash of Civilizations and the Remaking of World Order* (New York: Simon & Schuster, 2001), 70; Abdolkarim Soroush, *Reason, Freedom and Democracy in Islam* (New York: Oxford University Press, 2000).

<sup>8</sup>Soroush, Reason, Freedom and Democracy in Islam, xvii.

- <sup>9</sup>Wetenschappelijke Raad voor het Regeringsbeleid (Thinktank for Public Policy), *Dynamiek in islamitisch activisme – Aanknopingspunten voor democratisering en mensenrechten* (Dynamics in Islamic Activism: Points of Contact for Democratization and Human Rights) (Amsterdam: Amsterdam University Press, 2006), 38 f. Hereafter cited as WRR.
- <sup>10</sup>Hoodbhoy, "Science and the Islamic World," 55.
- <sup>11</sup>Huntington, The Clash of Civilizations, 118 ff.
- <sup>12</sup>Riffat Hassan, "Religion, Ethics and Violence: Developing a New Muslim Discourse," in Berma Klein Goldewijk, ed., *Religion, International Relations and Development Cooperation* (Wageningen: Wageningen Academic Publishers, 2007); Abdolkarim Soroush, "Ethics and Ethical Critiques," www.drsoroush.com (2004).

<sup>13</sup>Soroush, Reason, Freedom and Democracy in Islam; WRR, 29–58.

<sup>14</sup>Ian Buruma and Avishai Margalit, *Occidentalism: The West in the Eyes of Its Enemies* (New York: Penguin, 2004).

<sup>15</sup>Ibid., 76, 96.

<sup>16</sup>Cited in ibid., 73; see also Abd Al-Hamid Al-Ansari, "The Root Cause of Terrorism Is the Culture of Hate," The Middle East Media Research Institute, Special Dispatch Series, no. 1625 (June 15, 2007): http://memri.org/bin/articles.cgi?Page=archives&Area=sd&ID= SP162507 (Accessed April 10, 2008).

<sup>17</sup>Buruma and Margalit, Occidentalism, 17.

<sup>18</sup>WRR, 45; Zayd, Reformation of Islamic Thought.

- <sup>19</sup>E. Schuurman, *Reflections on the Technological Society*, 2d ed. (Toronto: Wedge Publishing Foundation, 1983), 1–25.
- <sup>20</sup>E. Schuurman, Faith and Hope in Technology (Toronto: Clements Publishing, 2003), 135–61.
- <sup>21</sup>Koo van de Wal and Bob Goudzwaard, eds., *Van grenzen weten: Aanzetten tot een nieuw denken over duurzaamheid* (Budel: Damon, 2006), 223.
- <sup>22</sup>See A. I. Waskow, "Creating the Future in the Present," *Future* 2, no. 4 (1968).
- <sup>23</sup>Buruma and Margalit, Occidentalism, 36, 116 f., 124 f., 131.
- <sup>24</sup>Huntington, The Clash of Civilizations, 333.
- <sup>25</sup>Sayyid Qutb, *Milestones* (Indianapolis: American Trust, 1990).
   <sup>26</sup>Buruma and Margalit, *Occidentalism*, 122, 152.
- <sup>27</sup>Mohammad Iqbal, *The Reconstruction of Religious Thought in Islam* (Lahore, 1971); see also Richard C. Foltz et al., eds., *Islam and Ecology: A Bestowed Trust* (Cambridge, MA: Harvard University Press, 2003).
- <sup>28</sup>Mohammed Abdus Salam, "Science and Technology in the Islamic World," keynote address delivered at the Science and Technology Conference, Islamabad, 1983.
- <sup>29</sup>Buruma and Margalit, Occidentalism.

<sup>30</sup>Habermas, Zwischen Naturalismus und Religion.

- <sup>31</sup>Huntington, The Clash of Civilizations, 335.
- <sup>32</sup>Russell Hittinger, "Christopher Dawson on Technology and the Demise of Liberalism" in *Christianity and Western Civilization* (Ft. Collins, CO: Ignatius Press, 1995).
- <sup>33</sup>Hans Küng, *Weltethos für Weltpolitik und Weltwirtschaft* (Munich: Piper, 1997).
- <sup>34</sup>Hans Opschoor, "'Wealth of Nations' or a 'Common Future': Religion-Based Responses to Unsustainability and Globalisation," in *Religion, International Relations and Development Cooperation*, ed. Klein Goldewijk, 247–81.
- <sup>35</sup>Jack Clayton Swearengen, *Beyond Paradise: Technology and the Kingdom of God* (Eugene, OR: Wipf & Stock, 2007), 271 ff.
- <sup>36</sup>E. Schuurman, The Technological World-Picture and an Ethics of Responsibility: Struggles in the Ethics of Technology (Sioux Center, IA: Dordt College Press, 2005).
- <sup>37</sup>Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962).
- <sup>38</sup>Herman Koningsveld, Het verschijnsel wetenschap (Amsterdam: Amsterdam University Press, 2006), 110 ff.
- <sup>39</sup>Foltz et al., *Islam and Ecology*, 3 ff.; Attilio Petruccioli, "Nature in Islamic Urbanism: The Garden in Practice and in Metaphor," in *Islam and Ecology*, Foltz et al., 499 ff; Schuurman, *The Technological World-Picture*, 49 ff.
- <sup>40</sup>Petrus Simons, *Tilling the Good Earth: The Impact of Technicism and Economism on Agriculture* (Potchefstroom, 2007), 63, 240 ff., and 374 ff. See also Schuurman, *Faith and Hope in Technology*, 102 ff.; Schuurman, *The Technological World-Picture*, 49–59.
- <sup>41</sup>Rein Willems et al., *Pleidooi voor een kabinet met een mondiale visie op natuur-en klimaatbehoud* (Plea for a Cabinet with a Global Vision for the Preservation of Nature and the Climate). Open Letter to party leaders in the Dutch parliament, The Hague, December 2006.
- <sup>42</sup>Van de Wal and Goudzwaard, eds., *Van grenzen weten*, 8 ff.
- <sup>43</sup>Günter Rohrmoser, *Islam, die unverstandene Herausforderung* (Bietigheim: Gesellschaft für Kulturwissenschaft, 2006).
- <sup>44</sup>Petruccioli, "Nature in Islamic Urbanism," 499 ff.; Schuurman, *The Technological World-Picture*, 37 ff.
- <sup>45</sup>Foltz et al., *İslam and Ecology*, 29.
- <sup>46</sup>Cf. Jer. 29:7 and Rom. 12:18.

<sup>47</sup>Bruce Bawer, While Europe Slept: How Radical Islam Is Destroying the West from Within (New York: Broadway, 2006).

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Mark A. Kalthoff

LeConte. Beecher, and Abbott offer together a lens through which to view the way speculative theology, when harnessed to ideological enthusiasm for scientific novelty, can spawn religious ideologies that bear little resemblance to orthodoxy ...

## **Article**

# Optimistic Evolutionists: The Progressive Science and Religion of Joseph LeConte, Henry Ward Beecher, and Lyman Abbott

Mark A. Kalthoff

Historians of science have carefully studied the post-Darwinian Protestant accommodations of evolutionary theory. This paper extends a small portion of their efforts by focusing upon three prominent nineteenth-century "optimistic evolutionists": Joseph LeConte (1823–1901), Henry Ward Beecher (1813–1887), and Lyman Abbott (1835–1922). Although each has been the subject of individual biographical studies, there is little scholarship looking at the three together, despite their personal relationships and mutual influences.

Thoroughgoing reformulation of traditional Christian doctrines stood among the nineteenthcentury theological responses to evolution. The cases of LeConte, Beecher, and Abbott exemplify this mode. Importantly, their theological accommodations of evolution include treatments of two fundamental issues: the problem of evil and the concept of design. Matters of theodicy still vex theologians, while philosophers and scientists continue to acknowledge the implications of evolution for the doctrine of original sin. The emergence of "intelligent design" theories in recent years establishes the chronic vitality of the design hypothesis. Hence century-old deliberations upon these topics provide useful perspectives, even if only as cautionary voices calling attention to the theological difficulties awaiting Christians who recast traditional doctrines in service of new and fashionable scientific orthodoxies.

undreds of disappointed attendees were denied admission to the great hall of New York's Cooper Union on Saturday evening, January 6, 1883. The hall's brimming capacity of 2,500 had been reached well before the appointed eight-o'clock hour, the time scheduled for delivery of a lecture on "Evolution and Revolution." By half past seven, the police had judged the situation

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unsafe and closed the doors to additional guests. While a discouraged mass remained outside barred from the event, thousands crammed inside Cooper's great hall were treated to the oratory of Henry Ward Beecher (1813-1887), "the most famous man in America." Eighteen years earlier Beecher had been President Lincoln's selection as principal speaker at the official ceremonial raising of the American flag at Ft. Sumter. The 1865 event had formally reunited the war-torn United States. Beecher was the fitting choice, for in so many ways he spoke to and spoke for middle-class Protestant America. He certainly spoke a lot, and was well paid for it too. As minister of Brooklyn's Plymouth Church since 1847, he had become the highest-paid American clergyman, drawing an annual salary of \$20,000. In addition to his weekly sermons, he delivered more than 125 popular lectures per year at the

height of his career, regularly collecting honoraria of \$1,000 per talk. Further, he influenced popular opinion on myriad topics through his written words that appeared in over thirty books and countless essays and articles published in his two widely read journals, the *Independent* and the *Christian Union*.<sup>1</sup>

Now, on this January evening less than one year after the death of Charles Darwin, Beecher was set to pronounce his views on one of the day's hottest topics, the relation of evolution to the Christian religion. He opened his Cooper Union address with the assertion that "a greater change has taken place within the last thirty years, probably, than ever took place in any former period of five hundred consecutive years." This revolution was nothing other than a shift in humankind's understanding of God's mode of creation, a shift from the "instantaneous obedience of matter to the divine command" to a "method of creation as gradual, and as the result of steadily acting natural laws through long periods of time." Simply put, Beecher embraced evolution as God's way of doing things. Beecher did not rest merely with asserting that "a man may be an evolutionist and believe in God with all his heart and strength and soul," he gloried in evolutionary theory as a new revelation that was transforming humanity's relation to the Divine. As he concluded, voicing triumphalism fitting only for an age committed to the idea of progress, he gave thanks to God "for the growing light and power of the great doctrine of Christian Evolution."2 As one student of Beecher's thought has put it, this most famous clergyman possessed the "ability to convince the American evangelical public that progress was more than scientific achievement, it was the redemption of the race through 'the law of development and growth.'"3

The last quarter of the nineteenth century witnessed what historian of science James Moore has called the "Protestant struggle to come to terms with Darwin." Jon Roberts and other historians have weighed in too, subjecting the topic to careful study and thoughtful discussion.<sup>4</sup> What work remains for the historian? Perhaps only shining light on a few specifics. Such an endeavor, however, remains worthy for it easily leads to consideration of significant primary sources and focused prosopographical study, a small sampling of which this paper offers through selective consideration of three prominent "optimistic evolutionists" who spoke and published on evolution and Christianity during the 1880s and 1890s: Henry Ward Beecher, Joseph LeConte (1823-1901), and Lyman Abbott (1835-1922). Of the three, only the ecumenically oriented Presbyterian LeConte, a member of the National Academy of Sciences who taught geology and natural history at the University of California, Berkeley, was a prominent scientist. Beecher and Abbott were, arguably, the two most famous and influential clergymen of the second half of the nineteenth century. All three men wrote books and lectured on the relation of evolution to Christianity. They

knew, admired, and influenced one another. Considered together, their ideas offer a lens through which to view the way speculative theology, when harnessed to ideological enthusiasm for scientific novelty, can spawn religious ideologies that bear little resemblance to orthodoxy, regardless of the names by which they go.

#### The Trio

Henry Ward Beecher's Cooper Union address was but an opening salvo. Two years later, in 1885, Beecher published a grand 440-page volume of sermons on the topic titled *Evolution and Religion*. The book purported to discuss the "bearings of the evolutionary philosophy on the fundamental doctrines of evangelical Christianity" and "the application of the evolutionary principles and theories to the practical aspects of religious life."<sup>5</sup> The same year that his *Evolution and Religion* was published, Beecher traveled to California, lecturing on the subject. Aware that the Harvard-trained scientist, Joseph LeConte, had authored a number of papers on evolution, in addition to a well-received book titled *Religion and Science*, Beecher contacted LeConte urging him to write another book devoted entirely to reconciling religion with evolution.



Figure 1. Henry Ward Beecher at Seventy-three (1887)

#### **Article** *Optimistic Evolutionists: The Progressive Science and Religion of Joseph LeConte, Henry Ward Beecher, and Lyman Abbott*

Beecher insisted that LeConte "owed it to the world" to publish a volume of his thoughts regarding evolution and Christianity. Earlier, LeConte had reluctantly entertained and dismissed the idea. But Beecher's plea finally persuaded him to write the book. Beginning work in earnest within months, LeConte devoted much of the next two years to writing. The book, *Evolution and Its Relation to Religious Thought*, appeared in early 1888 and immediately enjoyed "huge success" as it became "a leading work on the subject." Within three years, LeConte had revised and expanded the volume, the second edition of which appeared in 1891 under the new title, *Evolution: Its Nature*, *Its Evidences, and Its Relation to Religious Thought.*<sup>6</sup>



Figure 2. Joseph LeConte at Seventy-five (1898)

Among the readers deeply impressed by the evolutionary theology of both Beecher and LeConte, Congregationalist minister Lyman Abbott stood prominently. In 1876, Abbott had assumed an editorial position at Beecher's *Christian Union*, the journal that became *Outlook* in 1893 and that would occupy Abbott for the rest of his life. Following Beecher's death in 1887, Abbott inherited Beecher's ministerial position in the pulpit of Brooklyn's Plymouth Church. The late Henry Sloane Coffin once commented, "Lyman Abbott was unquestionably the foremost doctor of the church in America in his time, and one of the half-dozen most potent teachers of Christianity in our national history." Historians of American religion have further remarked that Abbott "exercised a more abiding influence" than any other modern religious leader.<sup>7</sup>

Among Abbott's many published volumes was a very thick book of over six hundred pages bearing the equally weighty title, Henry Ward Beecher. A Sketch of His Career: With Analyses of His Power as a Preacher, Lecturer, Orator, and Journalist, and Incidents and Reminiscences of His Life.8 The massive tome paid tribute to Abbott's close friend on the occasion of Beecher's seventieth birthday. The year was 1883. Hence the book appeared just a few months after Beecher's Cooper Union address, the text of which Abbott dutifully included in the volume. Abbott did not limit his praise to Beecher. His own 1892 book, The Evolution of Christianity, the first of three volumes on evolution, Christianity, and its social application, opened with affirmation and adoption of evolution as "defined by Professor LeConte." His goal in the book was "to show that the historic faith of Christendom, when stated in the terms of an evolutionary philosophy, is not only preserved, but is so cleansed of pagan thought and feeling, as to be presented in a purer and more powerful form."9

Considered together, then, Beecher, LeConte, and Abbott – three friendly associates of great national prominence – were co-laborers in the effort to unite evolutionary theory with the Christian faith. How did they do it? What did they produce? Were they successful? What can be gleaned, if anything, from their efforts? In particular, what did they have to say about such vital and related topics as the problem of evil, the question of design, and divine action and providence?

On these matters, Paul's epistle to the Romans has spoken clearly:

For the wrath of God is revealed from heaven against all ungodliness and unrighteousness of men, who by their unrighteousness suppress the truth. For what can be known about God is plain to them, because God has shown it to them. For his invisible attributes, namely, his eternal power and divine nature, have been clearly perceived, ever since the creation of the world, in the things that have been made. So they are without excuse. For although they knew God, they did not honor him as God or give thanks to him, but they became futile in their thinking, and their foolish hearts were darkened. Claiming to be wise they became fools ...

Since they did not see fit to acknowledge God, God gave them up to a debased mind to do what ought not to be done. They were filled with all manner of unrighteousness  $...^{10}$ 

Traditional Christian understanding of this text affirms at least some minimal version of natural theology, namely, that God's existence and attributes can be rightly inferred from the design evident in the created world. Further, this text clearly suggests, especially when read in light of Genesis 3, that the dark consequences of sin entered the world only *after* the innocent who first knew God *fell* into sin, that *evil and death* entered the world as a consequence of humanity's fall, and that evil, death, and scarcity are neither God's handiwork nor his tools of providential action.

Consequently, traditional Christian teachings regarding design and evil have stood in tension with evolutionary theories as long as thinkers have sought reconciliation between orthodox confessions and developmental hypotheses. Theologian George Murphy, for example, in contemplating a scenario of creation by evolution, has written, "The traditional problem of theodicy, how an all-good and all-powerful God can allow evil, is sharpened by evolution, for God apparently does not just allow evil but uses it in order to create."<sup>11</sup> Darwin agreed and found in this claim a telling case against the Christian deity. "I had no intention to write atheistically," Darwin wrote famously to his friend Asa Gray.

But I own that I cannot see as plainly as others do ... evidence of design & beneficence on all sides of us. There seems to me too much misery in the world. I cannot persuade myself that a beneficent & omnipotent God would have designedly created the Ichneumonidae with the express intention of their feeding within the living bodies of Caterpillars, or that a cat should play with mice.<sup>12</sup>



Figure 3. Lyman Abbott at Eighty (1915)

If evil constituted a barrier to Christian belief for Darwin, his theory of evolution by natural selection had rendered the design hypothesis simply superfluous. Darwin had shown Paley's disciples how design could be produced without a designer. Thus for Darwin, as historian Edward Larson has explained, "If nature reflected the character of its Creator, then the God of a Darwinian world acted randomly and cruelly."<sup>13</sup> It seemed, therefore, that the price for accepting the evolutionary theory would be the abandonment of the traditional Christian accounts of design, of evil, and, perhaps, of God himself.

From whence, then, did the optimistic evolutionists of this study secure their confidence that the tensions between evolution, on the one hand, and Christian accounts of design, of evil, and of God, on the other, could be resolved? And if such a resolution could be found, would the compromise preserve a Christian faith worthy of the name? Consideration of how Beecher, LeConte, and Abbott answered these questions requires, first, a review of their assessment and understanding of evolution as a process of divine action and revelation.

## Protestant Liberalism and Evolution as Revelation

If Darwinian evolution challenged the feasibility of traditional Christian theism, perhaps the sharp Darwinian edges of evolutionary theory could be softened and timeworn Christian doctrines modified in tactical ways to preserve the viability of both. This was the chosen path of American Protestant Liberalism. Historians have identified a host of sources from which Protestant Liberalism ostensibly drew: romantic philosophy, Hegelian teleology, the English Broad church movement, American Unitarianism, and transcendentalism.<sup>14</sup> No doubt there were others. Regardless of the sources, the accommodation between evolution and religion engineered by Beecher, LeConte, and Abbott was underwritten, first and foremost, by two initial steps: first, by a softening of evolutionary theory and, second, by the placing of Christian theology into the subservient position of evolution's handmaiden. For these liberal Protestants, evolution was a settled fact, even if Darwinian natural selection by itself was insufficient and too harsh.

Henry Ward Beecher welcomed the "universal physical fact of evolution" as "the Divine method of creation" and confidently asserted in *Evolution and Religion* that "Evolution is accepted as *the method* of creation by the whole scientific world and that the period of controversy is passed and closed ... [for] Evolution is the *working* theory of every department of physical science all over the world."<sup>15</sup> With a self-assurance matched only by its naivety, Abbott's journal, the *Christian Union*, proclaimed in 1882, "the time when ministers scoffed and derided Darwin and his disciples has forever passed."<sup>16</sup> Thus

## *Optimistic Evolutionists: The Progressive Science and Religion of Joseph LeConte, Henry Ward Beecher, and Lyman Abbott*

Abbott opened his 1892 book, *The Evolution of Christianity*, with the settled affirmation, "All scientific men to-day are evolutionists."<sup>17</sup> LeConte, of course, agreed, calling the law of evolution "the grandest idea of modern science" that is "thoroughly established, [indeed] far more certain than—the law of gravitation, for it is not a contingent, but a necessary truth."<sup>18</sup>

Whatever else it might have meant during these years to accept evolution as "grand" and "established," Beecher and his fellow optimists insisted that being a Christian "evolutionist" mandated that Christianity be recast into an evolutionary mold and that its old doctrines be tested according to new standards derived from evolutionary theories. "Evolution is God's way of doing things," wrote Abbott echoing Beecher.<sup>19</sup> The task then, he insisted, was "to restate the principles of the Christian faith in terms of an evolutionary philosophy."20 Beecher agreed. "Evolution is certain to oblige theology to reconstruct its system," he wrote.<sup>21</sup> LeConte, also convinced that evolution required "a fundamental reconstruction of religious thought," warned that failure to do so meant "the church will die."22 He later wrote, "There can be no doubt that evolution ... must profoundly modify our traditional views of Nature, of God, and of man."23

The transmutation hypothesis had demanded that thoughtful Christians reconstruct and restate their theology. Doing so was no onerous burden, however. Rather, it marked a welcome opportunity for ushering in the kingdom of God on earth. Accordingly, these optimists welcomed the evolutionary theory as new revelation. "The age of inspiration has not perished. Its sun has not set," announced Beecher. "A day has come when all dogmas, doctrines, formulas, laws and governments of the church, must be judged." Echoing Francis Bacon, Beecher believed that all theological opinions and convictions had been developed through the interpretation of God's two books. "We have two revelations," he explained, "God's thought in the evolution of matter, and God's thought in the evolution of mind." The former is the book of God's works, the latter, the book of God's words. So, asked Beecher rhetorically, "If to reject God's revelation of the Book [of God's words] is infidelity, what is it to reject God's revelation of himself in the structure of the whole globe?"24

But evolution was not merely a scientific description of God's book of works. Rather, it was an ideological lens through which *all* revelation was to be read. Beecher called "the Evolutionary philosophy … a new interpreter of God's two revelations" that "throws light upon many obscure points of doctrine and of theology that have most sadly needed light and solution."<sup>25</sup> Lyman Abbott voiced a similar theme:

The belief that the Bible is a revelation from God is not inconsistent with the belief that the Christian religion is an evolution; for revelation is not a final statement of truth, crystallized into dogma, but a gradual and progressive unveiling of the mind that it may see truth clearly and receive it vitally. The Bible is not fossilized truth in an amber Book; it is a seed which vitalizes the soil into which it is cast; a window through which the light of dawning day enters the quickened mind; a voice commanding humanity to look forward and to go forward; a prophet who bids men seek their golden age in the future, not in the past.<sup>26</sup>

As Beecher told his audiences that he "hailed the Evolutionary philosophy with joy," he conversely poured contempt, prescient of H. L. Mencken's anti-Fundamentalism, upon Bible-thumping Christians who voiced reservations about human evolution:

As it is now, vaguely bigoted theologists, ignorant pietists, jealous churchmen, unintelligent men, whose very existence seems like a sarcasm upon creative wisdom, with leaden wit and stinging irony swarm about the adventurous surveyors who are searching God's handiwork and who have added to the realm of the knowledge of God the grandest treasures. Men pretending to be ministers of God, with all manner of grimace and shallow ridicule and witless criticism and unproductive wisdom, enact the very feats of the monkey in the attempt to prove that the monkey was not their ancestor.<sup>27</sup>

This contempt for Christian anti-evolutionism sprung from a confident faith that the wedding of evolution with religion would be the first stage in establishing the kingdom of God on earth. "Evolution will multiply the motives and facilities of righteousness," proclaimed Beecher. Resistance to his progressive evolutionary theology was, therefore, reactionary opposition to the very hand of God.<sup>28</sup>

#### Beyond Darwin and Ancient Dogmas

Just what sort of "evolution" was it that promised such grand things on behalf of righteousness and pure religion? For Beecher, the specifics were still negotiable. Evolution, he explained, was that philosophy held by such a divergent lot as James Dwight Dana, Joseph LeConte, James McCosh, Asa Gray, George Mivart, and Herbert Spencer (just a few of the prominent figures Beecher explicitly mentioned as "men of profound Christian faith" who "substantially" hold to the theory of evolution).29 That such men held to varied understandings of biological evolution and Christianity seemed either lost on Beecher or a matter of no consequence. After all, that evolution was a settled fact mattered more than the details of its mechanisms. Indeed, evolution was itself evolving. For Beecher, evolution was less a strictly scientific notion than a grand metaphysical vision of progress. "The vast universe," he wrote, "is moving onward and upward in determinate lines and directions, while on the way the weak are perishing. Yet there is an unfolding process that is carrying creation up to higher planes and upon higher lines ... so that the whole physical creation is organizing itself for a sublime march toward perfectness."<sup>30</sup> The important factors for Beecher were that evolution meant progress, and it meant that the Genesis account was of no relevance for understanding the origins of life and the world.

With these convictions of Beecher, Lyman Abbott and Joseph LeConte each agreed. Further, none wanted evolution to be limited to the ideas of Charles Darwin merely. "Evolution is not to be identified with Darwinism," explained Abbott. "Evolution is, broadly speaking, the doctrine of growth applied to life ... the doctrine that all life proceeds by natural and normal processes from lower to higher stages ..." LeConte and Abbott went on to develop a more focused definition of evolution than had Beecher (who had contented himself with quoting James Dwight Dana).<sup>31</sup> LeConte provided the definition. Abbott borrowed it verbatim. "Evolution is," explained LeConte, "(1) continuous progressive change, (2) according to certain laws, (3) and by means of resident forces."32 Of course LeConte expanded considerably upon this bare-bones definition as he went on to identify and explain "six factors of evolution," each "graded" according to a "scale of energy" and historical "order of introduction." Specifically, he identified five "graded planes" through which life forms ascended according to "the law of the transmutation and successive elevation of matter and force." The upshot was a complicated amalgam of Lamarkian theory, Darwinian selection, and vitalism all woven together by threads of speculative imagination and determined rejection of divine transcendence.33

For LeConte, if God was anywhere, God was "resident in Nature." He explained that "forces of Nature are different forms of his energy [and] the laws of Nature are the modes of operation of the omnipresent Divine energy." At the heart of LeConte's evolutionism was a settled view of God as "immanent, indwelling, resident in nature ... in every molecule and atom, and *directly* determining every phenomena [sic] and every event."34 Two things followed from this. First, the particulars of evolution's mechanism were shrouded in mushy mystery, even if they were called laws. Accordingly, LeConte was content to affirm that "the most important factors of evolution are unknown." This permitted him freely to depart from or to borrow from other scientific thinkers of his day almost indiscriminately. Thus, his own theory emerged as a grand philosophical edifice, its pantheistic foundations resting firmly in mid air, with "natural forces" equated to "different forms of the omnipresent Divine Energy" and "natural objects" simply the "objectification of the Divine thought." Second, and of greater present concern, is the fact that LeConte's doctrine of divine immanence constituted the chief weapon in his defense of evolutionism against the charge that evolution fostered atheist materialism. "Either

God operates in nature in a more direct way than we have been accustomed recently to think," he wrote in an 1887 pamphlet, "or else nature operates itself and wants no God at all. There is no middle ground tenable."<sup>35</sup> LeConte believed that his view of evolution had fully vanquished materialism. Perhaps it had, but at the price of removing miracles from Christianity:

Once [one] clearly conceive[s] the idea of God permeating Nature and determining directly all its phenomena according to law, [then] the distinction between the natural and the supernatural disappears from view, and with it disappears also the necessity of miracles ... In fact, the word [miracle] as we usually understand it has no longer any meaning.<sup>36</sup>

According to this view, then, "all is natural and all is supernatural  $\dots$  but none more than another."<sup>37</sup>

LeConte's immanentist theology and its corollary demise of the distinction between the natural and supernatural carried important implications. Chief among them emerged the conclusion that *everything* evolved: God did, nature did, Christianity did, as did the human understanding of these grand things. "Religious thought," explained LeConte, "like all else, is subject to a law of evolution."<sup>38</sup> Lyman Abbott's book, *The Evolution of Christianity*, could not have been more aptly titled. In it he wrote, "The institutions of Christianity must be elastic, because Christianity itself is a growing religion." He continued, "[B]oth the Old Testament and the New Testament were constructed by a process of natural selection. As collections of literature both can be described ... as the result of a practical process of selection and elimination."<sup>39</sup>

Particularly important to this affirmation of universal evolutionism stood the distinction that these men drew between "religion" and "theology." Consider Beecher's complaint: "Men are continually confounding the two terms, religion and theology. They are not alike." Abbott provided quite simple definitions. "Religion is the life of God in the soul of man," he asserted. "Theology is the science of religion."40 Clearly then, religion was divine, while theology – human thought about religion – was but a human science, changeable and subject to gross error. Human formulations were inadequate because they were finite and limited. On this point Abbott explained, "The fundamental difficulty about all attempts to define truth in a creed is that truth is infinite, and therefore transcends all definitions."41 For Beecher, LeConte, and Abbott, religion needed to be emancipated from the "outrageous complexity" and "unbearable systems of theology." The tool for this emancipation was the evolutionary perspective, which, explained Beecher, "will obliterate the distinction between natural and revealed religion."42 Accordingly, the remaining pure religion would be "definite, absolute and unchangeable" as it would breed "love," "justice," and "harmonies of intimacy and inter-

*Optimistic Evolutionists: The Progressive Science and Religion of Joseph LeConte, Henry Ward Beecher, and Lyman Abbott* 

communication." Thickets of theological underbrush would be swept away as would, Beecher promised, "ancient dogmas which are either renounced or are falling into oblivion."<sup>43</sup> As this happened, the ancient Augustinian distinction between the "city of man" and the "city of God" would collapse and the kingdom of God would become progressively manifest on earth.<sup>44</sup> Fueled by such millennial intentions, these optimistic evolutionists had few qualms about recasting old doctrines of Christendom. Consider, as a significant case, the doctrine of sin.

#### The Fact of Sin

The great English literary genius G. K. Chesterton once called "the fact of sin—a fact as practical as potatoes." Aware that "certain new theologians dispute[d] original sin," Chesterton retorted that original sin "is the only part of Christian theology which can really be proved."<sup>45</sup> Perhaps so. Bad things happen and people do them. But squaring the traditional Christian account of sin—its origin and effects—with optimistic evolutionism still presented a hurdle to Beecher, LeConte, and Abbott. While they could hardly deny what Beecher called "the fact of sinfulness," their new evolutionary theology served to undermine and transform the historic doctrine of original sin and its effects.

Beecher dedicated an entire chapter of Evolution and Religion to "The Sinfulness of Man." Therein, he devoted considerable attention to what he called, "the whole theory of sin and its origin, that lie at the base of the great evangelical systems of Christianity." His judgment was unequivocal. "I hate it," he wrote repeatedly, as he denounced "the old theory of sin" for being "mischievous." Further, it was "repulsive, unreasonable, immoral, and demoralizing." He condemned the doctrine of inherited original sin with an autobiographical proclamation: "I inherited from my father and mother as pure a nature as ever descended to a child. There has [sic] no drop of Adam's bad blood come through to me." The narrative of Genesis 3 had value, he conceded. "If treated as a poem ... it is both harmless and pleasing." Lyman Abbott called it "a beautiful fable." If, however, it is treated as a "fact" or "as theology has for a thousand years treated it," Beecher explained, "it is an awful morass, out of which have flowed down streams of mischief ... and poisonous influences." Further, Beecher maintained a theological vision in which

no place is found for Adam, and no place for any allusion, even to the malformed and monstrous doctrine of the fall of the race in Adam, and its alleged terrific consequences, which have become the bed-rock on which theology has been built ... The fall of Adam and the imputation of his guilt to all his posterity was a bastard belief of the Jews, grown up, with other glosses and absurdities of Pharisaic theology ...<sup>46</sup>

Not surprisingly, Beecher's rejection of original sin had other theological implications. Maintaining the premise that "Adam's sin was his own, and no one else's," Beecher concluded, "It never descended. There is none of it in all the world." Clearly then, any doctrine of baptismal regeneration-the notion that the guilt of Adam's sin could be washed away in the waters of baptism-was absurd. "As well one might say that education relieves men of the effects of Aesop's Fables," mocked Beecher.47 Abbott, while less sarcastic, reached the same conclusion. "Now the [traditional Christian] doctrine of the Fall and of redemption," he wrote, "is inconsistent with the doctrine of evolution. It is impossible to reconcile the two."48 But, this was not a great problem for him. In his chapter on "The Genesis of Sin" in The Theology of an Evolutionist, Abbott shrugged with these words: "Did Adam fall, six thousand years ago? It is immaterial."49 LeConte displayed even less concern for the Genesis narrative.

With traditional notions of original sin and the fall set aside, Beecher and his fellow optimists were free from traditional concerns about death being a consequence of the fall. After all, such real things as death and destruction, evil and struggle, could hardly be the consequences of a fable or misty legend. The fifth chapter of Romans may have taught that "sin came into the world through one man, and death through sin," but whatever St. Paul may have intended by those words, Beecher and his colleagues considered themselves free to interpret the realities of death and evil according to their upbeat ideology of progressive evolutionism. So Beecher admitted that "the theory of Evolution is as much a theory of destruction and degradation as of development and building up ... [D]eath seems to be the instrument by which life itself is supplied with improvement and advancement." But in the long run, it was all for the good because "death prepares the way for life," he wrote.<sup>50</sup>

Joseph LeConte was even more optimistic about the good to be found in evils of all sorts. His final chapter of Evolution: Its Nature, Its Evidences, and Its Relation to Religious Thought bore the title, "The Relation of Evolution to the Problem of Evil."51 Was the traditional problem of theodicy in fact "sharpened by evolution" as many Christian scholars have asserted? Not for LeConte. Rather, in his law of evolution he claimed to have found the "philosophic alchemy which can transmute evil into good."52 LeConte considered, in order, physical evil in the animal kingdom, physical evil in relation to humans, organic evil and disease, and moral evil. In each case his conclusion was the same. That which seemed evil at first, was "only seeming evil" and "rather a good in disguise."53 Evil of every sort-be it suffered by the individual struggling animal, by the hurting or diseased human, or be it "the most dreadful" moral evil-he explained, had "its roots in the necessary law of evolution. It [was] a necessary condition of all progress, and pre-eminently so of moral progress."54

With a grand display of question-begging and circular reasoning, LeConte justified evil after evil. For example, the only way to overcome natural evils such as "heat and cold, tempest and flood, volcanoes and earthquakes" and "the dread evil of disease" was knowledge of the laws of Nature.55 Such knowledge could not be attained unless, first, natural evils existed and, second, unless the presence of those evils required humans to seek knowledge by which to avoid them. Since evil was the necessary prerequisite to the search for a means to overcome evil, evil, LeConte insisted, was actually good. "May we not, then, confidently generalize?" he asked. "May we not say that all physical evil is good in its general effect-that every law of Nature is beneficent in its general operation, and, if sometimes evil in its specific operation, it is so only through our ignorance?"56 Ultimately then, proclaimed LeConte, "All that we call evil both in the material and the spiritual world is good."57

Of course, even such fantastic rhetorical maneuvering could not erase from plain view sin's ubiquity. So Beecher, LeConte, and Abbott conceded that it was real. "[Since] all evolution, all progress, is from [a] lower to higher plane," explained LeConte, "all evil consists in the dominance of the lower over the higher; all good in the rational use of the lower by the higher."58 He was echoing Henry Ward Beecher who had written years earlier "that sin springs from the struggle for the relative ascendancy of animal and spiritual in man's double nature, and that the conflicts of life are simply the conflicts between the lower and the upper man."59 Abbott voiced the same theme: "Every man is two men; every man is a battle-ground in which the higher and the lower man are contending one against the other." Hence he explained, "every sin is falling back into the animal condition."60 This was the seventh chapter of Romans read through the lens of progressive evolutionism. Sin was real. But man could save himself from it by following Christ's example and overcoming his lower self. As men did this fine spiritual thing, the progressive evolution of society would hasten the arrival of heaven on earth.61

#### By Design

Was such a sublime prospect part of a grand divine plan? Even if LeConte, Beecher, and Abbott had satisfied themselves, as Darwin himself could not, that evil posed no barrier to theistic belief, had not Darwin at the very least vanquished Paley and rendered the argument from design the fossil of an extinct doctrine? Even if Abbott and his colleagues rejected the Bible as an infallible guide, the historic Christian faith had not repudiated St. Paul's contention that God's "invisible attributes have been clearly perceived in the things that have been made." How, then, did these optimistic evolutionists respond? They did so in the predictable fashion, by recasting Paley in an evolutionary mold and embracing design as the handiwork of an immanent God. Beecher admitted, "The doctrine of Evolution, at first sight, seems to destroy the *theory of intelligent design* in creation ... [The design theory] which has been a stable argument for the proof of the existence of God and his attributes, seems to have been shaken from its former basis."<sup>62</sup> But, just as evil "seemed" at first a problem for these men, so now evolution only "seemed" a challenge to the theory of "intelligent design." Like Paley, Beecher argued by analogy, but on a grander scale. After rehearsing Paley's argument for a watchmaker from the instance of finding a single watch, Beecher proposed that a watch factory "where watches are created in hundreds of thousands by machinery" was far more robust evidence of design:

If it be an argument of design that a man could make one watch, is it not a sublimer argument of design that there is a man existing who could create a manufactory turning out millions of watches, and by machinery too, so that the human hand has little to do but to adjust the parts already created by machines? If it be evidence of design in creation that God adapted one single flower to its place and functions, is it not greater evidence if there is a system of such adaptations going on from eternity to eternity? Is not the Creator of the system a more sublime designer than the creator of any single act?<sup>63</sup>

Beecher was so fond of the argument that he multiplied it. He imagined the design of an oriental rug and then proposed "a higher design" in the human who constructed a loom that could continue the work of rug making "a thousand-fold more magnificently than human fingers did." His conclusion was obvious: "Evolution, instead of obliterating the evidence of divine Design, has lifted it to a higher plane and made it more sublime." He confidently gushed, "Design by wholesale is grander than design by retail."<sup>64</sup>

LeConte and Abbott echoed their elder optimist with similar affirmations of design. LeConte grounded his avowal of design in his conception of "an infinite immanent Deity behind phenomena." He conceded that the old view of separate creative acts by a designing transcendent deity was no longer tenable. But this did not undercut all notions of intelligent design. "The removal of … manlike directness of separate action can not destroy the idea of design, but only modify our conception of the Designer," he explained. "What science, and especially evolution, destroys, therefore, is not the idea of design, but only our low anthropomorphic notions of the mode of working of the designer."<sup>65</sup> Lyman Abbott revisited and revived Paley's watch argument, but with a Beecheresque twist of fantasy in the form of an organic metaphor.

Suppose this watch which [the man] picks up and puts into his pocket, after he has carried it for a year, produces another watch that will keep time; does this show less intelligence, or more? Suppose this watch which he picks up and carries in his pocket drops

### **Article** *Optimistic Evolutionists: The Progressive Science and Religion of Joseph LeConte, Henry Ward Beecher, and Lyman Abbott*

from itself in a year's time a little egg, and out of that egg there comes a perfect watch a year later; does that show less intelligence or more? ... The processes of growth are infinitely more wonderful than the processes of manufacture.<sup>66</sup>

Similarly, Abbott contrasted the intelligence required to make a wooden cuckoo bird for a cuckoo clock with the intelligence required to produce a living bird that hatches from an egg. In every instance, he proclaimed, "growth is more wonderful than manufacture." Hence design by evolution was more wonderful to the optimistic evolutionists than was design by fiat.

### Christian Evolutionism as Utopian Ideology

Their grand project had been to recast the Christian faith in terms of a progressive evolutionary philosophy. Did their efforts issue in a Christian religion worthy of the name? Or had they crafted something, however ambitious, that substantively departed from both orthodox Christianity and received scientific opinion? Regardless, what do their efforts reveal about the nature of progressive ideology as it shaped the encounter between science and Christianity in late nineteenth-century America?

A generation ago there appeared a little book by Hungarian scholar Thomas Molnar (b. 1921) entitled *Utopia: The Perennial Heresy* in which he observed:

from time to time the belief spreads among men that it is possible to construct an ideal society. Then the call is sounded for all to gather and build it – the city of God on earth ... The dream – utopia – leads to the denial of God and self-divinization – the heresy.<sup>67</sup>

A similar theme was voiced over half a century ago by Austrian philosopher Eric Voegelin (1901-1985) in his book, The New Science of Politics. Voegelin offered an analysis of the nature of ideology and described as its chief error, "the fallacious immanentization of the Christian eschaton," the attempt to make heaven on earth.68 These twentieth-century European scholars understood some fundamentals that had escaped the view of the latenineteenth-century's American optimistic evolutionists. These fundamentals included the grim truth that attempts to make heaven on earth invariably fail, that implementation of ideological schemes are more likely to create hellish consequences, that humans are not evolving into God, that Christianity has always insisted on the distinction between the creature and the Creator, and that Christianity is the religion of hope for a kingdom of God "not of this world."69

Lodged in the optimistic hearts of theological evolutionism's proponents was an abiding commitment to a "superficial and dubious" ideology alluringly dressed in the language of the Christian religion. It was an ideology of progress, the aim of which was no less than establishing what Joseph LeConte called "A Divine Kingdom on Earth."70 The motives were noble enough. The successes of modern science carried the perceived threat of atheist materialism-a threat that needed to be answered and quashed without diminishing the grandeur of modern science in the process. Further, if the modern evolutionary perspective taught anything fixed, it seemed to teach that there were no fixed ideas, especially religious ideas. Thus "in order to reconcile religion and science, [these men] had to romanticize Christian experience" and to set aside "stale and rigid creeds" as fixed and fossilized remnants of bygone days. The only way to save Christianity, according to the optimistic evolutionists, was to alter it fundamentally by shedding historic doctrines, notably those associated with original sin, evil, sacramental theology, the divinity of Christ, divine transcendence and providence. The result, of course, was not genuine Christianity but pantheism. As one of Beecher's biographers has observed, "It appeared to be a brilliant maneuver which completely outflanked the menace of materialism."71 For the pantheist, either "everything is God" or "nothing is God."72 Recall that this was LeConte's analysis. Since materialism was intolerable, God must be fully immanent, so much so that his kingdom could be realized in humans and upon the earth. A tempting dream that is: collapsing the distinctions between heaven and earth, between the creature and the Creator, between the natural and the supernatural, all toward the ends of immanentizing the eschaton and humanity becoming like God. But was not the promise with which the serpent had tempted Eve, "you will be like God"?

Much of the optimistic evolutionists' project was animated by what one historian has called "a *quest for cosmic comfort* amid a fear that human beings confronted only an indifferent universe."<sup>73</sup> Since they accepted as a given the hegemony of evolutionary science, their selfappointed task was to recast Christianity in terms of evolutionism. Perhaps the richest irony of the entire project was the result: an ideology that was faithful neither to the Christianity they claimed to preserve nor to the science of evolutionary biology that would emerge in the twentieth century. While they transformed Christianity into pantheism, they advanced a squishy evolutionism barely recognizable to modern biology.

#### A Moral to the Story?

Perhaps this story suggests a moral that could be conveyed through a historical analogy. Imagine the science and religion of a fashionable and orthodox cosmologist in the fourteenth century. He would, of course, have embraced, with the blessing of both the church and established astronomical opinion, a Ptolemaic geocentric cosmology. But as the course of Western Civilization has shown, his doing so was, in fact, a mistake both theological and scientific. Had a longer prudential vision been available to him, what would have been the "correct" thing to have done at the time? It would have been to take the remarkably humble approach of embracing a provisional agnosticism regarding the cosmological question while awaiting a fuller human understanding of the heavens.

If such a humble perspective was missing at the dawn of the Renaissance, is it any surprise that the upbeat, confident, progressive Americans of the late-Victorian era lacked it as well, flush as they were with enthusiasms for modern science, industrial capitalism, imperialism, and the rush of change?<sup>74</sup> Although the optimistic evolutionism of Beecher, LeConte, and Abbott was pretty thin gruel upon which to nourish a soul or a society, the enthusiasm for wedding the latest science with new-fangled Christianity proved irresistible.

Has the time now finally come at the dawn of the third millennium to set aside the humble approach that would have saved thinkers of past eras from their confident mistakes? Is now the time to forge a solid integration of evolution with Christianity? If recent publications are any indication, many scientists and Christians seem to think so as they go about developing and defending new species of theistic evolutionism.75 Should this generation consider, instead, a less ambitious, but more difficult approach? It would require these actions. In science: Develop, extend, and investigate empirically biological evolution. Build energetically upon the strengths of evolutionary theory. Contend honestly with its weaknesses. In faith: Maintain fidelity to traditional Christian orthodoxy. Uphold historic confessions. Resist trendy ephemeral theological innovation. But in efforts to integrate evolution with Christianity, proceed with utmost caution. That is, before baptizing evolutionary perspectives with a "kenotic understanding of divine action";<sup>76</sup> before wrangling about the challenges of "intelligent design" theorists or squabbling about contrary theistic claims for the full-sufficiency of Darwinian mechanisms;77 before crafting a trendy Christian evolutionism expressly congenial to culturally fashionable sentiments regarding homosexuality, lesbianism, and transgenderism;78 before claiming to have discovered evolutionary biology hidden in the doctrine of the incarnation; and especially before setting aside-in deference to the demands of evolutionary science-traditional creeds, confessions, and doctrinal formulations;79 in short, before hurriedly pressing either Christian theology into the service of evolutionary theory or evolutionary theory into the service of Christian theology, might there be wisdom in patient and continued study? Might there be prudence in considering the option of a "provisional agnosticism" on the grand questions of exactly how and, perhaps even, whether to detail the ways evolutionary theory and the Christian faith are to be integrated? It is the option that would have saved both our pre-Copernican brothers and the Victorian optimistic evolutionists from errors, both theological and scientific. Could it be the option that just might do the same for Christians contending with evolution today?

#### Notes

- <sup>1"</sup>Beecher on Evolution," *New York Times*, 7 January 1883, p. 2; J. David Hoeveler, *The Evolutionists: American Thinkers Confront Charles Darwin, 1860–1920* (Lanham: Rowman & Littlefield, 2007), 112 (salary); Debby Applegate, *The Most Famous Man in America: The Biography of Henry Ward Beecher* (New York: Doubleday, 2006).
- <sup>2</sup>Henry Ward Beecher, "Evolution and Religion," in *Henry Ward* Beecher. A Sketch of His Career: With Analyses of His Power as a Preacher, Lecturer, Orator, and Journalist, and Incidents and Reminiscences of His Life, ed. Lyman Abbott (New York: Funk & Wagnalls, 1883), 566, 573.
- <sup>3</sup>William G. McLoughlin, *The Meaning of Henry Ward Beecher: An Essay on the Shifting Values of Mid-Victorian America*, 1840–1870 (New York: Alfred A. Knopf, 1970), 5–6.
- <sup>4</sup>James R. Moore, The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870-1900 (Cambridge: Cambridge University Press, 1979); Jon H. Roberts, Darwinism and the Divine in America: Protestant Intellectuals and Organic Evolution, 1859–1900 (Madison: University of Wisconsin Press, 1988); Frederick Gregory, "The Impact of Darwinian Evolution on Protestant Theology in the Nineteenth Century," in God & Nature: Historical Essays on the Encounter between Christianity and Science, ed. David C. Lindberg and Ronald L. Numbers (Berkeley: University of California Press, 1986), 369–90; David N. Livingstone, Darwin's Forgotten Defenders: The Encounter Between Evangelical Theology and Evolutionary Thought (Grand Rapids and Edinburgh: Eerdmans and Scottish Academic Press, 1987); and J. David Hoeveler, The Evolutionists: American Thinkers Confront Charles Darwin, 1860-1920 (Lanham: Rowman & Littlefield, 2007).
- <sup>5</sup>Henry Ward Beecher, *Evolution and Religion* (New York: Fords, Howard & Hulbert, 1885), 1, 147.
- <sup>6</sup>Joseph LeConte, *The Autobiography of Joseph LeConte*, ed. William Dallam Armes (New York: D. Appleton & Company, 1903), 288–9; Lester D. Stephens, *Joseph LeConte: Gentle Prophet of Evolution* (Baton Rouge: Louisiana State University Press, 1982), 173–4; Timothy Odom Brown, "Joseph LeConte: Prophet of Nature and Child of Religion" (M.A. thesis, Chapel Hill: University of North Carolina, 1977), 108–18; 134–49.
- <sup>7</sup>Ira V. Brown, Lyman Abbott: Christian Evolutionist A Study in Religious Liberalism (Cambridge: Harvard University Press, 1953); and Henry Sloane Coffin, quoted in ibid., vii.
- <sup>8</sup>Lyman Abbott, ed., Henry Ward Beecher. A Sketch of His Career: With Analyses of His Power as a Preacher, Lecturer, Orator, and Journalist, and Incidents and Reminiscences of His Life (New York: Funk & Wagnalls, 1883).
- <sup>9</sup>Lyman Abbott, *The Evolution of Christianity* (Boston and New York: Houghton, Mifflin & Company, 1892), iv. Abbott's other two books were *Christianity and Social Problems* (Boston and New York: Houghton, Mifflin & Company, 1897) and *The Theology of an Evolutionist* (Boston and New York: Houghton, Mifflin & Company, 1897).
- <sup>10</sup>Rom. 1:18–22, 28–29a; English Standard Version.
- <sup>11</sup>George L. Murphy, "Christology, Evolution, and the Cross," in *Perspectives on an Evolving Creation*, ed. Keith B. Miller (Grand Rapids: William B. Eerdmans Publishing Company), 374–5.
- <sup>12</sup>Charles Darwin to Asa Gray, 22 May 1860 in *The Correspondence* of *Charles Darwin*, vol. 8, ed. Frederick Burkhardt et al. (Cambridge: Cambridge University Press, 1993), 224.
- <sup>13</sup>Edward J. Larson, Evolution: The Remarkable History of a Scientific Theory (New York: The Modern Library, 2004), 92.
- <sup>14</sup>Hoeveler, *The Evolutionists*, 104.
- <sup>15</sup>Beecher, Evolution and Religion, 3, 50.
- <sup>16</sup>Christian Union 26 (1882), quoted in Brown, Lyman Abbott, 141.
- <sup>17</sup>Abbott, The Evolution of Christianity, 1.

#### *Optimistic Evolutionists: The Progressive Science and Religion of Joseph LeConte, Henry Ward Beecher, and Lyman Abbott*

<sup>18</sup>Joseph LeConte, "Man's Place in Nature," *The Princeton Review* (1878), quoted in Stephens, *Gentle Prophet*, 161; and Joseph LeConte, *Evolution: Its Nature, Its Evidences, and Its Relation to Religious Thought*, 2d ed., rev. (New York: D. Appleton & Company, 1901), 275.

<sup>19</sup>Abbott, The Theology of an Evolutionist, 76.

<sup>20</sup>Quoted in Hoeveler, The Evolutionists, 105.

<sup>21</sup>Beecher, Evolution and Religion, 52.

<sup>22</sup>Joseph LeConte to Sallie LeConte Davis, June 17, 1886, quoted in Stephens, *Gentle Prophet*, 180.

<sup>23</sup>LeConte, Evolution, 280.

<sup>24</sup>Beecher, Evolution and Religion, 41, 44, 46.

<sup>25</sup>Ibid., 48–9.

<sup>26</sup>Abbott, The Evolution of Christianity, 25.

<sup>27</sup>Beecher, Evolution and Religion, 46.

<sup>28</sup>Ibid., 52.

<sup>29</sup>Ibid., 51–2.

<sup>30</sup>Ibid., 115.

<sup>31</sup>Ibid., 49–50. Regarding Dana, Beecher wrote, "No man is more trusted, more careful, more cautious than he."

<sup>32</sup>LeConte, Evolution, 8; and Abbott, The Evolution of Christianity, 1.

- <sup>33</sup>LeConte's "six factors of evolution" were "1. Pressure of the environment. 2. Use and disuse of parts. 3. Natural selection. 4. Sexual selection. 5. Physiological selection. 6. Reason." His "five graded planes" were those of "chemical elements," "chemical compounds," "plant life," "sentient life," and "moral life." See Stow Persons, "Evolution and Theology in America," in *Evolutionary Thought in America*, ed. Stow Persons (New York: George Braziller, Inc., 1956), 441–4; LeConte, *Evolution*, 73–88; and Stephens, *Gentle Prophet*, 167 ff.
- <sup>34</sup>LeConte, *Evolution*, 353; and LeConte, "Evolu[t]ion, An Element in Fundamental Religious Thought," quoted in Stephens, *Gentle Prophet*, 184. See especially chapter seven of LeConte, *Evolution*, "Some Logical Consequences of the Doctrine of The Divine Immanency" in which LeConte asserts that "Divine immanency carries with it the solution of many vexed questions."
- <sup>35</sup>Quoted in Stephens, *Gentle Prophet*, 187 and 179. See also, LeConte, *Evolution*, 353.
- <sup>36</sup>LeConte, Evolution, 356.

<sup>37</sup>Ibid., 355.

<sup>38</sup>Ibid., 351.

<sup>39</sup>Abbott, *The Evolution of Christianity*, 18, 40. In *The Theology of an Evolutionist*, Abbott added, "There is no infallible authority. Infallible authority is undesirable" (p. 61).

<sup>40</sup>Abbott, The Theology of an Evolutionist, 1–2.

<sup>41</sup>Abbott, *The Evolution of Christianity*, 23.

<sup>42</sup>Beecher, Evolution and Religion, 52–3.

<sup>43</sup>Beecher, *Evolution and Religion*, 52, 11; and Beecher, "Evolution and Religion," in Abbott, *Henry Ward Beecher*, 572.

- <sup>44</sup>As Abbott's biographer, Ira Brown, stated it, the goal of evolution "was the Kingdom of God on earth, a cooperative society based on self-sacrifice." See Brown, 148.
- <sup>45</sup>G. K. Chesterton, *Orthodoxy* (1908; reprint, San Francisco: Ignatius Press, 1995), 19.

<sup>46</sup>Beecher, *Evolution and Religion*, 90–2; Abbott, *The Theology of an Evolutionist*, 43.

<sup>47</sup>Ibid., 97.

<sup>48</sup>Abbott, *The Evolution of Christianity*, 206.

<sup>49</sup>Abbott, *The Theology of an Evolutionist*, 43. For a more recent serious attempt to grapple with the "perceived conflict between the theory of evolution and Christian theology" regarding the doctrine of original sin, see Robin Collins, "Evolution and Original Sin," in *Perspectives on an Evolving Creation*, ed. Keith B. Miller (Grand Rapids: William B. Eerdmans Publishing Company), 469–501. Here Collins introduces what he calls the "Historical/Ideal View" as a tool for exegesis of relevant passages in Romans 1, Romans 5, and Genesis 1–4.

<sup>50</sup>Beecher, *Evolution and Religion*, 114–5.

<sup>51</sup>LeConte, "The Relation of Evolution to the Problem of Evil," in *Evolution*, 365–75.

<sup>52</sup>Ibid., 370. <sup>53</sup>Ibid., 366–7.

<sup>54</sup>Ibid., 369, 373. <sup>55</sup>Ibid., 366, 368.

<sup>56</sup>Ibid., 369.

<sup>57</sup>Ibid., 374.

58Ibid., 374-5.

<sup>59</sup>Beecher, Evolution and Religion, 86.

<sup>60</sup>Abbott, *The Evolution of Christianity*, 123; and Abbott, *The Theology of an Evolutionist*, 49.

<sup>61</sup>For further discussion of the evolutionary development of civilization in LeConte's thinking, see Lester D. Stephens, "Joseph LeConte's Evolutional Idealism: A Lamarckian View of Cultural History," *Journal of the History of Ideas* 39 (July–Sept. 1978): 465–80. For LeConte's comments on Christ as the ideal for emulation, see "The Relation of Evolution to the Idea of the Christ," chap. 8 in *Evolution*.

<sup>62</sup>Beecher, *Evolution and Religion*, 112–3. Emphasis added – this may be the first time the phrase "intelligent design" appears in the science-religion literature, well over a century before the emergence of the "intelligent design" movement of the 1990s.

<sup>63</sup>Ibid., 116.

<sup>64</sup>Ibid., 117, 115.

<sup>65</sup>LeConte, *Evolution*, 346, 349.

<sup>66</sup>Abbott, The Theology of an Evolutionist, 27.

<sup>67</sup>Thomas Molnar, *Ūtopia: The Perennial Heresy* (London: Tom Stacey Ltd., 1972), v.

<sup>68</sup>Eric Voeglin, *The New Science of Politics* (Chicago: The University of Chicago Press, 1952), 121.

<sup>69</sup>For fuller treatment of the errors and evils of ideology, see Mark A. Kalthoff, "Contra Ideology," *Faith & Reason* 30 (autumn & winter 2005): 221–41; and Russell Kirk, "The Errors of Ideology" in *The Politics of Prudence* (Wilmington: ISI Books, 1993), 1–14.

<sup>70</sup>Ira V. Brown, "Lyman Abbott: Christian Evolutionist," *The New England Quarterly* 23 (June 1950): 231; and LeConte, quoted in Lester D. Stephens, "Joseph LeConte's Evolutional Idealism: A Lamarckian View of Cultural History," *Journal of the History of Ideas* 39 (July-September 1978): 476. See also, Joseph LeConte, "The Theory of Evolution and Social Progress," *The Monist* (July 1895): 481–500.

<sup>71</sup>William G. McLoughlin, *The Meaning of Henry Ward Beecher*, 54; and Hoeveler, *The Evolutionists*, 105.

<sup>72</sup>Molnar, Utopia, 60.

<sup>73</sup>Hoeveler, *The Evolutionists*, 107.

<sup>74</sup>This is not to suggest that the optimistic evolutionists were without contemporary critics. For example, Francis M. Bruner (1833– 1899), a theologian trained at Halle and l'Ecole de Paris before his American academic career at Abingdon and Eureka Colleges, came out with a polemical refutation at the turn of the century. See Francis M. Bruner, *The Evolution Theory – As Stated by M. LeConte and Applied by Dr. Lyman Abbott, Unsupported by the Phenomena of the World as Far as We Are Able To Know It: A Historical and Scientific Examination of the Claims of Evolutionists, as they are set forth in THE EVOLUTION OF CHRISTIANITY* (Des Moines: The Kenyon Printing and Mfg. Co., 1900).

<sup>75</sup>Joan Roughgarden, Evolution and Christian Faith: Reflections of an Evolutionary Biologist (Washington, DC: Island Press, 2006); Karl E. Peters, "Toward an Evolutionary Christian Theology," Zygon 42 (March 2007): 49–63; Keith B. Miller, ed. Perspectives on an Evolving Creation; Francis Collins, The Language of God (New York: The Free Press, 2006), 197–211, wherein Collins proposes "to rename theistic evolution as Bios through Logos, or simply BioLogos"; Denis Lamoureux, Evolutionary Creation: A Christian Approach to Evolution (Eugene, OR: Wipf and Stock, 2008).

<sup>76</sup>Murphy, "Christology, Evolution, and the Cross," 372 ff.

<sup>77</sup>Collins, 181–95; and Roughgarden, 80–101.

<sup>78</sup>See Roughgarden, 102–24; and Joan Roughgarden, *Evolution's Rainbow: Diversity, Gender, and Sexuality in Nature and People* (Berkeley: University of California Press, 2005).

<sup>79</sup>Murphy, "Christology, Evolution, and the Cross," 378 ff. and 386 ff.

# Artificial Intelligence and the Soul

Russell C. Bjork

The view that there is an inherent theological conflict between strong artificial intelligence, on the one hand, and biblical teaching regarding the origin of the soul, human worth, and humanity being created in the image of God, on the other hand, is examined and shown to be ill-founded. Christian theology, therefore, has no stake in the claim that the possibility of technological accomplishments in this area is inherently limited. Consideration is also given to how a biblical understanding of human personhood can inform work in artificial intelligence.

inally, and most elusively, we are learning something about consciousness itself ... If we can identify that cognitive kernel, can we one day endow a machine with it? ... Human beings have always been brash enough to ask such questions but lacked the necessary gifts to answer them. At last, we are acquiring that ability ..." So ended the introduction to a special section in a recent issue of *Time* titled "A User's Guide to the Brain."<sup>1</sup>

For many years, thinkers have speculated about creating an artifact that deserves to be called a person. Moreover, intelligent robots or androids of various sorts have been prominent in works of popular culture (e.g., Commander Data of Star Trek: The Next Generation, R2D2 or C3PO of Star Wars, Andrew Martin of the Isaac Asimov short story which was later turned into the film The Bicentennial Man, or David of Artificial Intelligence). Is creation of such an artifact theoretically possible? Certainly there are many today who believe this to be the case. For example, Rodney Brooks, the director of the Computer Science and Artificial Intelligence Laboratory at MIT, claims that "the question then is when, not if, we will build self-reproducing intelligent robots."2 However, some Christians have seen this possibility as contradicting Christian doctrines concerning humanity, such as the nature of the soul or humans being made in the image of God. As one writer put it, "I fully grant that my theology would crumble with the advent of intelligent machines."3

Is there an inherent conflict between biblical teaching and the idea of an intelligent artifact? Or is it rather the case that Christian theology has something to say about how one might approach such a goal? Note that these are phrased as theological questions, not technological ones. No existing systems even come close to the kind of intelligence displayed by, say, Commander Data, and there is no hard evidence that such a system will exist in the near future, if ever. But one who believes in this possibility can legitimately point to a long history of technologies that we take for granted today, that were once believed to be impossible. The question I wish to address here is whether Christian theology has any necessary stake in the impossibility of creating an artifact that deserves to be called a person, on the one hand, or has anything to say about how one might pursue such an objective, on the other hand. In particular, I want to address three issues:

- 1. Is there a conflict between artificial intelligence and biblical teaching about the origin of the human soul?
- 2. Is there a conflict between artificial intelligence and biblical teaching about human worth or our being created in the image of God?

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**Article** 

### **Article** *Artificial Intelligence and the Soul*

3. Does biblical teaching about human personhood have any implications for work in artificial intelligence?

First, though, we need to look at a preliminary question: what do we mean by the phrase "artificial intelligence"?

#### What Do We Mean by "Artificial Intelligence"?

With the invention of the digital computer, the idea of creating intelligent artifacts moved from the realm of fiction into actual research programs, often referred to as "artificial intelligence." However, different writers use this phrase with a wide variety of meanings, both with regard to goals and basic methodology. (Indeed, the author of one undergraduate textbook speaks of the "paradoxical notion of a field of study whose major goals include its own definition."<sup>4</sup>) In regard to goals, the term is used in two quite different ways.

Sometimes, "artificial intelligence" is used of processes that achieve the same results as human intelligence (or even better results) in a specific domain. (This is sometimes called "weak AI"). An old, but oft-quoted, definition that reflects this is "the science of making machines do things which would require intelligence if done by men."5 For example, Deep Blue – the chess-playing program that defeated world chess champion Gary Kasparov in 1997 (by a score of 3.5 to 2.5 in a six-game match) - made use of heuristic knowledge of board situations from a library of master games played by human experts, coupled with sophisticated look-ahead strategies. Further work in this area could well result in systems that no human can ever beat.<sup>6</sup> The armies in The Lord of the Rings: The Return of the King were animated using software agents to generate the individual warriors. Many banks and other lenders use automated credit-scoring applications to evaluate prospective borrowers. Such systems, while very effective in their domain, are useless outside it-e.g., the agents used for animating The Lord of the Rings cannot play chess or score credit applications.

On the other hand, "artificial intelligence" is sometimes used in a broad sense, to refer to the goal of creating artifacts that are intelligent (and hence even self-conscious persons) just as we humans are – e.g., like the science fiction robots and androids listed earlier. (Sometimes this is called "strong AI"). While some artificial intelligence researchers see work on weak AI as generating insights which will ultimately lead to achieving strong AI, other researchers are quite happy to devote their attention to the former without any commitment to the latter.<sup>7</sup>

While work on weak AI can raise significant ethical issues related to the appropriateness of entrusting certain tasks to machines, it is strong AI that raises issues related to the essential nature of humanity, the focus of this article. To make this clear, I will sometimes use the word "person" instead of the words "intelligent" or "human." "Intelligent" lends itself to multiple interpretations, and also seems to be applicable (at least to some extent) to animals. "Human" is too restrictive-the Christian faith acknowledges the existence of persons who are not human (e.g., God and the angels).8 Of course, the term "person" itself needs definition. I will use the term in the sense of Lynne Rudder Baker's definition: "What makes a human person a person is the capacity to have a first-person perspective."9 She elsewhere defines this as "a perspective from which one thinks of oneself as an individual facing a world, as a subject distinct from everything else," and goes on to argue that "all sentient beings are subjects of experience (i.e., are conscious), but not all sentient beings have first-person concepts of themselves. Only those who do-those with first-person perspectives-are fully selfconscious."10

# Artificial Intelligence and the Origin of the Soul

That Christian doctrine and artificial intelligence might conflict has been part of the discussion from the outset. The earliest paper<sup>11</sup> to espouse what we now call "artificial intelligence" (though it did not actually use this phrase) was Alan Turing's "Computing Machinery and Intelligence." Turing devoted much of the paper to addressing various objections to the idea of "thinking machines," of which the first is what he called "The Theological Objection":

Thinking is a function of man's immortal soul. God has given an immortal soul to every man and woman, but not to any other animal or to machines. Hence no animal or machine can think.<sup>12</sup>

This view was not Turing's (He explicitly stated, "I am unable to accept any part of this."); rather, he was attempting to state and respond to an objection to his thesis that he assumed others would have.<sup>13</sup>

This objection does not really concern the *nature* of the soul,<sup>14</sup> but rather the *origin* of the soul. It considers God's creative acts to be of two kinds—material and immaterial. Technology has access only to what belongs in the realm of the former, but human personhood involves an immaterial component that only God could create. If this overall understanding is correct, then there would appear to be a conflict between biblical teaching and technological efforts to create an artifact that can rightly be called a person. Is this, however, an accurate understanding of biblical teaching?

The creation of humanity is described in Gen. 2:7 (KJV): "And the LORD God formed man of the dust of the ground, and breathed into his nostrils the breath of life (*neshamah hayim*); and man became a living soul (*nephesh*  *hayah*)." Many Christians understand this to speak of what are, in effect, two separate creative acts by God<sup>15</sup>: first, God formed man's body; and then—separately—God created man's soul (understood as an immaterial component part of humans, "an immortal though created essence, which is [man's] nobler part"<sup>16</sup>). On this view, the former is seen as physical—perhaps an immediate act of God or perhaps a process mediated through a mechanism such as evolution by natural selection—but the latter is seen as involving a divine act that lies outside the material realm.

However, this does not seem to be what the text actually says. It does not say that God made man's body of dust. It says he made *man* of dust. Neither is the "breath of life" something immaterial which sets humanity apart from animals. When the phrase neshamah hayim next occurs (in Gen. 7:22), it explicitly refers to all creatures (both humans and beast) drowned by the flood, describing them as those who had "the breath of life." Moreover, the text does not say that man "received" a living soul, but rather "became" a living soul-which seems better understood as meaning a living organism that has animate life rather than as an immaterial substance which sets humans apart from other creatures. (It does not make sense to say that man "became an immaterial substance"; moreover it is not clear that nephesh ever has the latter meaning.<sup>17</sup>) In the first two chapters of Genesis, nephesh hayah is used a total of six times; in the remaining occurrences (1:20, 21, 24, 30; 2:19), it explicitly refers to nonhuman creatures. (Indeed, many newer translations translate nephesh hayah in Gen. 2:7 with a phrase like "living being" for this reason.) In order to read this text as teaching two kinds of divine creative acts, one must implicitly substitute words that are not there for those that appear – e.g., "man's body" instead of "man," "immaterial soul" instead of "breath of (physical) life," "received" in place of "became," and "immaterial soul" in place of "living (animate) being." We will return later to the crucial point of the text: what makes humans special is not what humanity is, but rather it is God's relationship to us based on his purpose for making us.

An attractive alternative is to understand the immaterial aspect of humans (personhood) as an emergent phenomenon: personhood emerges from the interaction of the neurons in the brain. While this is certainly not the historical understanding (nor could it be, given that knowledge of the workings of the brain is fairly recent), it is not at all inconsistent with the silence of Scripture as to the details of exactly *how* God created a race of beings in his image. A Christian who holds an emergent view of personhood affirms the reality of God's creatorship of persons—in much the same way that he or she affirms the reality of God's ultimate responsibility for both the origin and day-to-day functioning of other aspects of the universe God created, even while affirming the reality of secondary causes. Emergence is a phenomenon that has been observed in many complex systems. Such systems often have properties that cannot be reduced to the properties of the underlying parts, and which can have a causal influence on the underlying parts. For example, the behavior of flocks of birds or colonies of ants emerges from the behavior of the individual birds or ants, though it cannot be predicted from even a very detailed knowledge of an individual, and the behavior of individuals is shaped, in part, by the behavior of the whole. William Hasker presents the idea as follows:

The human mind is produced by the human brain and is not a separate element "added to" the brain from outside. This leads to the further conclusion that mental properties are "emergent" in the following sense: they are properties that manifest themselves when appropriate material constituents are placed in special, highly complex relationships, but these properties are not observable in simpler configurations nor are they derivable from the laws which describe the properties of matter as it behaves in these simpler configurations.<sup>18</sup>

Emergence may, at first glance, seem almost mystical, but similar phenomena have been observed at many places in nature. Moreover, if one holds instead that human beings consist of two substances having separate origins, then it is difficult to account for the observed strong dependence of the hypothesized immaterial mind on the material brain—e.g., the fact that brain injuries and diseases such as Alzheimer's can totally disrupt the functioning of the mind, or even the fact that consciousness seems to cease temporarily during sleep or under anesthesia. How does an immaterial substance whose origin is separate from that of the body become so dependent on it?

Interestingly, while emergence does not *require* traditional body-soul dualism, it is compatible with both dualistic and nondualistic understandings of the nature of humanity. For example, William Hasker is a dualist, and calls his view "emergent dualism" (which he differentiates from traditional substance dualism in terms of its account of the origin of the immaterial aspect of humanity). However, other writers who hold to emergence hold nondualistic views such as nonreductive physicalism.<sup>19</sup>

Body-soul dualists sometimes allege that the Christian hope of eternal life requires dualism.<sup>20</sup> While I do not believe this contention to be valid, it is not an issue here. Emergence and Christian hope are really addressing two totally different questions—the *origin* of human persons, on the one hand, and the *destiny* of human persons, on the other. Moreover, emergence does not necessarily preclude dualism.<sup>21</sup>

Of course, Gen. 2:7 speaks only of the creation of the first man. Those who understand it as describing two

### **Article** *Artificial Intelligence and the Soul*

separate creative acts by God have generally understood the origin of the souls of Adam's descendants in terms of either (soul) creationism<sup>22</sup> or traducianism. Soul creationism is the view that God separately creates the soul of each individual at conception (or, in some variants, somewhat later) – thus repeating for each individual what he did for Adam. (This appears to be the view that Turing had in mind.) Traducianism is the view that the soul God created for Adam (though immaterial) is propagated to his descendants at the same time that the body is propagated, in conjunction with conception, but in a way that is otherwise left unexplained. (Though soul creationism is the more common view, to this day both views enjoy significant support from systematic theologians.)

How does the evidence for emergence compare with that for soul creationism and traducianism? There is no direct biblical teaching on the subject. Sometimes soul creationists argue for their position based on texts which teach that God is the creator of the human spirit.<sup>23</sup> However, as Augustine pointed out, Scripture also teaches that "God gives men their bodies ... although no one doubts that the said bodies are given, made, and formed by him by seminal propagation."<sup>24</sup> Thus, support for any view largely comes indirectly, by way of inferences from other doctrines.

Soul creationists argue that an immaterial soul is incompatible with the traducian view of propagation of the soul in conjunction with the material act of conception. However, this is not an argument against emergence, since—even in its dualistic form—emergence holds that the soul emerges some time after the body (which is purely material) begins to develop.

Emergence is actually quite similar to traducianism, in that both hold that our soul (personhood) derives from the soul (personhood) of our parents, and is propagated in conjunction with the generation of our bodies. Thus, the key argument that has historically been put forth in favor of traducianism also turns out to be an argument for emergence: the universality of human sin among the descendants of Adam conceived in the ordinary way. This is difficult to explain if each person has a soul separately created by God. A. H. Strong, in arguing for traducianism, presents this as follows:

[Soul creationism] if it allows that the soul is originally possessed of depraved tendencies, makes God the direct author of moral evil; if it holds the soul to have been created pure, it makes God indirectly the author of moral evil, by teaching that he puts this pure soul into a body which will inevitably corrupt it.<sup>25</sup>

Traducianism and emergence differ sharply on how they account for the origin of the soul (personhood) of Adam. The account offered by emergence is preferable if the interpretation of Gen. 2:7 given above is correct. Emergence also offers an explanation as to how propagation of personhood takes place, something with which traducianism has difficulty since it must account for the propagation of an immaterial soul through a material act. Finally, emergence easily handles a challenge for traducianism (and actually for soul creationism as well): it accounts for the phenomenon of identical twins. Though twins are distinct persons, they are conceived as a single embryo, which splits at some point after conception. This necessitates either two souls being generated, or the one soul splitting when the embryo does. Emergence has no problem with this, since the separation occurs long before the development of personhood (the capability for a firstperson perspective).

Historically, while some theologians have been insistent about a particular view of the soul's origin, others have been more reticent. Augustine-the church father who considered this question more thoroughly than any other-refused to the end of his days to commit to either soul creationism or traducianism<sup>26</sup> and stated that "I have therefore found nothing certain about the origin of the soul in the canonical Scriptures"<sup>27</sup> – a position echoed by more recent theologians as well.<sup>28</sup> This is not to argue that those who have been reticent to commit to one of the earlier views would recognize emergence as "the answer"-rather, it is to say that the question is one where the paucity of biblical teaching implies a need for cautious openness and calls into question "the supposed dichotomy of substances in man in its relation to the biblical picture of man."29

It does seem theologically plausible, then, to hold that personhood emerges from the (physical) interaction of neurons in the brain. Such a view is consistent both with the holistic tenor of Scripture and with empirical evidence for continuity among living creatures and for mind-brain interdependence. If this is the case, then there would not seem to be – in principle – a *theological* reason why personhood could not emerge in similar fashion from the operation of a sufficiently complex technological artifact. (This, of course, is not the same as saying that such an accomplishment is technically possible, or, if so, when it might occur.)

# Artificial Intelligence, Human Worth, and the Image of God

Should achievements in artificial intelligence impact our worth as persons? Historically, even before the era of computers, whenever a technological artifact has been able to surpass humans, people have seen this as a challenge to human worth.<sup>30</sup> Today, when computers routinely outperform humans in many tasks, people often take comfort in the fact that a computer is "only a machine." For example,

after losing to Deep Blue in 1997, Gary Kasparov was "rather gleeful that despite its win, it did not enjoy winning or gain any satisfaction from it."<sup>31</sup> What if an artifact were to exist that made this comfort ring hollow?

An answer to this question hinges on how we understand the relationship between human worth, on the one hand, and a belief that the human constitution is fundamentally unique, on the other hand. When human worth is tied to human constitutional uniqueness, the possibility of strong AI seems to pose a serious threat to one of our most cherished concepts. Indeed, some have argued that developments in this area constitute the final blow to the notion of human specialness. First, they claim, Copernicus and those who followed showed that our physical place in the universe is not special; then, Darwin and those who followed showed that our physical bodies are not special; finally, discoveries concerning animal intelligence along with artificial intelligence are showing that even our minds are not truly special.32 There are several possible responses to this.

One possible response is a form of denial: humans are special, and, therefore, whatever challenges this cannot possibly be true.<sup>33</sup> At this point in time, actual achievements in the realm of artificial intelligence appear to leave that possibility open. The writer whom I quoted at the beginning of this paper, for example, goes on to say "without such (intelligent) machines on the horizon, I feel safe in my 'archaic' theology."<sup>34</sup> This statement was written over fifteen years ago, yet is no less true today. But it is not at all clear that this is a viable position in the long run. Moreover, even without artificial intelligence, study of animal behavior has shown that some (limited) aspects of intelligence, consciousness, and emotion may also be present in nonhuman animals.

A second possible response is to accept the data as implying that humans are actually not special. Instead, we are simply biological machines, and the fact that we are rational and conscious and have emotions constitutes a proof that machines can be rational, etc.—because we are.<sup>35</sup> Living consistently with this perspective, however, is easier said than done. Some who are committed to the possibility of artificial persons deal with this by compartmentalizing their scientific and personal lives. For example, Rodney Brooks wrote:

On the one hand, I believe myself and my children all to be machines. Automatons at large in the universe. Every person I meet is also a machine – a bag of biochemicals interacting according to describable and knowable rules. When I look at my children I can, when I force myself, understand them in this way. I can see that they are machines interacting with the world. But this is not how I treat them. I treat them in a very special way, and I interact with them on an entirely different level. They have my unconditional love, the furthest one might be able to get from rational analysis. Like a religious scientist, I maintain two sets of inconsistent beliefs and act on each of them in different circumstances.<sup>36</sup>

What makes humans special is not what humanity is, but rather it is God's relationship to us based on his purpose for making us.

A third possibility, however, is to recognize that constitutional uniqueness and value are really two very different things. That is, the proposition "if humans are not somehow constitutionally unique, then they don't have worth" is not actually a true statement. The account in Gen. 2:7 describes God as involved in a very intimate way with the origin of humanity – of no other creature is it said that "God breathed into [its] nostrils the breath of life." Only after creating man and woman did God pronounce that his creation was not just good, but "very good." We naturally look for something in the way we are made that answers the question of why God values us. However, the same language used in Gen. 2:7 is also used with regard to animals elsewhere in Genesis, and biologically, humans are very similar to other organisms, even at the DNA level.<sup>37</sup> Many writers feel (and I concur), that human worth has more to do with our *purpose* (our relationship to God and what God intends us to *be* and *do*), rather than our constitution (what we are). Our constitution is not what makes us special; rather, it is necessary so that we can be special.

For Christians, a further question arises: should artifacts that exhibit genuine personhood some day exist, what would this mean for the Christian understanding of humanity as having been created in the image of God? The suggestion that fallen humans might create something that is actually in the image of God seems idolatrous (for good reasons, I think).<sup>38</sup> But, is it necessarily the case that creating a technological artifact that deserves to be called a person is tantamount to creating an artifact that is in the image of God?

The answer to this question hinges on the relationship between rational personhood and being in the image of God. The meaning of "the image of God" has been debated for centuries, and it is not my purpose here to

### **Article** *Artificial Intelligence and the Soul*

argue for a particular view. For the purposes of this paper, there are three possibilities: rational personhood (in particular, the mind) is (all or part of) the divine image;<sup>39</sup> being in the divine image is something else, though it may require rational personhood; or there is no connection between the two concepts. Of course, if rationality is all or part of the divine image, then the possibility of strong artificial intelligence implies that technology can produce artifacts that are in the image of God (which seems idolatrous). This, in turn, suggests that the production of such an artifact must not be possible, or at least not legitimate. However, if the divine image is to be understood in some other way (as many theologians contend), then there is no logical conflict between strong artificial intelligence and the doctrine of the image of God. In particular, one can certainly hold that "being created in the divine image requires (and hence implies) being rational" without holding the converse: "being rational implies being created in the divine image," just as one can hold that "all humans are mortal" without holding that "all mortals are human" (an obvious falsehood unless one contends that all animals are human).

This having been said, suppose technology were able to create artificial persons that are equal to (or even, in some cases, surpass) humans in rational powers. Suppose, further, that God were to choose to provide redemption for these persons<sup>40</sup> and that, as a result, they would be able to enter into a personal relationship with God that is no less real than that which we humans can experience, accompanied by a divine promise akin to the Christian hope. Suppose these persons were partners with us in exercising dominion over the earth, and could also manifest something of the divine character. Would even this nullify the worth of human beings? Why? (I offer this as a form of philosophical thought experiment, without at all suggesting that something like this will occur!)

Most of us who are parents have, at some time, addressed the child's question "Why do you love me?" Those of us who have multiple children have perhaps also addressed the older child's (verbalized or unverbalized) question about the birth of a sibling, "Will you love me less because you love my brother/sister?" The psalmist asked a question similar to the first: "What is man that you are mindful of him, the son of man that you care for him? You made him a little lower than the heavenly beings, and crowned him with glory and honor" (Ps. 8:4–5). Interestingly, though, the psalm never provides an answer to this question. Could this be because it has no answer that is *intrinsic* to us?

If, in the end, our value to God is not based on anything intrinsic to us, then the fear that artificial persons might somehow undermine our value as humans really represents a fundamental misunderstanding of biblical teaching. Of course, this also means that our worth as human beings cannot be understood without reference to our Creator. The existence of artificial persons might seriously undermine attempts to ground human worth in our intrinsic nature, apart from our value to God. But is this a bad thing? Perhaps technology, while seeming at times to lessen our need to depend on God, actually is having the opposite effect of showing us just how much we need him for our ultimate worth and purpose. Thus, though a secular form of humanism might indeed be threatened by the notion of artificial intelligence, a Christian form should not be.

### Implications of a Biblical View of Personhood for Work in Artificial Intelligence

What ramifications, if any, does a biblical understanding of personhood have for work in artificial intelligence? Were it the case that there were a theological conflict between biblical teaching and the notion of strong AI or that strong AI were to constitute a threat to humanity's place in God's creation, then the answer might well be that Christians should confine their work to weak AI and steer clear of anything smacking of strong AI. This, of course, would raise the issue of where one draws the line. However, I have argued that neither of these is the casei.e., there is no need to draw a theological line separating the doable from the not-doable (though the ethical ramifications of proposed applications would still need to be considered carefully). Given that no such line is called for, what does a biblical view of personhood have to say about work in artificial intelligence?

Much of the early work in artificial intelligence assumed that intelligence can be abstracted from implementation-what John Haugeland called GOFAI ("Good Old Fashioned Artificial Intelligence"41) or what others have called "symbolic AI." GOFAI claims that intelligence is symbolic computation; hence, it is possible, in principle, to implement intelligent processes (of "the same scope ... as human action") in any sufficiently powerful physical symbol system, including, in particular, a human brain or a digital computer.<sup>42</sup> Workers in symbolic AI have tended to focus on problems that require high-level human intelligence (e.g., playing chess, or expert performance in a domain such as medicine). While many such problems have yielded to this approach, everyday acts that we take for granted (e.g., distinguishing visually between a dog and a cat), or even things that "unintelligent" animals do routinely (e.g., moving around in a complex world), have proven intractable for symbolic AI.

In the past few decades, several other approaches have developed alongside symbolic AI. Connectionism (with roots that precede the digital computer) builds simulated neural networks that resemble the interconnection of the neurons in the brain.<sup>43</sup> Genetic computing evolves pro-

grams using mechanisms modeled after biological evolution. Behavior-based robotics seeks to build systems that behave intelligently in the real world by directly coupling perception and action. Rodney Brooks, the originator of this approach, characterizes it in terms of two key ideas: "Situatedness: The robots are situated in the world, they do not deal with abstract descriptions" and "Embodiment: The robots have bodies and experience the world directly."<sup>44</sup>

The Bible portrays humans as part of God's creationthe pinnacle of it, yes, but not in any sense, outside of it. In fact, Gen. 2:7 says that God formed us from the "dust of the ground," and the Bible sometimes speaks of humans as "dust" (Gen. 3:19; Ps. 103:14). God did not create abstract intelligence-he created physical brains, evidently using an evolutionary process, which incorporates features that closely resemble those in the brains of lower creatures. Approaches such as connectionism, genetic computing, and behavior-based robotics seem more in line with this than symbolic AI's view of intelligence as something abstract. (In fact, the latter more closely resembles Platonic dualism than biblical holism.) This is not at all to minimize the value of symbolic AI techniques for weak AI problems that have a strong symbolic component-often ones involving "higher" intelligence such as symbolic mathematics, "expert systems," natural language processing, or games like chess. But, in many areas, principles like those espoused by Brooks appear to be a better match to the biblical concept of personhood.

Moving beyond our origin, Genesis 3 makes it clear that we are not as God created us to be, and that death is a consequence of our sin. Genesis 3:15 introducesand the rest of Scripture describes-God's plan for our redemption and restoration to eternal fellowship with him. It is possible, however, for work in artificial intelligence to be seen as an alternative to the hope revealed in Scripture. Hans Moravec and Ray Kurzweil, for example, contend that the very near future will see intelligent machines whose mental powers vastly exceed those of biological humans, and whose powers will allow the solving of problems that have long plagued humanity.45 Their works portray what amounts to an anticipated technological deliverance for the human race through what Moravec calls our "mind children." But Scripture insistently warns against idolatry, which basically involves looking to someone/thing other than our Creator to meet one's needs. Isaiah rightly mocks those who look to the works of their own hands to save them (Isa. 44:16-20). Would superintelligent computers produced by our own hands really be the ultimate answer to the problems of humanity? Human history certainly suggests otherwise! Moreover, Moravec and Kurzweil argue that robotic technology might endow us with personal immortality. Here the goal is not so much to produce independent intelligences as to produce virtual brains into which a human's personality can be "uploaded," which, in conjunction with making backup copies periodically, will render a person immune to death by accident, disease, or old age.<sup>46</sup> In contrast, the closing verses of Genesis 3 portray fallen man as being driven out of the Garden of Eden, because "He must not be allowed to reach out his hand and take from the tree of life and eat, and live forever" (Gen. 3:22). This is ultimately for our good, since an eternity in our fallen condition would quite literally be hell. (It is worth noting that, though Moravec and Kurzweil are highly respected and prolific researchers, their views are hardly representative of the mainstream of the AI community.<sup>47</sup>)

As is true throughout the sciences, work in artificial intelligence can be wrongly motivated, but it can also represent a very legitimate part of humanity's fulfillment of the cultural mandate (Gen.1:28) through enhanced understanding of the greatest marvel of God's creation: human beings. There is no inherent theological conflict between a biblical view of personhood and work in artificial intelligence, nor would successes in this field undermine human value or the doctrine of the image of God. This having been said, a realistic assessment of what has been accomplished to date suggests avoiding grandiose projections of what will be achieved in the near future (a temptation to which workers in this field have often yielded). We need to approach this area with an attitude of great caution and even reverence, for, as Scripture says, we are "fearfully and wonderfully made" (Ps. 139:14). +

#### Notes

- <sup>1</sup>"The New Map of the Brain" Introduction to special section titled "A User's Guide to the Brain," *Time* 169, no. 5 (January 29, 2007): 57. 2Rodney A. Brooks, *Flesh and Machine* (New York: Pantheon, 2002),
- 209.
  <sup>3</sup>William Dembski, "Conflating Matter and Mind," *Perspectives on Science and Christian Faith* 43, no. 2 (June 1991): 109.
- <sup>4</sup>George Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, 5th ed. (Reading, MA: Addison-Wesley, 2005), 2.
- <sup>5</sup>Marvin Minsky, *Semantic Information Processing* (Cambridge, MA: The MIT Press, 1968), v.
- <sup>6</sup>Murray S. Campbell, "An Enjoyable Game" in David G. Stork, ed., *HAL's Legacy: 2001's Computer as Dream and Reality* (Cambridge, MA: The MIT Press, 1997), 94. It appears, though, that Deep Blue's success has led to a loss of interest in further development of high-power chess-playing programs.
- <sup>7</sup>Roger Schank, "I'm sorry, Dave, I'm afraid I can't do that," in Stork, ed., *HAL's Legacy*, 189.
- <sup>8</sup>Of course, to say that there are persons who are not humans is not the same as to say that there are humans who are not persons. This is not what I am saying here!
- <sup>9</sup>Lynne Rudder Baker, *Persons and Bodies: A Constitution View* (Cambridge: Cambridge University Press, 2000), 91.
- <sup>10</sup>Ibid., 60. Baker goes on to distinguish between "weak first-person phenomena" (which higher nonhuman animals can experience) and "strong first-person phenomena" (which are essential for a full self-consciousness and a first-person perspective).

<sup>12</sup>A. M. Turing, "Computing Machinery and Intelligence," *Mind* 59 (October 1950): 433–60. This article has been reprinted numerous

<sup>&</sup>lt;sup>11</sup>Intelligent artifacts had appeared earlier in science fiction, but this was the first formal paper to discuss the idea.

### **Article** *Artificial Intelligence and the Soul*

times; the quotations here are from Margaret Boden, ed., *The Philosophy of Artificial Intelligence* (Oxford: Oxford University Press, 1990), 49. Turing's attempt to answer this objection on its own terms – by asserting that an omnipotent God could give a soul to whatever he chooses to (including a machine) – would probably be unconvincing to a person who holds the view of the soul underlying this objection.

#### <sup>13</sup>Ibid.

<sup>14</sup>The word "soul" is understood in a wide variety of ways, and the range of meanings of the English word and of the Hebrew (nephesh) and Greek (psuche) terms commonly translated as "soul" are all different. One meaning-which is the sense in which I will generally use the term here-is to speak of a person, understood in a holistic way, though with particular emphasis on the inward side of life (intellect and emotions), sometimes as a virtual synonym for "self" or the personal pronoun "I." See the discussions by Hans Walter Wolff, Anthropology of the Old Testament (Philadelphia: Fortress, 1974), 10-25, for nephesh, and by Gunther Harder in Colin Brown, ed., The New International Dictionary of New Testament Theology, vol. 3 (Grand Rapids: Zondervan, 1978), 682-6, for psuche. The difference between the common meaning of the English word "soul" and that of the ancient words has led some writers to avoid the use of the word "soul" altogether. For example, see Nancey Murphy, Bodies and Souls, or Spirited Bodies? (Cambridge, England: Cambridge University Press, 2006), 1. Kevin Corcoran has titled his most recent book, Rethinking Human Nature: A Christian Materialist Alternative to the Soul (Grand Rapids: Baker, 2006).

<sup>15</sup>For example, Louis Berkhof, *Systematic Theology* (Grand Rapids: Eerdmans, 1939), 183.

- <sup>16</sup>John Calvin, *Institutes of the Christian Religion* 1, trans. Henry Beveridge (reprint, Grand Rapids: Eerdmans, 1979), Book I, chap. 15, section 2, p. 160 in translation.
- <sup>17</sup>Hans Walter Wolff writes: "We must not fail to observe that *n*. is never given the meaning of an indestructible core of being, in contradistinction to the physical life, and even capable of living when cut off from that life," *Anthropology of the Old Testament* (Philadelphia: Fortress, 1974), 20. Even a writer such as John Cooper, writing in defense of a form of body-soul dualism, affirms that Wolff's analysis of Hebrew anthropological terms is "virtually undisputed among scholars of various theological persuasions," though he later claims that "holding that *nephesh* occasionally refers to human beings who have died is certainly possible, if not demonstrable, on the basis of Old Testament scholarship. It cannot be certified, but neither can it be discounted." John Cooper, *Body*, *Soul, and Survival* (Grand Rapids: Eerdmans, 1989), 38–9, 61.

<sup>18</sup>William Hasker, *The Emergent Self* (Ithaca, NY: Cornell University Press, 1999), 189–90.

<sup>19</sup>This view is developed in Warren S. Brown, Nancey Murphy, and H. Newton Malony, *Whatever Happened to the Soul?* (Minneapolis: Fortress, 1998). Murphy explicitly calls consciousness an emergent property on p. 131.

<sup>20</sup>A very thorough statement of this position is given by John W. Cooper, *Body, Soul and Life Everlasting* (Grand Rapids: Eerdmans, 1989).

<sup>21</sup>In his preface to the second printing of his book, Cooper specifically addresses emergentism of the sort proposed by Hasker saying: "Although I still have reservations about it, I think that emergentism, if philosophically tenable, could offer a materialistic philosophy of human nature that is consistent with the traditional Christian doctrine of the afterlife" (Preface to the second printing, page xx).

<sup>22</sup>Systematic theologies typically refer to this view simply as "creationism," but I will use the qualified term "soul creationism" to avoid confusion with other, distinct ways in which the term is used in discussions of origins.

<sup>23</sup>E.g., Eccl. 12:7; Isa. 42:5; Zech. 12:1; Heb. 12:9.

<sup>24</sup>Augustine, *On the Soul and its Origin*, Book II, chap. 19. The quotation here is from www.newadvent.org/fathers/15082.htm (accessed on January 15, 2007).

<sup>25</sup>Augustus H. Strong, *Systematic Theology* (Valley Forge, PA: Judson Press, 1907), 493.

<sup>26</sup>Mary Inez Bogan, *The Fathers of the Church*, vol. 60 (Washington, DC: Catholic University of America Press, 1968), 246.

<sup>27</sup>Augustine, *Letter 190 (to Optatus)*. The quotation here is from the translation by Sister Winifred Parsons, SND in *The Fathers of the Church: A New Translation*, vol. 12 (New York: Fathers of the Church, Inc., 1955), 281.

<sup>28</sup>G. C. Berkhouwer discusses this question at length in his chapter on "Creationism and Traducianism" in *Man: The Image of God* (Grand Rapids: Eerdmans, 1962), 272–309.

<sup>29</sup>Ibid., 295.

<sup>30</sup>For example, the story of John Henry, the "steel-driving man" who died trying to outdo a steam drill.

<sup>31</sup>Brooks, Flesh and Machines, 170.

<sup>32</sup>Ibid., 159-71.

<sup>33</sup>Turing called this "The 'Heads in the Sand' Objection," and did not deem it worthy of a response; see, Boden, ed., *The Philosophy of Artificial Intelligence*, 50. An argument of the form "X is so terrible it cannot possibly be true" is usually not at all convincing to someone who believes otherwise!

<sup>34</sup>Dembski, "Conflating Matter and Mind."

<sup>35</sup>Brooks, Flesh and Machines, 175.

<sup>36</sup>Ibid., 174.

<sup>37</sup>Francis S. Collins, *The Language of God* (New York: Free Press, 2006), 124–41.

<sup>38</sup>The Hebrew word translated "image" in Gen. 1:26 (*tselem*) is one of several words used elsewhere in the Old Testament for idols, and its Aramaic cognate is used throughout Daniel 3 for the statue Nebuchadnezzar set up for his subjects to worship. Of the use of this word for idols, John E. Hartley says it "refers to the image as a representation of the deity. As such, images were strictly forbidden" (in R. Laird Harris, Gleason Archer, and Bruce K. Waltke, eds., *Theological Wordbook of the Old Testament* 2 [Chicago: Moody Press, 1980], 767).

<sup>39</sup>This, for example, is the position argued for by Thomas Aquinas (*Summa Theologica* I, Question 93, Article 6).

<sup>40</sup>I am assuming, of course, that anything which is the work of human hands would be affected by sin.

<sup>41</sup>John Haugeland, *Artificial Intelligence: The Very Idea* (Cambridge, MA: The MIT Press, 1985), 112.

<sup>42</sup>Alan Newell and Herbert Simon, "Computer Science as Empirical Inquiry: Symbols and Search," the Tenth Turing Lecture. First published in *Communications of the ACM* 19 (March 1976): 113–26.

 <sup>43</sup>Neurons are inherently analog devices; however neural networks are almost always simulated on digital computers.

<sup>44</sup>Rodney A. Brooks, "New Approaches to Robotics" in *Cambrian Intelligence* (Cambridge, MA: The MIT Press, 1999), 60.

<sup>45</sup>This line of argument is developed in Hans Moravec, *Robots: Mere Machine to Transcendent Mind* (New York: Oxford University Press, 1999); Ray Kurzweil, *The Age of Spiritual Machines* (New York: Viking, 1999); Ray Kurzweil, *The Singularity Is Near* (New York: Viking, 2005).

<sup>46</sup>Kurzweil, *The Singularity Is Near*, 198–203. <sup>47</sup>Brooks, *Flesh and Machines*, 204.

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# Human Evolution: How Random Process Fulfils Divine Purpose



Graeme Finlay

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Some people deny that speciation and macroevolution have occurred, and that new genetic functionality can arise from the randomness of mutational mechanism. The genome sequences of many mammalian species are now available for comparison, and have provided a wealth of data that can address these issues. The aim of this article is to show that humans and other mammals share distinctive genomic features that have arisen from singular mutational events. These shared features provide compelling evidence that (1) the human species is descended from ancestors shared with other mammals, so establishing the truth of speciation (our own) and of macroevolution, and (2) new genes have been generated by mutational events that are recognized to occur randomly. This article reflects on how the randomness of natural process achieves God's creative purposes. We can see this pattern in the way God constrains the randomness of history (or indeed of our own lives) into his purposed end.

he opposition of some Christians to evolutionary biology is frequently featured in the media. Positions taken by many in this debate seem to be so polarized as to preclude resolution. But there is an irony to this controversy. Even as some Christians deny that new species can evolve, that macroevolution has taken place, and that complexity can develop through natural genetic processes, the genomic revolution of this century has established the truth of all three evolutionary concepts.

This article is written from the perspective that Scripture possesses the very authority of God.<sup>1</sup> This includes the early chapters of Genesis. Indeed attentiveness to the structure of Genesis 1 has led Old Testament scholars to the conclusion that this text uses rich symbolism to instruct the reader that the incomparably majestic Creator of the universe is the God of Israel, so repudiating all other conceptions of deity. Genesis 1 is arranged in a stylized form. It presents no chronological sequence and implies no mechanism. It describes a transformation from the waters of chaos to the establishment of rest. It reveals to us a God of power, wisdom, purpose, and goodness-a God of order who makes science possible.2

Thus one of the key themes of Genesis 1 is that God the Creator transforms chaos into order. This theme is then echoed repeatedly, and in many forms, throughout Scripture. God creatively transformed the chaos of slavery in Egypt into nationhood. Under his creative authority, the turmoil of history led "in the fullness of time" to the climax of the Incarnation. He transformed the Crucifixion into the glory of the Resurrection. He transforms the human state of sin, estrangement, and death into justification, reconciliation, and life.<sup>3</sup>

This theme is compatible with the evolutionary pattern revealed by the post-2001 revolution in comparative genomics. The randomness of genetic process has been shown to underlie the current form of the human genome. Genetic mechanism in all its happenstance has produced the genetic basis of humanness. Genetics describes the process, ordained and upheld by God, to make the creature that expresses God's "image and likeness" (Gen. 1:26–28). That God

Genetic mechanism in all its happenstance has produced the genetic basis of humanness. Genetics describes the process, ordained and upheld by God, to make the creature that expresses God's "image and likeness" (Gen. 1:26-28).

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### **Article** *Human Evolution: How Random Process Fulfils Divine Purpose*

uses the randomness inherent in the natural world to achieve his purposes should be no surprise to people who believe that he is transforming the chaos of history into the new creation.<sup>4</sup>

The following sections describe how our genome shares particular, uniquely arising innovations with the genomes of a range of other species. Shared genetic markers establish the fact that we and other creatures share common ancestry, and delineate the route of our evolutionary development. This approach reveals how familiar mutational processes have constructed new genes and generated novel genetic functionality.

#### New Genes from Recycled Spare Parts

In female Eutherian (placental) mammals, one copy of the X chromosome in every cell is inactivated, due to the activity of the *Xist* gene. The *Xist* gene is found only in Eutherians, and in no other vertebrates. Part of the Eutherian *Xist* gene arose from segments of DNA left over from a pre-existing gene (*Lnx3*) found in lower vertebrates (Figure 1). Fragments of the *Lnx3* gene were converted into *Xist* gene sequences through mutational events that include the insertion of bases. Such insertion mutations typically destroy the protein–coding function of genes, but in the case of the *Xist* gene (which does not encode a protein), contributed to its formation (Figure 2).<sup>5</sup>



Figure 1. Birth of the Xist gene.

The Xist gene found in Eutherian (placental) mammals arose in part from the Lnx3 gene that is found in all the species from fish to marsupial mammals.<sup>6</sup>

This example illustrates how novel genes may arise by mutational mechanisms that are familiar to geneticists. In the brief segment of genetic sequence shown in Figure 2, the original gene (represented by the chicken *Lnx3* gene) has undergone three separate insertion mutations (arrows). These mutations added one base (at two sites) and two bases (at one site) to the original sequence, and are found at the identical positions in all the Eutherian species for which sequences have been obtained. It is highly unlikely that the same insertion mutations would

have occurred independently in multiple species. It is vastly more probable that each mutation represents a unique event, and that all the species that now possess the inserted bases received them by inheritance. This means that all Eutherians are descendants of the one individual in which each mutation occurred. And a gene that is integral to our status as Eutherian mammals was formed by the stepwise accumulation of mutations in a lineage of common ancestors.



**Figure 2.** Insertion mutations that converted *Lnx3* gene sequences into *Xist* gene sequences.

The upper part of the diagram shows the layout of the *Lnx3* and *Xist* genes. Horizontal lines indicate segments of DNA; short vertical lines and boxes indicate exons (discontinuous segments of DNA that comprise the parts of a gene used to form an RNA copy). Dotted lines connect those parts of the *Lnx3* gene that have survived in the *Xist* gene. A segment of genetic sequence is shown for part of the chicken *Lnx3* gene and for the corresponding part of the *Xist* gene of four Eutherian mammals. The letters A, C, G and T represent the four units of genetic information (bases). Three insertion mutations (arrows) are common to the four Eutherian mammals, establishing their descent from the one ancestor in which each mutation occurred.<sup>7</sup>

### New Genes from Duplications

Five percent of the human genome consists of large segments of DNA that have been duplicated from elsewhere in the genome. Such *segmental duplications* are a familiar feature of genomes, and generate multiple copies of the genes that lie within them.<sup>8</sup> If such duplications provide a survival advantage to the organisms that possess them, they will persist through the effects of natural selection. These duplications have increased the number of copies of some genes over the last few thousand years of human history. For example, human populations that derive much of their food from plant starch (agriculturalists such as the Japanese) have more copies of the salivary amylase gene in their genomes than populations that do not depend on dietary starch (pastoralists and fishermen such as the Siberian Yakut).<sup>9</sup>

Segmental duplications arise randomly. They often arise in cancers, and drive cancer development. If multiple cells in a tumor share the same duplication, they are recognized as descendants of the one progenitor cell in which the duplication arose.<sup>10</sup> Similarly, if two species share such a duplication, it may be accepted that they are descendants of the one progenitor in which the singular originating event occurred. Genome comparisons have shown that two-thirds of the segmental duplications in our genome are shared with chimps.<sup>11</sup>

If mutations accumulate in each of a pair of duplicated genes, the proteins they encode may acquire different activities. The end result of reiterated duplications will be families of genes of diverse function.

Genes for visual pigment proteins called opsins are required for color vision. New World Monkeys (NWMs) have two opsin genes; apes and Old World Monkeys (OWMs) have three. The third gene appeared when an ancestral opsin gene (and part of a nearby gene of unknown function, TEX28) on the X chromosome was duplicated to form the tandem arrangement: red opsintruncated TEX28-green opsin-TEX28 (Figure 3). Comparison of the uninterrupted sequence to the left of the present red opsin gene, and of the interrupted sequence to the left of the present green opsin gene identifies the exact position of one of the two breakpoints that occurred during the duplication. This breakpoint is common to apes and OWMs, and demonstrates that the duplication arose in a unique event, and that it that has been inherited by all the species that now possess it. This finding indicates that trichromatic vision arose in a random DNA dupli-



Figure 3. Birth of an opsin gene.

Upper diagram: In lower primates including NWMs, the X chromosome contains one opsin gene, next to the TEX28 gene.

Second diagram: In an ancestor of the apes and OWMs, the opsin gene and part of the *TEX28* gene were duplicated (segment in dashed box).

*Third diagram:* The duplicated segment was re-inserted into the chromosome (arrow), generating a second opsin gene and a truncated pseudo ( $\Psi$ ) *TEX28* gene. The segments of DNA sequence show the junction between  $\Psi$ *TEX28* (bold) and the duplicated opsin gene sequences. The junction point is the same in all species investigated, indicating that this segmental duplication arose as a unique event in an ancestor of apes and OWMs.<sup>12</sup>

cation event. Subsequent mutations conferred distinct spectral properties on the pair of opsin proteins.<sup>13</sup>

The *human leukocyte antigen* (HLA) gene complex is critical to the functioning of our immune system. The HLA Class I region is 1,800,000 bases long, and was generated by several rounds of segmental duplications. Many of the genes and surrounding genetic markers (inserted *transposable elements*; see later) are arranged in multiple repeated units, which are shared by multiple primate species.<sup>14</sup> Gene families arising by similar processes of DNA duplication have been documented in a large number of cases.

#### New Genes from Transposable Elements

Half of the DNA in our genome has been contributed by *jumping genes* or *transposable elements*. These are discrete segments of DNA that reside in the genomes of fungi, plants, and animals. They are units of genetic material that possess the ability to propagate themselves haphazardly within genomes. They insert new copies of themselves into chromosomal DNA at loosely preferred sites, chosen largely at random from the vast number of potential sites distributed throughout the genome. The insertion process is marked by a particular signature: the inserted transposable element is flanked by short duplications of target site DNA. Such *target site duplications* arise from the mechanism by which transposable elements propagate. They can be classified into two main groups called *DNA transposons* and *retrotransposons*.<sup>15</sup>

One in every ten people may have a new insert in their germ-line DNA arising from the activity of these agents.<sup>16</sup> Because transposable elements invade new sites at random, they insert into and disrupt existing genes at an appreciable frequency. These agents are *insertional mutagens*, and their current activity is responsible for a significant burden of human genetic disease.<sup>17</sup> They are relevant to our understanding of human evolution for two reasons.

Firstly, the probability that two transposable elements of the same class would insert independently into the same site in the DNA of two individuals is negligible. Thus, if two (or more) individuals share the same parasitic insert in their DNA, it may be concluded that they are descendants of the one individual in which that unique insertion event occurred. Such instances exemplify the well-established concept of *founder mutations*.<sup>18</sup> Analogously, if two (or more) distinct *species* share the same parasitic insert in their DNA, it may be concluded that they are descendants of the one individual in which that unique insertion event occurred.<sup>19</sup> Genomic science has shown that >99% of the millions of genetic parasites inserted in the human genome<sup>20</sup> are shared with chimpanzees,<sup>21</sup> and the great majority are shared with macaques,

### **Article** *Human Evolution: How Random Process Fulfils Divine Purpose*

an OWM.<sup>22</sup> Such findings establish that humans, chimps, and (more remotely) macaques share common ancestors.

Secondly, transposable elements are individualistic genetic parasites. The transposable elements scattered throughout our genomes have traditionally been dismissed as "junk." However, it is now established that at least some of this DNA has been co-opted to provide essential genetic functionality.<sup>23</sup> The activities of these insertional mutagens are random with respect to the functioning of the host organism, but they have contributed to the development of complexity.

#### **DNA Transposons**

DNA transposons are short segments of self-propagating DNA that reside in the genomes of many organisms. Their origins are lost in remote history. They possess an enzyme called a *transposase* which enables them to cut-and-paste themselves into new sites in the genome. They appear to increase in number by co-ordinating their activities with episodes of cellular DNA synthesis. There are nearly 400,000 individual DNA transposons inserted into our genome, of which essentially all are shared with apes and OWMs.<sup>24</sup>

Many of the DNA transposons scattered throughout our genome have acquired genetic functionality since the time they inserted into the primate germ-line. Some now function as genes that generate RNA molecules involved in widespread and important regulatory functions.<sup>25</sup>

Other DNA transposons have contributed to the information content of genes that make proteins. A DNA trans-



Figure 4. Birth of the SETMAR gene.

Lower left: The ancient SET gene consists of two segments of DNA. Middle left: Two events transformed the SET gene into the SETMAR gene: the deletion of twenty-seven bases ("del") that allowed the second segment of coding DNA to extend to the right, and the insertion of an Hsmar1 parasitic element that provided new coding information. An Alu element inserted beside the Hsmar1 element, but did not become part of the gene.

*Right:* A partial evolutionary tree indicating the time at which the mutational events occurred (thickened line).<sup>26</sup>

poson of the *Hsmar1* class inserted itself into a pre-existing gene (known as the *SET* gene) in an ancestor of apes and monkeys. This insertion event converted the *SET* gene into the novel *SETMAR* gene. This hybrid gene now makes a protein that may function in DNA repair processes, or in the regulation of genome activity (Figure 4). The portion of the SETMAR protein that was donated by the transposon retains many of the enzymatic functions performed by the original transposon-coded protein.<sup>27</sup>

#### Retrotransposons

Retrotransposons are parasitic residents of the genome that copy-and-paste themselves into new sites of genomic DNA via an RNA intermediate (Figure 5):

parent DNA insert $\rightarrow$ RNA cop	$bies \rightarrow daughter DNA$ inserts
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The *LTR retrotransposons* constitute one class of these agents. They are related to the retroviruses that cause human disease. Indeed our DNA contains many segments of retroviral DNA, known as *endogenous retroviruses*, which originally invaded the genome as infectious agents. We have inherited at least 300,000 LTR retrotransposons and endogenous retroviruses in our DNA. Nearly all of them are shared with chimps, and most with macaques. Most of them are genetic fossils that are degenerating into the genetic background, but some have assumed vital genetic functions.<sup>28</sup>

A few endogenous retroviruses have, against all odds, retained one of their genes in a form that can direct the production of an active protein. A gene that has excited particular interest is the *envelope* gene.<sup>29</sup> One of the endogenous retroviruses that retains an active *envelope* gene is the



Figure 5. Propagation of a transposable element via an RNA intermediate.

A parent transposable element (situated in chromosomal DNA) is copied into a diffusible RNA molecule. This RNA directs the formation of proteins which remain associated with it, induce a cut at a new target site in chromosomal DNA, and insert a DNA copy into the gap made by the cut. Triangles indicate target site duplications (not drawn to scale).
unique ERVWE1 insert that became resident in primate DNA in an ape-OWM ancestor (Figure 6).<sup>30</sup> The ERVWE1 insert directs the production of an active envelope protein that is made in a specific population of cells in the placenta, and that appears to be necessary for placental and fetal development.<sup>31</sup> A gene added to primate DNA as part of the viral infection apparatus has been transmogrified into a gene that is essential for our life-cycle.

human	CAATTATCTTG <b>CAAC</b> [ERVWE1]CAACCATG
chimpanzee	CAATTATCTTGCAAC[ERVWE1]CAACCATG
gorilla	CAATTATCTTGCAAC[ERVWE1]CAACCATG
orang	CAATTATCTTGCAGC[ERVWE1]CAATCATG
gibbon	CAATTATCTTGCAAC[ERVWE1]CAACCATG
NWM species	CAATTATCTTG <b>CAAC</b> CATG
NWM species	CAATTATCTTG <b>CAAC</b> CATG
prosimian spe	ciesCCACCATCTTGCAAACATG
dog	CAACCATCTTG <b>CAAA</b> CATG

Figure 6. DNA sequence surrounding the ERVWE1 endogenous retrovirus.

All species of ape (and OWMs, sequence not available) have the same insert and variants of the same flanking target site duplication (bold). Other species tested show the uninterrupted precursor target site. Shading highlights the target site and its duplications.<sup>32</sup>

It appears that endogenous retroviruses repeatedly have donated genetic information that has contributed to the form and function of the placenta. The *PEG10* gene arose from a retrovirus-like agent that inserted into mammalian DNA in an ancestor of marsupials and Eutherians. It is also implicated in the formation of the placenta.<sup>33</sup> Mammalian development has been promoted through the exploitation of genetic material contributed by potentially pathogenic insertional mutagens.

Many other classes of retrotransposons in our DNA have contributed raw material that has led to the development of genetic novelty. *Alu elements* are found only in primates. There are at least 1.1 million of these inserts in our DNA. Nearly all of these inserts are shared with chimps (>99.9%) and most with macaques (90%). Alu elements have provided raw material from which new genes have been constructed.<sup>34</sup> They have inserted themselves into pre-existing genes, thereby generating alternative forms of those genes.<sup>35</sup> For example, an insert in the *survivin* gene, which controls life-and-death decisions in cells, entered the primate germ-line in an ancestor of the apes (Figure 7).

*Mammalian-wide interspersed repeat* (MIR) elements are very ancient and widely distributed in the DNA of all mammals. Essentially all of the 300,000 MIR elements present in our DNA are shared with chimps and macaques. Some genes (including the *ZNF639* and *POMC* genes) contain MIR inserts that have been found in all mammals tested including the egg-laying platypus.<sup>36</sup> Numerous other families of very ancient transposable elements have contributed functional units to our genome and each insert common to mammals establishes that the mammals are monophyletic (descended from a single common ancestor).<sup>37</sup>



Figure 7. DNA sequence surrounding an Alu insert in the *survivin* gene.

All species of ape have the same insert and variants of the target site duplication (bold). Other species show the uninterrupted precursor target site. Shading highlights the target site and its duplications.<sup>38</sup>

# Via Enzymatic Machinery of Retrotransposons

During the normal activities of cells, genes are copied into RNA, which performs housekeeping or regulatory functions, or directs the synthesis of proteins. RNA is normally short-lived, but sometimes, an RNA molecule becomes entangled in the enzymatic machinery of retrotransposons, and a DNA copy gets inserted back into chromosomal DNA. Our DNA contains thousands of copies of such randomly copied-and-pasted genes. Most have lost the capacity to make proteins, and are called *pseudogenes*.<sup>39</sup>

parent gene in DNA $\rightarrow$	RNA copy $\rightarrow$	daughter pseudogene in DNA
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Despite the haphazard nature of this process, some of these copied-and-pasted inserts retain the capacity to direct the production of proteins. These additions to our gene complement are called *retrogenes*.

Our genome possesses a family of novel genes that arose following the insertion of a DNA segment from one gene (encoding a protein called  $\beta$ -actin) into another gene (called the POTE gene). This novel hybrid gene subsequently spawned a family of POTE-actin genes. The presence of a unique  $\beta$ -actin insertion site (with its tell-tale target site duplications) establishes that one original insertion event was followed by a series of gene duplication events. The outcome of this series of mutational events is that our genome possesses seven genes that contain the insertion (Figure 8). POTE-actin genes are found in apes and OWMs. This insertion mutation involving actin gene sequences is an unambiguous marker indicating that a novel gene family, and the complexity of function entailed in the interactions of its members, developed from a random event that occurred in an ancestor of apes and OWMs.40

## **Article** *Human Evolution: How Random Process Fulfils Divine Purpose*



Figure 8. DNA sequences surrounding the β-actin insert in POTE genes.

Seven genes in the family have the  $\beta$ -actin insert and its target site duplication (bold). Apes and OWMs have representative  $\beta$ -actin-POTE genes, indicating that the insertion event occurred in an ape-OWM ancestor.<sup>41</sup>

The *PIPSL* gene (also an interesting hybrid gene) was inserted into the DNA of a great ape ancestor, and the *GLUD2* gene in an ape ancestor.<sup>42</sup> Retrogenes have accumulated in the DNA of our ancestors at a steady rate through primate history.<sup>43</sup> The process of transposable element-mediated gene generation has been in operation as far back in time as we are able to see. The *YY2* and *REX1* genes arose early in the development of placental mammals,<sup>44</sup> and other copied-and-pasted genes shared widely with other mammals are being identified all the time.<sup>45</sup>

These copying-and-pasting events have generated a host of retrogenes from which small RNA molecules are made. These RNA molecules perform a range of house-keeping jobs pertaining to genome function, and act as master regulators of genome activity. Most are shared with chimps; and some with creatures as distantly related as mice.<sup>46</sup> We are at least partially what our parasitic transposable elements have made us.

# Genome Data and the Christian Worldview

An outline of the evolutionary development of the human species is depicted in Figure 9. This evolutionary tree has been established by many approaches. The comparative genomic approaches have provided compelling corroboration of the evolutionary relationships depicted. They have resolved long-standing controversies regarding some branch points. They have shown how genes have arisen at particular times through natural processes. Many similar events have been mapped to every point, and together have established the pattern of evolutionary branching.

This discussion has been limited to events in mammalian evolution because it is only in the timescale of mammalian evolution that the unambiguous genetic markers of our evolutionary history have survived. Transposable elements provide tantalizing molecular evidence for human-avian common ancestry,<sup>47</sup> without reporting (for example) any surviving shared transposable elements flanked by target site duplications. However, there is no reason to doubt the reality of earlier evolutionary transitions (inferred through other means) just because they occurred so long ago that unambiguous genetic markers establishing common descent have been eroded beyond recognition. How should Christians respond to such data, which are a small selection of what is available?<sup>48</sup>

An authentically biblical worldview requires that we view the world through critically realist eyes. Our mind-set must be critical in the sense that the data of experience must consistently challenge and correct our understanding of reality. It must be *realist* in the sense of recognizing that we face a world of which there is an objective truth, even though we will never fully grasp it. This mind-set governs Christian approaches to both the natural world<sup>49</sup> and to Scripture.<sup>50</sup> Transposable elements that disrupt genomes today possess genetic information that is highly similar to that in transposable elements that we share with other mammalian species. We must accept that they all arose through the same elaborate biochemical mechanisms. Genes present in our DNA really arose when transposons acquired coding capacity in simian ancestors. Christians have defended critical realism in other historical situations. The earth really revolves around the sun (contra the Aristotelians, who claimed that Galileo's heliocentric model merely saved the appearances as an interpretive device).<sup>51</sup> Christ really suffered (contra the docetists, who claimed he only appeared to do so).

If we are God's creation, then our DNA sequence is an authoritative text that God has written. It is the Primal Testament that describes how God in faithfulness has created, via the randomness of genetic happenstance, the creature that bears his image and that he intends to glorify. Francis Collins has stated that shared transposable



Figure 9. An outline of human evolution, indicating the timing of particular events described in this article.

elements have implications for common ancestry that are "virtually inescapable."<sup>52</sup> We must listen attentively to this text, and respond appropriately.

### Creation and Evolution: Agency and Process

It follows that the theological assertion that God is our Creator may not be seen as an alternative to the evolutionary mechanism of human origins. This "either-or" position represents a false dichotomy. *Creation* refers to personal agency (the intentionality and action of God),<sup>53</sup> which may be described in terms such as goodness, love, and grace.<sup>54</sup> *Evolution* refers to material process. God creates. Transposable elements and genomes evolve. Indeed, transposons and genomes evolve in the world that God has chosen to create. *Creation* refers to God's continuous covenantal relationship with the entirety of creation – past, present, and future.<sup>55</sup> *Evolution*, with its physical components (bases, transposons) and its processes (duplications, insertions), describes only relationships within creation.

For Christians, the life, death, and resurrection of Christ constitute the necessary and sufficient basis of faith in the self-revealing God. From this foundation, all presuppositions that inform our interpretation of the world are necessarily theistic. Thus, all scientific descriptions of physical phenomena (such as the molecular mechanisms which gave rise to genes), since they are describable in physical terms, can and must be included within a Christian perspective of *reality as creation*. We dare not exclude any biological process—including evolutionary ones—from the creative work of God.

Neither is the agency of God an alternative to natural law. MacKay stated that "the laws of nature we discover are not *alternatives* to divine activity, but only our *codification* of that activity in its normal manifestations."<sup>56</sup> Similarly, Van Till stated:

Natural laws are held to be statements describing the patterned behavior that matter and material systems exhibit as a consequence of divine governance. Natural laws are not prescriptive laws *of* nature for its own behavior but descriptive representations of the laws of God *for* nature, which is his creation.<sup>57</sup>

And to Polkinghorne, "Everything in the world–its form and its substance, the nature of law and the nature of matter–is contingent upon his will alone."<sup>58</sup>

Physical laws that describe the behavior of DNA and the way it mutates (no matter how probabilistic their operation may be) are laws that reflect God's faithful dealings with his creation. The lawful processes of segmental duplication and of retrotransposon insertion, responsible for the generation of new genes in now-extinct ancestors, are open to experimental analysis, are starkly molecular in nature, and are inalienably part of that physical reality that we recognize as creation. Thus any claims that "evolution is religion" cannot refer to evolution as description of biological history, but only to the metaphysical (atheistic) denial of God as its Author.

### Creation and Random Process

This article has described how random mutations (insertions and deletions of bases, large duplications, and the actions of retroviruses and transposable elements) have arisen during primate history. In the timescale of a human life, they are commonly encountered as disease-causing mutations.<sup>59</sup> But over the timescales of mammalian history, these same events have helped to generate the human genome and humanity. The preponderant harmful mutations have not survived.

The roles of random mutagenic events in the evolutionary development of genes and their regulatory networks present no new issues to Christian theology. Genetic randomization processes are integral to sexual reproduction, and so reflect the creative work of God in the generation of every human being. It is axiomatic that sex exists to shuffle genetic material, partly through random assortment of chromosomes into gametes. The biological origin of each one of us is the outcome of the probabilistic segregation of chromosomes: given that humans possess two sets of chromosomes, each of which has twenty-three members, there are  $2^{23}$  (8.4 million) possible ways of assorting them when gametes are formed. And to compound the degree of randomization, elaborate mechanisms exist to shuffle material between chromosome pairs.<sup>60</sup> To the Christian it is also axiomatic that each one of us is a created being (Ps. 139). Scientifically, we are the product of random genetic process. Theologically, we are the outcome of loving divine purpose. Molecular randomness (in scientific terms) and createdness (in theological terms) inevitably go hand-in-hand.

The operation of random (probabilistic) processes in gene and species formation cannot be an alternative to divine creativity, but is an aspect of divine creativity. Indeed, because of their evident role in contributing to the formation of new genes, such random processes (chance) in the context of the directing effects of selection (*necessity*) lead to predictable results. This lawful interaction between chance and necessity demonstrates the potentiality inherent in matter. The combination of randomness and determinism, chance and necessity, was God's way of generating life – including humanity.<sup>61</sup> The potentiality of the interaction between chance and necessity is a pointer to the rationality and purpose of God, analogous to the powerful problem-solving capacities of genetic algorithms, computer programs that select optimum solutions from a range that is randomly generated.<sup>62</sup>

### **Article** *Human Evolution: How Random Process Fulfils Divine Purpose*

Our genome has developed by incorporating novel features provided by random mutagenic events (of which over three million are recognizable as the insertions of transposable elements alone). These genetic processes are part of the divine creative strategy by which the creature that would bear God's image has come to be.

### Divine Purpose and Creaturely Freedom

Is it legitimate to suggest that in the random events that transform evolving genomes, God's directing hand acts covertly and immediately to achieve his purposes?<sup>63</sup> Theological justification for this has been suggested by recourse to Prov. 16:33: "The lot is cast into the lap, but the decision is wholly from the Lord."<sup>64</sup> By this reasoning, God determines mutations, and so directs evolution.

But Kidner disallows this interpretation. He states: "The Old Testament use of the word lot is not about God's control of all random occurrences, but about his settling of matters properly referred to him."65 In addition, the postulate that God controls phenomena that are to us random is problematic because the random events that have added novelty to our genome (over the long term) are identical to those that disrupt genomes and cause genetic disease (over the short term). There are good theological reasons for denying that God is the immediate cause of genetic mutations, because if he were, he would be the immediate cause of genetic diseases such as cancer. God is not the author of disease and suffering. Rather he is the implacable foe of disease and suffering. The healing works of Jesus and the cost of Calvary are the guarantee that he is committed ultimately to destroying not only evil but also disease (Isa. 53:4; Rev. 21:4).66

God sustains the lawfulness of the world, but is not the direct cause of each event. Thomas Aquinas spoke of God as the first cause. The universe and everything in it depends directly upon him. But a secondary level of causation exists. This is the interlocking and interdependent cause-and-effect network that constitutes the operation of the physical universe. McGrath has stated:

Events within the created order can exist in complex causal relationships, without in any way denying their ultimate dependency upon God as final cause ... This classic approach laid the conceptual foundations for the development of the natural sciences in the later middle ages.<sup>67</sup>

Israel's concept of creation entailed that the universe is subject to a single code of law that has been established for all time. God has devolved a self-sufficient mode of operation upon creation (it is autonomous), but this freedom exists only in relation to God who conferred it on creation (it is relative). Nature possesses *relative autonomy*.<sup>68</sup> It seems that God has conferred the gift of freedom upon his created world, and upon the molecular processes that mold our genomes.<sup>69</sup> God does not determine DNA rearrangements (duplications, transposon insertions), but they are part of the network of autonomous secondary causation. Evolutionary transformations thus manifest the features of authentic history. The lawful behavior of the world sustained by God has provided channels by which our genome has freely evolved into what it is now.<sup>70</sup>

It is a paradox that the God of love has ordained a way of generating humankind that entails the possibility of disease and suffering. "If God *allows* sin and suffering, he remains answerable for them."<sup>71</sup> God is implacably opposed to pathogens and cancers, and is committed to destroying evil in all its manifestations. The resolution to this paradox is found in the mystery of God Incarnate, bearing the evil of the natural world as well as the totality of our sin. Calvary is the proof that God will eliminate evil from creation. The "Eschatological Doctrine of Providence" stems from the Resurrection and describes the hope that God will transform creation and remove all suffering from it.<sup>72</sup>

## Creaturely Freedom in History

Genes describe biological (evolutionary or natural) history.<sup>73</sup> Biological history is analogous to human or biblical history. In each, God achieves his purposes with creatures that are endowed with freedom (the relative autonomy to act through secondary causes). The freedom of evolutionary process thus presents no new problems for Christians.

God is the *sufficient* condition for the existence of the world: he alone is the source of all reality. But God limits himself to being the *necessary* condition for every occurrence in the world: he does not determine everything that happens. If God did not grant such freedom, "neither the relative autonomy of natural processes in the world which we express in the probabilistic statements of natural laws nor human freedom would be possible."<sup>74</sup>

Polkinghorne draws an analogy between the freedom God gives to creation (seen in the randomness of natural process, and which may result in natural evil) and free will exercised by people (which results in moral evil). The "free-process" defense argues that a free world with the capacity for disease and disaster is superior to a wholly deterministic one. The "free-will" concept argues that a world in which people have the capacity to act in evil ways is better than a world of automata.<sup>75</sup>

God does not determine the way in which people will live. He gives people free choice – which is often used in selfish, evil, and irrational (arbitrary) ways that are opposed to his holy nature. And yet in the context of God's faithfulness, history progresses through this chaotic matrix (randomness) toward the glory that God has purposed. Biblical history provides many examples of how arbitrary human evil, exercised in freedom and contrary to the nature and will of God, has contributed to the fulfilment of God's goals.

Pharaoh acted freely in defiance of God but the biblical interpreters saw his arbitrary evil choices as contributing to the achievement of God's purposes (Rom. 9:17). The Assyrians in all their sadistic ruthlessness were (unwittingly) the "rod" of God's anger (Isa. 10:5), the "bees" God summoned to effect his purposes (Isa. 7:18). The ruthless Nebuchadnezzar was God's "servant" (Jer. 25:9; 27:6; 43:10). Cyrus, acting out of political expediency, was God's "messiah" in allowing the exiles to return (Isa. 45:1). Those who collaborated to murder Christ, acting in opposition to the nature of God, were unwittingly bringing the purpose of history to its fulfilment (Acts 2:23, 36; 3:13-15, 18). The messy "randomness" of history is incorporated by God to achieve his ends. These ends are the ongoing creation of the nation of Israel (Isa. 43:1, 15; 44:2); a reformed Israel after the Exile (Isa. 4:5; 41:17-20); a new, redeemed humanity (2 Cor. 5:17; Eph. 2:10, 15); and the eschatological Kingdom of God (Isa. 65:17; 66:22; 2 Pet. 3:13; Rev. 21:1).

The insights of the Princeton theologian B. B. Warfield are pertinent in trying to understand how God achieves his ends through secondary causes (whether random genetic mutations or arbitrary human agents). Warfield was supportive of evolution as a theory operating under the control of providence. Indeed, natural laws were the expression of divine supervision.<sup>76</sup> This must be true of natural laws which are probabilistic, such as those that describe mutational events.

Warfield emphasized that "evolution could be given a teleological reading, that mechanical explanations in nature were thoroughly consistent with his Calvinistic conception of divine creation" (1889). Moreover, teleology was inseparable from a complete system of natural causation: "Every teleological system implies a complete 'causomechanical' explanation as its instrument" (1908).<sup>77</sup> Warfield integrated God's purpose with evolution's freedom using the concept of *concursus*. In the same way as Scripture is at once wholly the outcome of the will of God and the action of humans, so evolution is entirely the work of God and also of the operation of natural causes.

God is not known by Aristotelian "proofs," whether these come from the schools of Thomas Aquinas, William Paley, or the Intelligent Design movement.<sup>78</sup> He is known only by his self-revelation through history, and climactically in Christ. Christians reflecting on the randomness of genetic history as revealed by comparative genomics may marvel that we are here, and so worship God for bringing humanity into being via genetic randomness. Biological evolution, just like the progressive unfolding of God's purposes in the messiness of history, is testimony to the sovereign wisdom and authority by which God brings a freely operating world to fulfilment, and so transforms randomness into glory.

There is of course mystery in this. The achievement of God's purposes in the light of genetic or human freedom is a paradox to which we must hold. The actions of God in history are not obvious to the casual observer. Butterfield wrote that we cannot find the hand of God in secular history unless we have first gained assurance of God's involvement by personal experience.<sup>79</sup> It is Christ who makes sense of Israel's tumultuous past. Once we have recognized how God's blessing for the world arose from Israel's tragic history, we may perceive with worship that he has created humanity by the random evolutionary route attested by our genome.

The vision of God's sovereign action revealed in biological and human history is a comfort to each of us as individuals. For in the chaos of our lives—the "randomness" of accident, sickness, irrational and selfish choices the God in whom we have placed our trust is faithfully at work to bring those lives to the ends which he has purposed. The God who created the human species through the turbulent genetic history recorded in its genome can be trusted to bring us, through the happenstance of our lives, to completion in his presence.

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## **Article** *Human Evolution: How Random Process Fulfils Divine Purpose*

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<sup>49</sup>J. Polkinghorne, One World: The Interaction of Science and Theology (London: SPCK, 1986), 22–3.

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<sup>51</sup>O. Gingerich, *God's Universe* (Cambridge, MA: Belknap Press, 2006): 91–2.

<sup>52</sup>F. S. Collins, *The Language of God* (New York: Free Press, 2006), 136–8.

<sup>53</sup>D. C. Spanner, Biblical Creation and the Theory of Evolution (Exeter: Paternoster, 1987), chap. 4.

<sup>54</sup>A. Konig, New and Greater Things, 132–3.

<sup>55</sup>H. J. Van Till, *The Fourth Day* (Grand Rapids: Eerdmans, 1986), 226–7; 246–7.

<sup>56</sup>D. M. MacKay, *The Clockwork Image* (London: InterVarsity Press, 1974), 60.

<sup>57</sup>Van Till, *The Fourth Day*, 256.

<sup>58</sup>J. Polkinghorne, Science and Christian Belief (London: SPCK, 1994), 76–7.

## **Article** *Human Evolution: How Random Process Fulfils Divine Purpose*

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- <sup>60</sup>W. P. Pawlowski and W. Z. Cande, "Coordinating the Events of the Meiotic Prophase," *Trends in Cell Biology* 15 (2005): 674–81; R. U. Vallente, E. Y. Cheng, and T. J. Hassold, "The Synaptonemal Complex and Meiotic Recombination in Humans: New Approaches to Old Questions," *Chromosoma* 115 (2006): 241–9.
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- <sup>62</sup>H. Rolston III, *Genes, Genesis and God: Values and Their Origins in Natural and Human History* (Cambridge: Cambridge University Press, 1999), 34 f.
- <sup>63</sup>Gingerich, *God's Universe*, 100–1; Rolston, *Genes, Genesis and God*, 367–70.
- <sup>64</sup>MacKay, Clockwork Image, 49; Spanner, Biblical Creation, 48–9.
- <sup>65</sup>D. Kidner, *Proverbs: An Introduction and Commentary* (London: Tyndale, 1964), 84; as, for example, when the land was *allotted*, Josh. 14:1, 2.
- <sup>66</sup>A. Konig, E. van Niekerk, and D. F. Olivier, *Doctrine of Creation* (Pretoria: University of South Africa, 1986), chap. 29.
- <sup>67</sup>A. McGrath, *Science and Religion: An Introduction* (Oxford: Blackwell, 2005), 104–5.
- <sup>68</sup>C. B. Kaiser,"The Early Christian Belief in Creation: Background for the Origins and Assessment of Modern Western Science," *Horizons of Biblical Theology* 9, no. 2 (1987): 1–30, esp. pp. 3–4; C. B. Kaiser, *Creation and the History of Science* (Grand Rapids: Eerdmans, 1991), 15 f.
- <sup>69</sup>Polkinghorne, Science and Creation, 63.
- <sup>70</sup>Rolston, *Genes, Genesis and God*, 370. The world is not a watch; there is no watchmaker. God acts in grace as a covenant partner, not a technician.
- <sup>71</sup>Konig, van Niekerk, and Olivier, Doctrine of Creation, 327.
- <sup>72</sup>Konig, van Niekerk, and Olivier, *Doctrine of Creation*.
- <sup>73</sup>Rolston, Genes, Genesis and God, chap.1, esp. pp. 50–3.
- <sup>74</sup>C. Schwobel, God: Action and Revelation (Kampen: Pharos, 1992), 31.
- <sup>75</sup>J. Polkinghorne, *Reason and Reality* (London: SPCK, 1991), 84; J. Polkinghorne, *Science and Christian Belief* (London: SPCK, 1994), 83–5.
- <sup>76</sup>D. N. Livingstone, *Darwin's Forgotten Defenders* (Grand Rapids: Eerdmans, 1987), 116–7.
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## **Student and Early Career Forum**

# Staying on the Road Less Traveled: Fulfilling a Vocation in Science

Keith B. and Ruth Douglas Miller



Keith B. Miller

t was over ten years ago that we wrote of our thoughts on "taking the road less traveled" of a vocational calling in the sciences, and particularly within the secular academy.<sup>1</sup> We have been asked to reflect again on our experience in staying on that road. The perspective that we emphasized then, and continue to see as foundational, is that of understanding our work as scientists/engineers as an inseparable part of Christian stewardship. We see stewardship as more than just a responsibility to use our resources wisely – we see it as a worldview that encompasses all of life.

What do we mean by worldview? As described by Brian Walsh and Richard Middleton,

A worldview is never merely a vision of life. It is always a vision for life as well. Indeed, a vision of life, or worldview that does not actually lead a person or a people in a particular way of life is no worldview at all. Our worldview determines our values. It helps us interpret the world around us. It sorts out what is important from what is not, what is of highest value from what is least.<sup>2</sup>

A worldview is both individual and shared within a community. The idea of stewardship is such a worldview.

Stewardship is rooted first in the Christian confession that God is the Creator, Sustainer, and Ruler of all things. The earth and all things in it are God's creation and possession. All things were and are created by God and for God. We can claim ownership and ultimate authority over nothing. Secondly, we were created to be God's image-bearers. As image-bearers we have been given a commission to have dominion over God's creation. However, the focus of that dominion is on actively imaging God in creation, of exercising God's rule, not ours.<sup>3</sup> This is a call to stewardship, not self-interested exploitation. We are called to be conformed to the image of God, and then to image that God to others and to the rest of the nonhuman creation. As Christ is the fullest expression of the image of God, our model for dominion is that of selfsacrificing servant lordship.

Our servant lordship is all encompassing and touches on all aspects of our lives. The Deuteronomic command is to love God with heart, soul, mind, and strength. That command can be seen to include what we feel (e.g., arts, aesthetics, relationships, worship), what we think (e.g., philosophy, theology, history, science), and what we do (e.g., technology, work, finances, social action, spiritual disciplines). This comprehensive claim should destroy any sacredsecular dichotomy in our lives. All of our talents and abilities are to be used for God's glory whether in the secular academy or in Sunday worship.



Ruth Douglas Miller

We ... see ... our work ... as an inseparable part of Christian stewardship.

**Keith Miller** is a research assistant professor in geology at Kansas State University. He obtained a BA from Franklin and Marshall College, an MA from the State University of New York at Binghamton, and a PhD from the University of Rochester, all in geology. His research has focused on paleoecology and the geologic history of climate change. In recent years, he has been especially involved in public science education and the public understanding of science. He is the editor of the book Perspectives on an Evolving Creation.

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They have an 11-year-old son, Ian, who enjoys reading, music, and playing with anything mechanical or electronic.

### **Student and Early Career Forum** *Staying on the Road Less Traveled: Fulfilling a Vocation in Science*

The academy is not just concerned with knowledge and learning, but with thinking also (whether that focus is made explicit or not). As Christians, this should be an expression of the scriptural challenge to renew our minds. As expressed by Harry Blamires in his book, *The Christian Mind*, we need to think "Christianly."<sup>4</sup> It is the way we think, not just *what* we think, that needs to be Christian. Commonly, a Christian's orthodoxy is evaluated on his or her position on an issue, not on his or her way of thinking about it. We need to think in terms of stewardship of the mind, as well as stewardship of knowledge. According to Blamires, the attributes of the Christian mind include the following: a supernatural/eternal perspective, awareness of evil, concern for truth, recognition of God's authority, concern for humanity, and the affirmation of life.

While stewardship of the mind is personal, stewardship of knowledge is more an act of community. Knowledge is both recognized and preserved as a communal process. Stewardship of knowledge involves the recognition of the value of history – of the treasure of past wisdom preserved in the history of ideas. However, do we in the evangelical church in America value history? Or has American individualism penetrated the church and resulted too often in the ignorance of, and even rejection of, history?

God is the God of history and reveals himself in history. God repeatedly calls his people to remember. Scripture itself is a record of God's progressive revelation of himself in history. Furthermore, the history of the church, and the witness of the words and works of past followers of Christ provide the foundation upon which our own theology rests. This historical foundation is one of the primary protections against being deceived by false theological claims. All other areas of human knowledgethe academic disciplines-similarly rest on a historical foundation. The stewardship of knowledge thus involves knowing something of the history of ideas. The history of ideas can help us recognize the cultural influences on Christian thinking, and thus see the truths that transcend culture. We also are unlikely to encounter issues and struggles in our faith and work that have not been shared in some way by others. We may find answers to our own questions and direction in our own circumstances through the thoughts, questions, struggles, and failures of those who came before us.

The study of the natural world—of God's creation through the disciplines of science is part of our calling to be stewards, a calling that involves not just our minds, but our feelings and our actions as well. God has given us stewardship over all creation (Ps. 8:3-8), but we cannot be stewards over what we do not know or understand. Knowledge of the natural world is an essential part of creation stewardship. The best theology will not result in responsible stewardship if it is combined with a failure to know and understand the natural world. The natural sciences are thus not just an acceptable Christian vocation, but a necessary one, if we take seriously the call to stewardship.

Although God's power and divine nature can be seen in creation though the eyes of faith (Rom. 1:18–25), we must come to nature informed by God's revelation in the written and incarnate Word. We cannot find God in nature; God must be revealed to us. Nor can we find ethical or moral direction by observing nature. Nature can be, and has been, used to support virtually any religious or philosophical belief. We will see what we wish to see. Scientific knowledge is thus not a substitute for theology, and theology should not be wedded to any particular scientific theory.

The study of the natural world – of God's creation – through the disciplines of science is part of our calling to be stewards, a calling that involves not just our minds, but our feelings and our actions as well.

We do not draw our understanding of God from nature, but bring our understanding of God to nature. In the process, nature becomes transformed into the creation. As did the Psalmists, so can we look at that creation and see God's power and wisdom, as well as his grace, magnified. We can share, in a small way, the praise that the creation offers to God by its mere existence. We can recognize our position as God's image-bearers, who are called to share in the divine rulership of creation.

While science is a vocation dedicated to understanding the natural world that God has made and continually sustains, technology is the application of our knowledge of creation for the good of humanity. As defined by Stephen Monsma and others, technology is "a distinct human cultural activity in which human beings exercise freedom and responsibility in response to God by forming and transforming the natural creation, with the aid of tools and procedures, for practical ends or purposes."<sup>5</sup> The use and manipulation of creation associated with technology is within the creation mandate (Ps. 8:3–8; Gen. 1:28–30). However, as God's stewards and image-bearers, our technology must be used in a way consistent with God's purposes and desires. God's desire is to care for the poor, hungry, and oppressed (Isa. 58:5–7; Jer. 22:3; Zech. 7:9–10), and this was reflected in Christ's ministry (Luke 4:16–21). Likewise, our vocational ministry must always be directed outward to the "least of these" – those who are most vulnerable and most at risk. Technology issues are social justice issues. This can be seen especially in environmental issues such as pollution, resource use, and global climate change where the poor are affected disproportionately.

When making decisions with regard to our scientific research or development of technology, we need to first ask questions such as the following:

- Does it empower people or control them?
- Does it broaden the gap between the rich and poor, or narrow it?
- Does it meet needs or generate wants?
- Does it value life or demean it?
- Does it respect people's dignity as God's image-bearers?
- Does it heal or endanger health?
- What is its potential for evil?
- Does it appropriately use resources-is it sustainable?
- Does it preserve and care for the creation?
- Does it restore and heal what has been broken?

As Christians in the science and technology fields, we have great opportunities to image God. Whether in the academy, industry, or business, we are called to the stewardship of our vocations. Our "jobs" are far more than a place to witness, or earn money with which to support Christian missions. Our jobs *are* Christian vocations. They are places and contexts within which we can participate in God's purpose of making the Kingdom of God—the Kingdom of the Crucified—manifest.

#### Notes

- <sup>1</sup>Keith B. Miller and Ruth Douglas Miller, "Taking the Road Less Traveled: Reflections on Entering Careers in Science," *Perspectives on Science and Christian Faith* 49, no. 4 (1997): 212–4.
- <sup>2</sup>Brian J. Walsh and J. Richard Middleton, *The Transforming Vision* (Downers Grove, IN: InterVarsity Press, 1984), 31–2.
- <sup>3</sup>This view is central to the stewardship perspective forcefully argued by Douglas John Hall in *Imaging God* (Grand Rapids, MI: Wm. B. Eerdmans Publishing Co., 1986).
- <sup>4</sup>Harry Blamires, *The Christian Mind: How Should a Christian Think?* (Ann Arbor, MI: Servant Books, 1978). This focus is carried forward in Mark A. Noll, *The Scandal of the Evangelical Mind* (Grand Rapids, MI: Wm. B. Eerdmans Publishing Co., 1994).
- <sup>5</sup>Stephen Monsma ed., *Responsible Technology* (Grand Rapids, MI: Wm. B. Eerdmans Publishing Co., 1986), 19.





Mark Strand

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# **Student and Early Career Forum**

# A Compass for Christian Graduate Students

any sincere and faithful Christian students find graduate school to be challenging to their faith. Christian fellowship groups to support graduate students are fewer than for undergraduate students. Graduate school is busy and generally quite intense so it is harder to find time for Christian fellowship and Bible study. Graduate school also involves focused thinking which asks graduate students to process what they know and believe. This challenge to integrating their faith with learning can be overwhelming for some students.

When I began my PhD studies, I made a covenant with God to keep practices and beliefs that I hoped would not only sustain me spiritually through graduate school, but would allow my faith to flourish and grow in ways I deeply needed at that time. In this paper, I would like to introduce what I did, not to be woodenly copied, but as a conceptual challenge to other graduate students who would also like to walk faithfully and humbly with God as they complete their graduate studies.

#### Discernment

Mark Strand

First I wanted to acknowledge my limitations and approach learning with a proper attitude. Ecclesiastes 8:16–17 says,

When I gave my heart to know wisdom and to see the task which has been done on the earth (even though one should never sleep day or night), and

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These words helped me approach my learning with humility. I did not casually disregard what I was taught, and I worked hard to suspend judgment, but this perspective helped me to approach my professors' knowledge with circumspection and modest expectations. I was less intimidated by my classmates and professors. Though I worked very hard and pushed my mind to its known limits, I maintained a healthy skepticism about what I was learning.

One of my mentors in the school of integrating faith and science is ASA (American Scientific Affiliation) legend Richard Bube. In his very helpful book Putting It All Together, he wrote about the caution we must use in banking on our scientific knowledge. He wrote that we must remember "the triple relativizing of scientific knowledge as: 'an approximate description of a limited number of physical phenomena which in their turn are only a *limited* part of our human experience.""1 I did not give up my commitment to reason, but neither did I place false confidence in it. While I worked hard to understand and absorb what I was learning, I was reluctant to allow the content I was learning to become the basis for a worldview. For example, we spent a lot of time studying sociobiology and altruism from an evolutionary perspective. I had previously considered sociobiology to be ethically irrelevant, but these discussions pushed my understanding of altruism to new depths. So whereas I became more conversant and appreciative of the discipline, I was yet reluctant to make it the basis for ethical decision-making.

Some of the books that were helpful to me in spiritual formation and integrating academics and faith during graduate school are listed below:

- Bryant L. Myers, *Walking with the Poor* (Maryknoll, NY: Orbis Books, 1999)
- Mark A. Noll, *The Scandal of the Evangelical Mind* (Grand Rapids, MI: Eerdmans, 1995)
- Ronald L. Numbers, *The Creationists* (Berkeley, CA: University of California Press, 1993)
- V. Samuel and Chris Sugden, Mission as Transformation: A Theology of the Whole Gospel (Oxford: Regnum Books, 1999)
- James W. Sire, *Habits of the Mind: Intellectual Life as a Christian Calling* (Downers Grove, IN: InterVarsity Press, 2000)
- Harold Turner, *The Roots of Science: An Investigative Journey Through the World's Religions* (Auckland, New Zealand: Deep Sight Publishing, 1998)
- Ian G. Barbour, Religion and Science: Historical and Contemporary Issues (New York: HarperCollins Publishers, 1997)
- Charles Habib Malik, A Christian Critique of the University (Downers Grove, IN: InterVarsity Press, 1982)
- George M. Marsden, *The Outrageous Idea of Christian* Scholarship (New York: Oxford University Press, 1997)

#### Personal Humility

"The fear of the Lord is the beginning of wisdom, and the knowledge of the Holy One is understanding" (Prov. 9:10). No academic knowledge could bring me closer to God, so I did not boast in my learning. Rather, I sought to fear and know God as the path to true wisdom and understanding (Ps. 119:97-100). This was a precious reminder to me as I struggled to use my mind to its full capacity, and also to walk humbly with God. Augustine said, "Unless you believe, you shall not understand." It is not through a complete understanding that we come to know God; rather, as we come to know God through faith, we have a grid by which to understand the things we learn and experience. I cannot claim to have come to understand all things, but my faith commitment has given me a cornerstone upon which to build my growing structure of knowledge and faith.

It is essential that one have a strong support network during graduate studies. I was married and we had children during my PhD studies, so family and church were my most important support. Most graduate students are single, and likely find their graduate student fellowship to be of greatest value in helping them stay spiritually strong during graduate school. Groups such as the InterVarsity Graduate Ministry provide excellent fellowship and the opportunity to work through issues unique to graduate students (www.intervarsity.org/gfm/). One area where a strong graduate student fellowship can help the Christian graduate student is deciding on a direction for their research and future career. I began my PhD studies with the intention of returning to my same job, but most students will make these decisions as they are in the process of their studies. Being involved in a strong fellowship will help you to make these decisions in a supportive environment and without ignoring your spiritual calling as you look to your future.

#### Spirit-Guided Intellect

Paul's commitment in 1 Cor. 14:15 has become mine too: "I shall pray with the spirit and I shall pray with the mind also; I shall sing with the spirit and I shall sing with the mind also." This reminder gave me courage to bring my mind to church on Sunday and to pray and sing with my mind. It also gave me confidence to bring what I was learning with my mind into my daily devotions and spiritual disciplines and into my worship of Christ. This verse also gave me comfort in the other direction as I felt the presence of God and the wisdom of the Holy Spirit filling my mind and my spirit as I wrestled with my studies. Over time my faith grew and my thinking changed, even as I remained rooted in Christ.

#### **Practical Disciplines**

I was committed to maintaining a twenty to thirty-minute personal quiet time each day, no matter how busy or how tired I was. This discipline allowed me to daily draw on God's Word and his Spirit to guide me.

I did not study on Sundays. That time was reserved for worship, rest, and family time (Exod. 31:17). The pressures and busyness of graduate studies need to be balanced with regular rest and renewal. Working hard through the week, and then resting on Sundays, allowed me to wake up Monday morning with my work done and a refreshing day of fun and family time behind me. It is no loss to sacrifice Sunday for true Sabbath rest. It is gain all the way around. Sunday was my time to let studies and worldly pressures reassume their proper size in my life. It was my day to stunt my ambitions and competitiveness and to rest before the Lord.

I made it my habit at all times to be reading one Christian book alongside my studies (some of the more influential books I mentioned above). Some of the books were related to my discipline and a help to the challenge of integrating faith and science. Other books were a diversion from my studies and meant simply as spiritual food or as recreation, such as the fascinating book by Kosuke Koyama titled *Water Buffalo Theology* (New York: Orbis Books, 1999).

I actively sought for ways to merge the Truth with what I was learning at the time. Many of us in the ASA

# **Student and Early Career Forum**

A Compass for Christian Graduate Students

are familiar with James Clerk Maxwell, physicist and theologian (1831–1879). He was a model Christian in science. His practice was to spend Sundays studying theology, seeking to relate his faith and his science. It has been said of Maxwell that through this process of disciplined study of theology, "basic structures in his theology and his science began to match, and he assimilated them from his theology before he began to pursue them in his science."<sup>2</sup> It was said of him that his "mind was stored with Christian theology," and when he turned to his science, he was able to rely on his theological convictions to guide him. This is an admirable approach worthy of modeling by us in the ASA.

I maintained active membership in the ASA and regularly attended ASA meetings and events. The ASA not only provided me with resources to guide my thinking, but also, through meetings, I was able to come to know living models of how to do it.

### Personal Pursuits

I sought to never deny my faith in God or the authority of his Word in my life. This was a true step of faith, for I found many things I was learning that were in conflict with my faith. I agreed to hold on to my faith, trusting that God would give me understanding over time. I also accepted that some aspects of my faith would be forever in tension with human reason or knowledge. It also meant taking the risk to identify with Christ in class. I did this with care and patience, and it was largely a satisfying part of my graduate school experience. But it was challenging as well. I met with unfair generalizations made about the Christian faith. For example, one professor argued that because Christians believe that sin has cursed women with pain in childbirth, therefore Christians have a morbid desire for women to suffer and a reluctance to relieve women of unnecessary suffering. This myth had long since been disputed.3

The unique contributions that Christians and the church have made in science and in health services were often ignored, or at times delegitimized because they have a faith basis. In these situations I chose to speak up with confidence, but with humility. I found that both professors and fellow students responded favorably to this approach. I believe they were most interested in whether my arguments were made with sincerity and with sound thinking, and less so with the exact content of my beliefs or arguments.

In order to help with processing and integrating faith and learning, I started a file of my observations, struggles, and new thoughts. By the end of my PhD program, the file was a thorough summary of my philosophy of faith and science and I have turned to it often since then.

### Conclusion

The process introduced in this paper allowed me to enjoy intellectually rigorous, professionally satisfying, and spiritually invigorating graduate school days. I was able to be successful in my studies, I grew in my faith, and I believe my approach was a positive influence in an often contentious environment. It is my hope that Christian graduate students will be excellent in their academic performance, and still enjoy a robust and growing spiritual life during graduate school. The personal compass introduced here is a personal testimony of my experience in graduate school in hopes that other students might be able to think of similar or related ways to walk humbly with God during their graduate school days. Maybe you could create your own compass to guide you forward in your studies and in life.

#### Acknowledgments

My heartfelt thanks to the two reviewers for their encouragement and excellent suggestions.

#### Notes

<sup>1</sup>Richard H. Bube, *Putting It All Together: Seven Patterns for Relating Science and the Christian Faith* (New York: University Press of America, 1995).

<sup>2</sup>Raymond J. Seeger, "Maxwell, Devout Inquirer," *Journal of the American Scientific Affiliation* 37, no. 2 (1985): 101–2.

<sup>3</sup>A. D. Farr, "Religious Opposition to the Obstetric Anaesthesia – A Myth?" *Annals of Science* 40 (1983): 159–77.

"It is my hope that Christian graduate students will be excellent in their academic performance, and still enjoy a robust and growing spiritual life during graduate school."

-Mark Strand

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J. W. Haas, Jr.

# **Essay Book Review**

# From Intelligent Design to Quantum Divine Action— Recent Accounts of God and Nature

J. W. Haas, Jr.

This unique, inexpensive work provides an evenhanded view of the ID story and a wider look at current ways that Christians view God's directing hand in nature.

**INTELLIGENT DESIGN: William A. Dembski & Michael Ruse in Dialogue** by Robert B. Stewart, ed. Minneapolis MN: Fortress Press, 2007. 257 pages, index, notes. *Paperback;* \$22.00. ISBN: 9780800662189.

ntelligent design (ID) continues to be a hot-button topic. The March 2008 issue of *Perspectives on Science and Christian Faith (PSCF)* alone contains five reviews of new books on the subject. Can there be room for another? Yes, when it includes ID as part of a useful broad survey of realms of knowledge claimed to be metaphysical in nature even though the title filters out this point.

The current volume emerged in part from a conference sponsored by the Greer-Heard Point-Counterpoint Forum in Faith and Culture held at the Johnson Ferry Baptist Church in suburban Atlanta, Georgia, February 3–4, 2006, before an audience of 850. The venue had been moved from New Orleans Baptist Theological Seminary due to the destructive effects of Hurricane Katrina on campus facilities. Robert B. Stewart, conference director and seminary professor of philosophy and religion, has drawn together authors and topics with an even hand.

Intelligent Design (ID), championed by Berkeley law professor Phillip Johnson, emerged in the late 1980s from three

**John W. (Jack) Haas, Jr.** served as professor of chemistry at Gordon College from 1961–1995. Following ten years as editor of PSCF, he became an editor of the ASA website. A physical chemist with research interests in electrochemistry and carbohydrate reaction mechanisms, he was inspired to work on historical aspects of science and Christianity at a 1987 seminar led by Ronald Numbers and David Lindberg. His publications in this area include studies of the response to science of British Methodists from John Wesley to those of the early twentieth century. He is elder, organist, web page editor, and Sunday school teacher at First Presbyterian Church, Ipswich, MA. intellectual streams which Donald Yerxa has described as (1) the underdetermination of evolutionary theory, (2) the emergence of anthropic arguments, and (3) the search for new theistic approaches to offset the naturalistic stance of mainstream evolution.<sup>1</sup> From the start, the American Scientific Affiliation provided opportunities for discussion of ID at annual meetings and in *PSCF*. In 1996 the Seattle-based Discovery Institute became the organizational base for the ID movement.

Johnson's "Wedge" strategy comprises three general approaches – scientific research and publication, publicity and opinionmaking, and cultural confrontation and renewal – with the goal of destroying materialism and reinstating Christian values in education and society.<sup>2</sup> It was clear to the ID pioneers that they needed to win over the evangelical laity and scientists as well as the general public. To this end, a plethora of conferences, lectures, books, academic papers, interviews, and blogs have spread the message.

Fifteen years later, a 2005 Gallup poll found that 31% of Americans favored ID over natural selection as an explanation for the development of species. Yet, creationist organizations quickly disowned ID because it would not denounce evolution. The ID movement also lacks clarity for many because of changes in emphasis when one moves out to a non-Christian culture. In addition to many articles in *PSCF*, Robert T. Pennock's *Intelligent Design Creationism and*  *Its Critics: Philosophical, Theological, and Scientific Perspectives* offers a full treatment of the many sides of a debate which engages Christians, militant atheists, politicians, scientists, cultural pundits, and those seeking an alternative to evolution.<sup>3</sup>

In the title chapter of *Intelligent Design*, William Dembski, ID's foremost spokesman, and Michael Ruse, anti-ID philosopher of science, offered well-honed presentations and good-humored dialogue that pulled no punches. A panel of conference speakers then offered follow-up comments.

Martinez Hewlett's "The Evolution Wars: Who is Fighting with Whom about What?" discusses the infamous warfare metaphor in the context of the recent Dover, PA, school board trial. Hewlett, a molecular biologist and writer on science and religion, defines science and lists the three criteria for theories to be useful: "The model must have explanatory value ... have predictive value and be fertile ... [and] must be falsifiable" (p. 45). He provides a short historical sketch and description of evolution and finds the current neo-Darwinian model acceptable in the light of these criteria. Hewlett locates the war in what he dubs "Ideological Shrink-Wrapping" by atheists, social Darwinians, and eugenicists-whose views challenge the core of Christian faith. ID fails when measured by the values of scientific fruitfulness and falsifiability and thus adds to the shrink-wrap. Hewlett offers, instead, theistic evolution as a productive model that enables science to flourish, separates primary from secondary causes, emphasizes God's purpose for nature, is consistent with incarnational theology, and values scientific vocations.

Philosopher William Lane Craig's chapter, "Naturalism and Intelligent Design," asks: "Can one embrace both evolutionary theory and nonnaturalism?" in the light of the ID critique. He concludes that Dembski holds a weak form of naturalism which "... implies not atheism, but what we might call theistic indifferentism" (p. 59). In general, "It is mistaken ... to think that evolutionary theory commits us to atheism or the nonexistence of nonnatural beings" (p. 60). In turn, Craig finds that an evolutionist need not be committed to antiteleological, methodological, antisupernaturalistic, and pragmatic forms of naturalism. "Antiteleological and methodological naturalism may commit us to evolutionary theory, but the reverse is not the case" (p. 65). His complaint is "not the prohibition of the supernatural in science but the exclusion of teleology in nature." Craig asks:

What happens to evolutionary theory if we do not assume, metaphysically or methodologically, antiteleological naturalism? If we permit design hypotheses to compete on a level playing field with the evolutionary hypothesis, which emerges as a better question? I honestly do not know the answer to that question (p. 71). Craig joins Dembski in the charge that evolutionary theory has been unable to come up with satisfying mechanisms for particular complex biological systems. The scientist responds, "Give us time." Who has the stronger faith? Back to square one!

The cultural confrontation dimension of the Wedge strategy receives attention in the chapters that describe legal issues related to incorporating ID into public school curriculum. Chapter 4, "The Collapse of Intelligent Design," represents Wesley R. Elsberry and Nicholas Matzke's somewhat shrill account of the landmark Kitzmiller et al. v. Dover Area School District et al. school board case that attracted international attention in 2005. The two were active on the side of the eleven community plaintiffs who sued their school board for requiring the introduction of ID into the biology curriculum and for adopting the ID textbook, Of Pandas and People: The Central Question of Biological Origins. The plaintiffs were represented by the American Civil Liberties Union, Americans United for Separation of Church and State, and Pepper Hamilton LLP and advised by the National Center for Science Education. The school board was defended by the Thomas Moore Law Center which had been avidly looking for an ID test case.

Curiously, the Discovery Institute (DI) played little part in the proceedings. Five DI board members had volunteered to be expert witnesses. However, three, including Dembski, withdrew without testifying. The Institute submitted an *amicus* brief to the court of peer-reviewed and peer-edited articles (p. 82). Despite that, DI's biology expert Michael Behe's testimony would contain the admission:

There are no peer-reviewed articles by anyone advocating for intelligent design which provide detailed rigorous accounts of how intelligent design of any biological system occurred.<sup>4</sup>

As the trial wore on, the media frenzy and behind-thescenes behavior of the participants evoked memories of the *Scopes v. Tennessee* case eight decades ago. To most observers, the case for ID was not ready for prime-time in the courts.

However, Baylor legal scholar Francis J. Beckworth's chapter, "Intelligent Design, Religious Motives, and the Constitution's Religious Clauses," finds constitutional room for ID in public schools. He analyzes earlier court cases that struck down anti-evolution statutes because they promoted either a biblical view over science (*Scopes*, Epperson 1968) or a balanced treatment that placed both views on the student table (*McLean v. Arkansas*, 1982; *Edwards v. Aguillard*, 1987). The issue for Beckworth is the "religious motivation baggage" that *allegedly* accompanies anti-evolution and/or design arguments. A statute will fall if the motive or purpose of its advocates can be demonstrated to be religious—one reason for Judge Jones's

## **Essay Book Review**

#### From Intelligent Design to Quantum Divine Action – Recent Accounts of God and Nature

dismissal of the policy in the Dover case. Beckworth considers this judgment as "both logically fallacious and constitutionally suspect" (p. 95). He then argues a constitutionally consistent view, that "a law's purposes and a legislator's (or a citizen's) motive are conceptually distinct." I suspect that few readers would disagree with his point regardless of the validity of the other reasons for Judge Jones's decision.

Subsequent chapters in *Intelligent Design* were chosen to broaden the scope of the conference. Oxford University theologian Alister E. McGrath's "Dawkins, God, and the Scientific Enterprise" examines the place of Charles Darwin's ideas in Dawkins' high-profile form of atheism. McGrath has debated Dawkins on occasion yielding nothing to arguments which he refers to as atheistic fundamentalism—"antireligious embodiments, characterized primarily by their dogmatism, refusal to take alternatives with any intellectual seriousness, and their hectoring aggressive rhetoric" (p. 101). A former atheist, he ably demonstrates holes in Dawkins' arguments—circular argumentation, basing a universal worldview on a provisional scientific theory, and his too-easy dismissal of critiques of logical positivism.

Darwin, at the close of *Origin of Species* (1859), predicted that a future account of psychology would be based on the evolutionary ideas that he had been describing. Slow to gain scientific status, this field today might be described as the study of the physical nature of brains, how brains process information, and how the brain information-processing programs generate behavior. Biola University philosopher J. P. Moreland offers a theistic ID approach to psychology in his chapter "Intelligent Design and Evolutionary Psychology as Research Programs" – a natural extension of the ID concept to the most complex of biological systems. Moreland's proposal is very similar to his 2001 paper "Intelligent Design Psychology and Evolutionary Psychology: A Comparison of Rival Paradigms."<sup>5</sup>

Moreland proposes a Christian approach (IDP<sub>C</sub>) to counter the standard naturalistic evolutionary psychology (EP<sub>N</sub>). His model is grounded with ontological commitments concerning the being and nature of God, God's freedom to act, and God's value properties exemplified by humans as moral activities, sin, and much more. IDP<sub>C</sub>'s epistemological/methodological commitments recognize the value of both first-person and third-person descriptions of living organisms. A top-down approach is critical in contrast to the bottom-up approach used to investigate molecular behavior. IDP<sub>C</sub> methodology "will embrace both event/causal covering law explanations for phenomena as well as irreducible personal explanations for phenomena" (p. 120). For Moreland:

 $IDP_C$  implies that psychology should be defined not primarily as a study of behavior, and certainly not primarily as a study of the brain and its mechanisms related to behavior, but as a study of the soul/self and the different aspects of consciousness intrinsic to it (p. 123).

Moreland next examines EP<sub>N</sub> and finds it wanting.

Hal N. Ostrander moves beyond biological complexity and the science of human behavior to questions involving the nature of the universe—its history and structure. In "Because 'Cause' Makes Sense: The Anthropic Principle and Quantum Cosmocausality," Ostrander offers a theistic cosmology based on two versions of the anthropic cosmological principle. The phrase "anthropic principle" was coined by theoretical astrophysicist Brandon Carter, in his contribution to a 1973 Kraków symposium honoring Copernicus's 500th birthday. Various prominent physicists picked up on the term which became a topic of much public interest and controversy within the scientific and apologetic communities. The subject has been marked by a lack of clarity in definitions of various terms.

Accepting the Tipler and Barrow definitions, Ostrander bases his thinking on the *weak anthropic principle* and the *strong anthropic principle*. The weak anthropic principle takes note of the fact that a host of physical and cosmological properties are restricted to particular values at various places in the universe for life to exist. The strong anthropic principle is seen as an organizing meta-principle that directs the laws of nature to a desired purpose – provision of enough time to get things done. Ostrander draws together these ideas in the form of a theistically instantiated anthropic cosmological principle.

Ted Peters, Stanley Jaki, John Polkinghorne, and Howard J. Van Till are among those who have written on the subject in theistic terms. Scientists and philosophers of little or no religious persuasion have commented in religious language over the fine-tuning of fundamental physical constants, lengths, times, mass of particles, and cosmic coincidences of singular value for carbon-based life to be possible. Ostrander views a six-member theistic set of causal powers (material, formal, instrumental, final, efficient, and sufficient cause) that works with the anthropic cosmological principle to produce a cosmos inhabited by human life—something to ponder in more detail.

Philosopher and theologian Nancey Murphy further considers divine action in her chapter, "Science, Divine Action, and the Intelligent Design Movement: A Defense of Theistic Evolution." She sketches the history of divine action from the medieval period to the present, concluding that Christians are left with the choice of an interventionist (dare we say "God-of-the-Gaps") creation or an immanentist noninterfering God closely associated with (perhaps part of) creation.

Murphy finds traditional theistic evolution, progressive creationism, and ID as wanting in terms of accounting

for divine interaction. She then offers Robert J. Russell's idea founded in quantum thinking that "God performs special, intentional, but non-interventionist acts at the indeterminist quantum level" (p. 155). Theistic evolution *would* be the ideal position if it could avoid interventionism or immanentism.<sup>6</sup> As Murphy explains it,

God is immanent in all of the entities and processes at the quantum level, sustaining them in existence ... God's cooperation consists in God's participation in all deterministic processes, and in not interfering with the basic nature of the creatures he has made (p. 163).

Evolution involves both variation and selection. Russell has listed the sorts of mutations affecting variations that involve quantum rather than classical deterministic processes and that are noninterventional and thus invisible to science.

John Polkinghorne then turns an outsider's eye to what he dubs an "old kind of theistic defense dressed in new intellectual clothes" (p. 168). This involves the ID claim that certain parts of nature must be explained as the result of a designer. He reminds the reader of what science is and is not—emphasizing its limited role as a method and its inability to answer questions involving meaning and purpose. Science is further limited in the quantum world whose "facts" appear indeterministic.

In evaluating ID as a defense of metaphysics, Polkinghorne offers a brief overview of the science and theology involved. He finds five elements of science to be important: (1) fragmentary accounts, (2) intrinsic unpredictabilities, (3) relationality, (4) evolving and emergent complexity, and (5) fine-tuned potentiality. At one point he notes:

We could say that Hoyle felt that he perceived intelligent design present in the world. This world would, of course, be quite different from the ID movement's claim to discern a different kind of intelligent design present in the detailed structures of some living beings. The former relates to the rules of the cosmic game; the latter refers to specific moves in that game (p. 172).

Theology offers three important concepts: (1) creation, (2) kenosis, and (3) providence. Finding ID to fall short on these scientific and theological lines, Polkinghorne offers a complex version of theistic evolution which finds "God present both in the chance and in the necessity of creation" (p. 177).

Oxford research fellow in mathematics John C. Lennox examines the place that ID plays in the current debate over faith and science writ large. He is frustrated by the unintended consequences of the strategies employed to broaden the reach of the concept – dismissing theological

questions, focusing myopically on biology, and ignoring philosophy of science. He then offers a thorough discussion of these ideas, including fundamental questions concerning information. He concludes with the comment: "The evidence of God is to be seen mainly in the things that we do understand and not in the things we don't" (p. 195).

Ken Keathley's "Flat or Round? The Sixth Century Debate over the Shape of the Earth" shows us that the framework of faith-science discussion-has been with us for a long time. He contrasts the (unexpected) dismissal of ID by American creationists using the sixth-century debate between John Philoponus and Cosmas Indicopleustes. Both were Christians. However, Philoponus based his arguments on evidence and reason while Cosmas based his view of a flat earth on the Bible and evidence which confirmed Scripture. Cosmas claimed that a true Christian must accept the biblical account of creation and the cosmos or be a pagan. Philoponus regarded Cosmas's case as the "braying of an ignorant ass" (p. 199). In turn Cosmas once remarked: "How great is your knowledge! How great your wisdom! How great your intelligence! How great your inconsistency!" (p. 201). Philoponus felt that Cosmas was a bad exegete. Cosmas was (correctly) dubious about the other's acceptance of Ptolemic cosmology. Keathley concludes that Philoponus wins because he directly engaged nature rather than examining it through the filter of Scripture. Creationists insist on the same filter in rejecting ID strategies. Keathley suggests that the ultimate fate of ID will depend on its scientific fruitfulness.

In an Afterword, Wolfhart Pannenberg offers a sweeping view of creation. In claiming that Christian faith in God the Father cannot be separated from the belief that he is the Creator of the world, Pannenberg insists that "Christian faith in creation must relate positively to the world of nature as it is described by the sciences" (p. 210). "The biblical report on creation has its authority in its function of providing an example for using the natural science of each period in the task of describing God's action in the creation of the world" (p. 211). Offering a sweeping survey of how this has played out, he notes Faraday's concept of bodies as effects of fields of force as offering new possibilities for God's influence in nature. Parallels between biblical salvation history and long-term processes in nature - a history of nature - encouraged new types of thinking for those bound to earlier static views of the natural order. Divine action can be seen as continuous in a lawful framework through which "his Spirit is creatively sustaining and animating his creatures" (p. 218).

A detailed set of notes expands on chapter content and offers further resources. This unique, inexpensive work provides an evenhanded view of the ID story and a wider look at current ways that Christians view God's directing hand in nature.

## **Essay Book Review**

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#### Notes

<sup>1</sup>See Donald A. Yerxa, "Phillip Johnson and the Origins of the Intelligent Design Movement, 1977–1991," *PSCF* 54, no. 1 (2002): 47–8.
 <sup>2</sup>Excerpted from a report by Phillip E. Johnson, Berkeley, CA, April 16, 2001.

Approximately ten years ago, I formulated the Wedge strategy with two related goals. The first was to legitimate the topic of intelligent design, and hence the critique of Darwinism and its basis in naturalistic philosophy, within the mainstream intellectual community. The second was to make the critique of naturalism the central focus of discussion in the religious world, replacing the deadlocked debate over the Genesis chronology which had enabled the Darwinists to employ the "Inherit the Wind stereotype" so effectively. The goals are intertwined because the approach which is capable of challenging the dominant philosophy in the secular world will also tend to attract the most interest in the religious world. Likewise, the secular world finds it fairly easy to ignore a view which it can categorize as marginal in the religious world, but very difficult to ignore a view which has widespread and growing public support.

www.asa3.org/archive/asa/200104/0313.html (accessed February 12, 2008)

<sup>3</sup>Robert T. Pennock, ed. Intelligent Design Creationism and Its Critics: Philosophical, Theological, and Scientific Perspectives (Cambridge, MA: The MIT Press, 2001).

<sup>4</sup>Quote from *Kitzmiller v. Dover*, 400F Supp. 2d 707.

<sup>5</sup>J. P. Moreland, Journal of Psychology and Theology 29 (December 2001): 261.

<sup>6</sup>Robert John Russell, "God's Providence and Quantum Mechanics," www.counterbalance.net/physics/qmprovid-frame.html (accessed February 12, 2008).

## **A Call for Book Reviewers**

he readers of *PSCF* have long appreciated the many insightful reviews published within its covers. Reviews have been assigned to whoever requested a particular book first. Out of fairness to ASA members with different post delivery times and to assure the best fit between reviewer and book, *PSCF* is planning to **initiate book reviews by invitation**. If you would be open to being asked to contribute to this interesting and important service of writing a book review, please send a brief email to **psfranklin@gmail.com** that describes your areas of interest and expertise, preferred mailing address, and phone number. This information will be entered into a database that will bring you to the book review editors' attention when a book of interest to you and *PSCF* readers becomes available for review. Of course, when a book is offered to you by email or phone for review, you would still be able to accept or decline the mailing of the book at that time.

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# HOW CHEMISTRY REVEALS the CREATOR'S ARTISTRY



HOW CHEMISTRY REVEALS THE CREATOR'S ARTISTRY

## The Cell's Design

HOW CHEMISTRY REVEALS THE CREATOR'S ARTISTRY *Fazale Rana* 9780801068270 • 336 pp. • \$16.99p

Armed with cutting-edge techniques, biochemists have unwittingly uncovered startling molecular features inside the cell that compel only one possible conclusion—a supernatural agent must be responsible for life. Destined to be a landmark apologetic work, *The Cell's Design* explores the full scientific and theological impact of these discoveries. Instead of focusing on the inability of natural processes to generate life's chemical systems (as nearly all apologetics works do), Fazale Rana makes a positive case for life's supernatural basis by highlighting the many biochemical features that reflect the Creator's hallmark signature.

This breakthrough work extends the case for design beyond irreducible complexity. These never-before-discussed evidences for design will evoke awe and amazement at God's creative majesty in the remarkable elegance of the cell's chemistry.

"As I sat in a class on cell biology at MIT, a thought kept going through my head: *This cannot have just happened;* 

someone must have made it this way! I am not the only one who ever thought this. In this book Dr. Rana takes us on a far more detailed tour of the inner chemistry of the cell and shows why that intuition is indeed well-founded; in fact, many new discoveries in biochemistry only make the conclusion stronger. Like William Paley's *Natural Theology*, which aimed to overwhelm the skeptics with example after example of 'contrivance,' or design, Dr. Rana's book builds a strong cumulative case for design, and thus a Designer, from the way the cell works. Those of us who know the Designer can rejoice with awe at the magnificence of these designs, and we can pray that this book will help those who do not know the Designer to seek after him."—C. John Collins, professor and chairman, department of Old Testament, Covenant Theological Seminary

"Zoologist Richard Dawkins defines *biology* as 'the study of complicated things that give the appearance of having been designed for a purpose.' Fazale Rana's book plausibly argues that we are dealing with more than the appearance of design. In his wellresearched, carefully argued book, he further advances the case for the complex cell's actual design. The remarkable phenomenon of the cell is one that naturalism is profoundly hard-pressed to explain."—**Paul Copan**, Pledger Family Chair of Philosophy and Ethics, Palm Beach Atlantic University



Available at your local bookstore, www.bakerbooks.com, or by calling 1-800-877-2665 BakerBooks



**HEAT: How to Stop the Planet from Burning** by George Monbiot. Cambridge, MA: South End Press, 2007. xx + 278 pages, index. Hardcover; \$22.00. ISBN: 9780896087798.

Published a year earlier in the UK, this book now appears in a US edition ("printed and bound in Canada, by union workers"), with a new foreword, and a 3-page list of American "organizational resources addressing the impact of climate change" that includes a few interfaith groups (but not the Au Sable Institute of Environmental Studies). The cover image by E. Burtynsky shows a river glowing fiery red against the blackened landscape of Sudbury, Ontario. The author (born 1963) read zoology at Brasenose College, Oxford; did investigative journalism in Indonesia, Brazil, and Africa; and has written several books on environmental and political causes. He is Visiting Professor of Planning at Oxford Brookes University, UK. Here in *Heat* his thesis is that catastrophic climate change can only be averted by reducing greenhouse gas emissions by 90%, a reduction that can nevertheless be accomplished.

The foreword, introduction, and first three chapters (with 2 graphs) set out the problem. Fossil fuels have enabled the industrialized countries to raise their standard of living enormously, but at the price of a looming change in climate comparable to that at the time of the Permian mass extinction. Politicians have failed to act, because of ignorance, or disinformation from "the denial industry" (chapter 2). The large cost of effective actions, not overwhelming compared to expenditures such as subsidies or warfare, would amount to postponing the next level of prosperity by only a few years in growing economies. A rationing scheme is feasible: individuals get units of entitlement to emit carbon, to be exchanged, together with the payment in money, when they buy electricity or fuel.

In the next seven chapters (not illustrated), details are worked out on how to accomplish the 90% reduction: in home heating; in electricity production from fossil and nuclear fuels, and from micro-generation; in transport, urban and regional, and trans- and intercontinental; and in retailing and cement manufacture. The final chapter "Apocalypse Postponed" urges readers to press politicians from talking about the problem to taking effective action. Combining information from a variety of reliable sources with his own insights, Monbiot argues convincingly that these big reductions are feasible technically and economically, yet the political will is essential. At the back of the book are the 1,011 notes the text refers to, which cite mostly internet sources, with a few books and articles in peer-reviewed scientific journals. The index fills 6½ pages.

Monbiot has a forceful style that keeps the reader's interest in the quite technical subject matter. However, some expected references do not appear, for example, John T. Houghton, *Global Warming: The Complete Briefing*, 3rd ed. (Cambridge, UK: Cambridge University Press, 2004). Nor does S. Pacala and R. Socolow, "Stabilization Wedges: Solving the Climate Problem for the Next Fifty Years with Current Technologies," *Science* 305 (2004): 968–72, which identifies essentially the same ways as *Heat*, but with more emphasis on changes in agriculture and for-

estry, which Monbiot rather belittles. Somewhat credible arguments of academics who dispute the link between carbon dioxide and climate change, like Richard Lindzen of MIT, are not discussed and refuted. (See Royal Society at http://royalsociety.org/page.asp?id=6229). The detailed chapters focus on the United Kingdom, with British words unfamiliar to Americans. Poorly lagged [insulated] houses are less an issue in America, where air conditioning is a greater concern. Crossing the country by coach on motorways [by bus on freeways] is more feasible in Britain than in the United States and Canada.

The author maintains a high moral tone, with a real concern for the plight of the disadvantaged in the wealthy countries and particularly in the poor ones. Organized religion and the church are ignored in the text, with belief not being regarded positively: "A faith in miracles grades seamlessly into excuses for inaction." One author in "the denial industry," Arthur B. Robinson, is identified as a "Christian fundamentalist." The inspirational text undergirding the writing is Christopher Marlowe, Doctor Faustus (1604). An evangelical treatment of this subject, also oriented toward Britain, is given by Nick Spencer and Robert White in Christianity, Climate Change and Sustainable Living (London: SPCK, 2007). Nevertheless, by reading Monbiot's Heat, anyone wanting good environmental stewardship will benefit, because this book shows the way to a definite goal for carbon reductions to control global heating.

Reviewed by Charles E. Chaffey, Adjunct Professor of Natural Science, Tyndale University College, Toronto, ON, Canada M2M 4B3.

**EXPOSED: The Toxic Chemistry of Everyday Products and What's at Stake for American Power** by Mark Schapiro. White River Junction, VT: Chelsea Green Publishing Company, 2007. 224 pages. Hardcover; \$22.95. ISBN: 978193392158.

Mark Schapiro, editorial director of the Center for Investigative Reporting, has written extensively on foreign affairs. His work has appeared in *Harper's*, *The Nation*, *The Atlantic Monthly, The New York Times Magazine*, and other publications. He has been a correspondent for Frontline/WORLD, NOW with Bill Moyers, and public radio's Marketplace. The publisher of this book is dedicated to expanding the politics and practice of sustainability. Schapiro's book is definitely written with this goal in mind.

The main premise of the book, which is summarized in chapter one, is that the United States is no longer the worldwide leader in environmental protection. In the 1970s and 1980s, an American mix of scientific rigor and legal muscle gave birth to a body of environmental regulation that was seen as a model for the rest of the world. Back then, America wrote the rules and the rest of the world followed. But leadership in the arena of environmental protection has switched in recent years. It is the European Union that is asserting new priorities that are far more protective of citizens' health and the environment than those in the United States. The European approach is based upon what is called the precautionary principle, and the result is that many substances that are in wide use in the United States are now banned in Europe. Not only are American citizens less protected from toxic substances than Europeans, this difference in perspective is also placing the American economy at risk. Regional economic

powers such as China, India, and Brazil are now looking to Brussels rather than to Washington for new alliances, trade agreements, and sources of environmental inspiration. This shift in power will, according to the author, most likely have long-term effects on America's global competitive edge. Specific examples of "the toxic chemistry of everyday products" are presented throughout the rest of the book.

In chapter two, the toxic chemistry behind the American cosmetic industry is discussed. Schapiro cites several reports which suggest that common substances in cosmetics are potential carcinogens, endocrine-disrupting chemicals, mutagens, and reproductive toxins. Compounding the risk for the American consumer is the fact that the Food and Drug Administration has no authority to regulate the ingredients in cosmetics. The cosmetic companies, not the FDA, are responsible for monitoring the safety of their products, but according to the author, "89 percent of cosmetics on the market today contain ingredients that have not been assessed for safety either by the FDA or by the industry" (p. 30). Much of the world is now departing from the American laissez-faire approach to potential cosmetic hazards and is instead turning to Europe's more rigorous way of assessing product safety.

The potential health hazards of a family of polyvinylchloride plastic softeners called phthalates are presented in chapter three. While phthalates have been banned from toys in Europe, they are still present in many toys and other plastic products purchased by American consumers. The failure of the United States to ratify a global treaty called the Stockholm Convention on Persistent Organic Pollutants is lamented in chapter four. Genetically modified American crops, that are not welcome in Europe for a variety of reasons, are the subject of chapter five. Chapter six exposes the opposition of US industry to end-of-life product principles that are presently being implemented in Europe. Other examples of America's failure to provide leadership in the arena of consumer and environmental protection, including the Bush administration's refusal to sign the Kyoto Protocol, are cited and discussed in chapters seven through nine.

While the major premise of Schapiro's book is certainly valid, the accuracy of some of his specific claims may be called into question. Several relatively minor inaccuracies make this reviewer wonder if other, more major, misrepresentations may have been included. For example, on page 106, the author states that "the Illinois river flows past the historic city of Springfield, Illinois, birthplace of Abraham Lincoln." In this one statement Shapiro is wrong on two counts: Springfield is at least forty miles from the Illinois River and although Lincoln lived in Springfield, he was born in Kentucky! In the same chapter, when discussing corn cross-pollination, he states that "seeds can fly from the tassels, borne by the wind, from as far as six miles away" (p. 93). Anyone with even a little botanical knowledge should know that pollen flies from the tassels, not seeds. To be fair to the author, the copy of the book received for review was an "uncorrected proof," so hopefully these and other inaccuracies were corrected prior to publication.

One other concern is that most of the endnotes included at the end of the book are citations of conversations the author had with various individuals. Very few scientific publications are cited in support of the author's claims. In spite of these shortcomings, the overall message that Schapiro is declaring is a message that American law-makers, governmental officials, and citizens need to hear.

Reviewed by J. David Holland, Biology Instructor, Benedictine University at Springfield College, 1500 North Fifth St., Springfield, IL 62702.



**THE STEM CELL DEBATE** by Ted Peters. Minneapolis: Fortress Press, 2007. 122 pages, notes. Paperback; \$7.00. ISBN: 9780800662295.

The Stem Cell Debate shows one of the risks and many of the fruits of writing bioethics. In the first seventeen pages, Peters orients the ethical discussion with the basic science of stem cell research. The description is well informed with the caveat that whatever is well informed today can be quickly dated. Peters was aware that induced pluripotent stem cells (iPS) were being pursued from adult cells but states that they are not possible, a reasonable assessment at the time of the book's printing in early 2007. Since then Kazutoshi Takahashi et al. has published in the November 2007 issue of Cell (pp. 861-72) his team's remarkable success with iPS. Induced pluripotent stem cells from adult cells seem to be viable after all. This does not render Peters' thoughtful book irrelevant. While embryo sacrifice may not be the only source of human stem cells, there are still many other current and projected practices that sacrifice embryos. The book remains a helpful guide for a whole series of questions that remain for how Christians should treat embryos in research, in pre-natal genetic diagnosis, and in a myriad of other developing technologies.

Peters helpfully describes the status of embryos according to three major theological perspectives. One emphasizes embryo protection, a second the protection of nature, and a third the duty to help fellow human beings medically. He explains each view with care and offers a fair statement of challenges for each. At times he does lump evangelicals under one version of the first perspective: that from fertilization every human embryo is already a fellow human being. Actually, despite repeated attempts by a number of evangelical organizations and presses to enforce one position on this topic, there are many evangelicals that have remained convinced of the historic Christian view, that a fellow human being is not present until a point further along in pregnancy than fertilization. On the second framework, protecting nature, Peters describes President Bush's Council on Bioethics as the most influential source. That view is championed by Leon Kass with the "wisdom of repugnance" as the crucial guide. Then Peters examines the third framework, which makes a theological case for an obligation to develop technology that heals.

Peters finds the third view the most persuasive as he works consistently out of his proleptic theology. For Peters, the key to understanding human beings is not what we have been, but what God plans for us to be. The standard is not Garden of Eden; it is, rather, the new heaven and the new earth that God promises in the Revelation to John. Our essence as human beings is not in

where we started, but in where God is taking us. Christ takes precedence over Adam, grace over sin, the new world over the old one. "Jesus rose with scars in his hands and his side, memories of his previous finite experience with human fallenness. Yet these scars were healed. Resurrection heals ... Science itself is not salvific, to be sure; but by relieving human suffering and enhancing human flowering, medical science fragmentarily incarnates ahead the grand healing that is God's eschatological promise" (pp. 98–9).

Peters also develops an argument that human dignity depends on our relationship with God and one another and hence starts at implantation. It is at that point that beginning human community establishes human dignity.

The book is direct, lively, and fair to differing views on a topic easily obfuscated. Further, it is remarkably concise for what it covers, just 122 pages in a small-dimension format. It would be an excellent choice for a church discussion group or other lay audience, as well as for professionals getting oriented to the discussion.

Reviewed by James C. Peterson, R. A. Hope Professor of Theology, Ethics, and Worldview, McMaster University Divinity College and Faculty of Health Sciences, Hamilton, ON L9G 4C3.



MIND, LIFE, AND UNIVERSE: Conversations with Great Scientists of Our Time by Lynn Margulis and Eduardo Punset, eds. White River Junction, VT: Chelsea Green Publishing Company, 2007. 352 pages, indices. Paperback; \$21.95. ISBN: 978193392431.

Thirty-six scientists across a wide range of disciplines are interviewed by three notables: (1) Lynn Margulis, noted biologist of the University of Massachusetts at Amherst; (2) Eduardo Punset, host of the Spanish TV popular science program Redes; and (3) David Suzuki, the wellknown Canadian scientist, environmentalist, and media personality. In each case, the interviewers seek to have scientists explore those aspects of their scientific works that they find most interesting. The result is a set of highly readable, engaging, and thought-provoking essays on a wide array of topics that are still not well understood. For example, five scientists (Nicholas Mackintosh, Robert Sapolsky, Jane Goodall, Jordi Sabater Pi, and Edward O. Wilson) talk about culture before humans existed based on their research with ants, bees, termites, and chimps. They also study the nature of intelligence and cognitive processes in humans and other animals.

A fascinating set of three interviews explores the measurement of beauty, the science of happiness, and the etiology of psychopaths. Other topics in this well-chosen and tightly edited set of interviews include music, dreaming, genetics, the body-mind problem, immortality, biospheres, evolution, bacteria, amoebae, and matters at both subatomic scale and cosmic scale.

Quite a few of the interviewees are asked to speculate about matters that one could class as transcendent, and the answers are revealing about human nature and human knowledge. Responses include those hostile to purpose or meaning in the world such as the late Stephen J. Gould, Richard Dawkins, Daniel Dennett, and Lisa Randall. Also interviewed are scientists who accept the possibility of transcendency including Paul Davies and Jane Goodall. What is highly evident throughout the volume is the supreme confidence that these scientists have in science itself and its ability to unravel the mysteries of life and the cosmos.

Several scientists advance the view that a final theory that explains everything will one day be found, surely a faith statement if there ever was one. In this sense, we are all deeply metaphysical beings. The book makes for interesting reading about a wide range of topics; it provides background for how and why scientists investigate certain questions using scientific methods.

Reviewed by Dennis W. Cheek, Ewing Marion Kauffman Foundation, Kansas City, MO 64110-2046.



THE SPIRITUAL BRAIN: A Neuroscientist's Case for the Existence of the Soul by Mario Beauregard and Denyse O'Leary. New York: HarperCollins, 2007. 368 pages, index. Hardcover; \$25.95. ISBN: 0060858834.

Mario Beauregard is one of the few scholars in neurology who is not a reductive materialist, meaning that he does not reduce all experiences to their underlying material construction and constituents. Beauregard contends that reductive materialists, such as Richard Dawkins and Daniel Dennett, to name two more-outspoken representatives, are mistaken to view the mind as reducible to the brain. He has studied and researched neurology for many years, and is convinced that counter to current opinion, a mystical state of consciousness truly exists. He has written this book in tandem with journalist Denyse O'Leary in order to discuss the significance of his research findings on mystical experiences and their irreducibility. Beauregard attempts to demonstrate that the materialist nondistinction between mind and brain is in error, and instead asserts strongly that they are two distinct entities. Mind truly exists, and so does the brain. Beauregard could be construed as arguing that the mind is indeed dependent upon the brain, but is also emergent from it. Emergence from the brain, in this sense, entails that the mind has qualities that are not reducible to its substrate (i.e., the brain) alone.

Beauregard seeks to establish three main ideas: (1) that the nonmaterialist approach to the human mind contains more explanatory power than does the reductive materialist one; (2) that nonmaterialist approaches to the human mind are more productive in terms of practical benefits than are reductive materialist ones; and (3) that there exists the potential for spiritual experiences which can radically transform lives via contact with a reality outside of material forces. In his argument Beauregard notes that neural synapses within the brain operate according to quantum physics, and not according to classical (Newtonian) physics, and that therefore materialist accounts of the mind and brain are out of step with current physics and thus do not advance research. Moreover, Beauregard posits that materialism leads to hypotheses that can never be tested, and thereby undermines scientific neural research.

The second chapter addresses why it is nonsensical, scientifically, to speak of a "God gene" as directing perceived spiritual sensations. Chapter three disputes the notion that there is a "God module" within the brain that accounts for religious visions, sensations of ecstasy, and related phenomena. Chapter four critically engages the not-so established scientific work of Michael Persinger, who attempted to demonstrate that spirituality could be induced by a "God helmet" which specifically stimulated the temporal lobe in differential increments causing quasi-spiritual sensations. Chapter five is probably the strongest one in which Beauregard expounds upon what, exactly, the "mind" is. The other chapters develop notions of how the mind acts upon the brain, as supported by Beauregard's own research.

It should be noted forthrightly that the intention of this book is not to argue that evolution did not occur. Rather, Beauregard intends to raise questions regarding whether a fully reductive, naturalistic process of human evolution is tenable without invoking meaning, purpose, direction, or design. This Beauregard does by analyzing the seemingly inherent spirituality within humans. Beauregard notes that while the logical extrapolations of Charles Darwin's metascientific evolutionary paradigm temporarily displaced the special status of human beings within the cosmos, modern biology and neuroscience seem to be restoring humans to a semblance of their former lofty position. Beauregard advocates that the only strong argument against purpose and design being present within the evolutionary epic of the cosmos is the advancement of the hypothesis that our universe is an accidental success amid a proverbial limitless number of other failed universes. This position currently has little scientific support.

Beauregard concludes with the contention that though studying what occurs within people's brains cannot directly prove or disprove spiritual experiences (or, for that matter, the realities that said experiences point to), they nonetheless can give credence to such extrapolations. I heartily advocate the purchase of this book.

Reviewed by Bradford McCall, Divinity Department, Regent University, Virginia Beach, VA 23464.

**OUR DAY TO END POVERTY: 24 Ways You Can Make a Difference** by Shannon Daley-Harris and Jeffrey Keenan. San Francisco, CA: Berrett-Koehler Publishers, 2007. 216 pages, index. Paperback; \$14.95. ISBN: 9781576754467.

This book is for those who are interested in making a difference in ending extreme poverty in our world. The authors' goal is very practical and is described in their introduction:

This book doesn't give extended analyses or mountains of data relating to all the complex issues surrounding poverty. We expect that you already know enough that you too find it intolerable. What you will find here is what you can do, starting today, to help end the long night of extreme poverty that more than a billion people in the world now endure.

The two main authors have experience in dealing with poverty-related issues. Shannon Daley-Harris has worked for the Children's Defense Fund and the National Council of Churches on issues related to poverty and children. Jeffrey Keenan is a strategic initiatives manager with Adobe Systems and looks at these issues from the perspective of someone trained in business.

The topics are based on the United Nations Millennium Development Goals. Each of the twenty-four chapters is related to one or more of these goals. Much attention is paid to Goal 1 (eradication of extreme poverty), Goal 2 (universal primary education), Goals 5 and 6 (health issues), and Goal 7 (ensuring environmental sustainability).

Each chapter is short, about six to ten pages, and deals with a single topic. The chapters are organized by the issues a reader might face as he or she goes through a typical day. For example, the section on morning starts with breakfast and discusses hunger issues. It then moves on to getting the kids to school and discusses primary education. Each chapter starts with a general background discussion of the topic which is followed by four sections of recommended actions: (1) lists things that can be done to learn more about the topic; (2) shows how the reader can contribute (both time and money) to groups working on this problem; (3) discusses how to serve others in helping to solve the problem; and (4) describes how to live on a day-to-day basis while helping in this area.

The authors show real creativity in their suggestions. Many groups have suggested that we conserve water. If you do so, one of the results will be a lower water bill. They suggest you keep track of how much you save on water and give this amount to a nonprofit agency that is working in the water conservation/purification area. These sorts of creative suggestions are what set this book apart from many others. For example, while it is good for this reviewer to conserve water at his home in Texas, it is hard to see how this directly helps someone in North Africa. However, by giving the money I save while also saving water, I can help poor villagers in North Africa get access to better and cleaner water.

This book is not written to be read at one sitting. It should be read one chapter a day, so that the reader can think about the suggestions. There are more than four hundred specific recommended actions, and the authors do not expect anyone to try to do them all. Although this book is not written from an explicitly Christian perspective, it is Christian friendly. A number of the suggestions are for the reader to involve his or her worship community in doing a particular action. Given the politically charged nature of poverty and environmental issues, most readers (like this reviewer) will disagree with some of the recommendations. On the other hand, this book has so many very good recommendations, it is worth reading. The authors have clearly met their goal of providing many suggested actions that the reader can take to help fight poverty.

This book is not aimed directly at scientists and engineers. It will appeal to Christians from any background who are interested in making a difference in helping poor people. However, some of the things we can do to help eradicate poverty do have scientific or engineering implications. The chapters on health, housing, water, transportation, and energy all contain suggestions that could probably best be implemented by people who have a technological background.

Reviewed by William Jordan, Professor of Mechanical Engineering, Baylor University, Waco, TX 76798.



THE ARCHIMEDES CODEX: How a Medieval Prayer Book Is Revealing the True Genius of Antiquity's Greatest Scientist by Reviel Netz and William Noel. Philadelphia: Da Capo Press, 2007. 313 pages. Hardcover; \$27.50. ISBN: 030681580X.

Of the Palm Sunday triumphal entry of Jesus into Jerusalem, Scripture says that had the people remained silent, the very rocks would acclaim the King of kings. What a description! Beyond poetry, is such a thing possible? William Noel, a museum curator, and Reviel Netz, a mathematical historian, describe a singular instance of this phenomenon, albeit with respect to Archimedes rather than with respect to the Messiah. Rather than rocks crying out, the mildewed parchment pages of an old prayer book – which the scribe, John Myronas, finished copying in Jerusalem, upon recycled pages of an older manuscript, on the day before Easter 1229 – cry out the ideas of and give praise to the old Greek master geometer. How so?

Noel and Netz write alternating chapters in a detective style about the story behind an old book bought at auction by a reclusive patron of the arts for \$2 million in 1998. Noel documents the book's physical transformation through time. Netz itemizes the book's mathematical significance, ultimately concluding that Archimedes may be the father of combinatorics—as well as being an even greater giant than we had previously imagined—upon whose shoulders Newton and Leibniz were able to discover the calculus.

The book begins with the story of Archimedes writing letters on papyrus scrolls to several natural philosophers, describing solutions to a variety of geometrical conundrums. Over the years, copies of these letters were made, ultimately onto the new medium of sheaves of bound parchment, which in turn were copied according to demand, resources, and need. In time, all but one of these was lost. This last copy somehow survived the 1204 Crusader sack of Constantinople. A few years later, it too was seemingly destroyed. Its binding was undone, its pages scraped of words and figures. Then its pages were cut in half and stacked, to be used as smaller-sized pages of new books. One of them was Myronas' prayer book, which was used in services for three centuries.

In 1906, a philologist stumbled upon the prayer book and recognized the faint writings of Archimedes beneath the prayer script. He carefully photographed pertinent pages and translated what he could. Thereafter the book disappeared again, and ultimately wound up on the auction block. By this time, the book was in extremely poor condition. The new owner had it restored and studied with today's technology. If you wish to learn first-hand the details of this codex, this is the book to read, for the authors are the team leaders who restored and translated this manuscript—or palimpsest, as it is called.

The authors narrate their discoveries in a lively style. For example, Noel describes his initial feelings about working on the codex as those of "a nervous puppy trying to come to grips with the biggest fish of my little career" (p. 12). Netz describes his feelings while first reading through an especially clever argument of Archimedes: "'By God' you exclaim, 'he is actually going to prove this precisely, no fudges made!'" (p. 47). The book includes copious exchanges of e-mail during the discovery process. For my taste, the authors could safely prune some of these personal insights without lessening the impact and flow of their story to the reader.

If you want a clear, first exposure to Archimedes' mathematics, I recommend Stein's introduction.<sup>1</sup> Next read this book. Archimedes, like Newton, is notoriously cryptic. Indeed, as Netz points out on page 237, Arab translators of Archimedes rewrote his works for increased clarity. Yet Netz—as he should, in the context of his chapters of discovery—takes us through the cryptic parts. Sometimes the reader can be overwhelmed by the underlying mathematical arguments cloaked in old Greek archaic conventions. Such style is the two-edged strength and weakness of the mathematical historian.

As I read this book and wondered how to review it, I realized that the book is a review of Archimedes' work. From the experience of reading critics of his own works, C. S. Lewis, in an essay "On Criticism," admonishes any reviewer including Noel and Netz (and me, too):

Nearly all critics are prone to imagine that they know a great many facts relevant to a book which in reality they don't know. The chances of their being right are low, even when they are made along sensible lines.<sup>2</sup>

At times, out of enthusiasm, Netz seems to jump to conclusions too quickly. For example, on the basis of the names Pheidias (Archimedes' father) and Archimedes, he concludes that Archimedes' father was an astronomer, and his grandfather was an artist (pp. 36–7). Why not phrase the conclusion as a whimsical guess instead? On page 147, he says that Archimedes codified the dictum that the universe could be understood by modeling it through mathematics. Yet Aristotle championed this idea long before Archimedes.<sup>3</sup> Netz concludes: "Archimedes is the most important scientist who ever lived" (pp. 29, 284). Wait a minute! Natural philosophers are not baseball players. There is no home-run king among those who study the universe. It is enough to say that Archimedes was great.

Finally, this book celebrates ten years of work and is a charming tale of goodness. Experts in old manuscripts and imagery analysis gave freely of their time on this project. The thrill of working on revealing some of the lost works of Archimedes was reward enough for their labor – a telling tribute to the enduring genius of Archimedes. For whom else would people give like service?

#### Notes

<sup>1</sup>Sherman Stein, Archimedes: What Did He Do Besides Cry Eureka? (Washington, DC: The Mathematical Association of America, 1999).
<sup>2</sup>C. S. Lewis, On Stories and Other Essays on Literature, ed. Walter Hooper (Orlando, FL: Harcourt Brace Jovanovich, 1982), 132–3.

<sup>3</sup> Aristotle, *On the Heavens*, trans. W. K. C. Guthrie (Cambridge, MA: Harvard University Press, 1958), Book I, Chapter I, p. 263.

Reviewed by Andrew J. Simoson, Professor of Mathematics, King College, Bristol, TN 37620.

**EQUATIONS FROM GOD: Pure Mathematics and Victorian Faith** by Daniel J. Cohen. Baltimore, MD: The Johns Hopkins University Press, 2007. 242 pages, notes, bibliography, index. Hardcover; \$50.00. ISBN: 0801885531.

Crediting religious faith and ecclesiastical affiliation as significant motivating and contextualizing factors has become commonplace in the history of science. It is still a relative novelty in the history of mathematics. The 2005 book *Mathematics and the Divine: A Historical Study* (see www.maa.org/reviews/MathDivine.html), consisting of thirty-five diverse articles on the relation of religion and mathematics, is a substantial exception. The book we are now considering is another. It is a revision of the author's prize-winning 1999 PhD dissertation written at Yale University under historian of Victorian science Frank Turner.

Daniel Cohen's training is in history of religion and history of science, with a particular focus on aspects of nineteenth-century British and American mathematics. This book kicks off a new series, the Johns Hopkins Studies in the History of Mathematics. While it fails to engage secondary literature published since 1999, it nevertheless draws upon and analyzes a wealth of Victorian primary source material—books, articles, personal correspondence, and sermons. Cohen breaks new ground in his treatment of nineteenth-century English-speaking mathematicians, bringing it more in line with what is typically done in history of science.

Cohen's main thesis is that pure mathematics in mid-nineteenth-century England and America (primarily mathematical logic, along with some work on algebra and number systems) owes its origin to neo-Platonic, Kantian, and transcendental philosophies of mathematics as well as to religious idealism seeking to promote toleration. Only later in the century, as professionalization became a greater concern, did British mathematicians officially begin to distance themselves from their earlier grand philosophical and theological positions. Taking a more modest and secular approach to mathematics, the door was left open to anti-religious agendas for symbolic logic that went far beyond merely bypassing theological justification and approbation for mathematical truths.

After an opening introduction that nicely summarizes the aims and outline of the work, Cohen devotes five chapters to developing his book's thesis. The first chapter sketches some historical sources and precursors for the early Victorian perspective on mathematics, chapters two through four discuss the work and outlook of three pivotal mathematicians (Benjamin Peirce, United States; George Boole, Ireland; and Augustus De Morgan, England), and the final chapter argues that the trend toward professionalization redirected the British outlook on mathematics during the last half of the century.

Cohen points out that many early-Victorian thinkers succumbed to an almost giddy neo-Platonic vision of mathematics. Chapter Two, "God and Math at Harvard: Benjamin Peirce and the Divinity of Mathematics," makes this abundantly clear. Pure mathematics transcends the mundane world of sensory experience, rising to sublime heights of spiritual truth in its equations and abstract mathematical patterns. Mathematicians grasp and formulate the most intimate divine truths in a way that cannot be matched by the divisive dogmas of sectarian theologies. At his funeral in 1880, Benjamin Peirce was eulogized by a Harvard colleague as one who, being a first-rate mathematician, knew "more about the realm of spiritual being than anyone else who ever trod the earth, that he beheld God, entered into the Divine mind, drank in truth from its living and eternal fountain, as no other human being ever did" (pp. 42–3). Quite a claim, considering the potential merits of other candidates one might propose, such as Moses or St. Paul or St. Augustine! Peirce's vocation and faith were essentially one; mathematics is a religion in its own right. "His theology deemphasized the core dogmas of Christianity and indeed the figure of Christ himself, settling instead on a broad monotheistic faith in which the quest for mathematical truth and the quest to know God were identical. Benjamin Peirce saw his work with equations as a way to access the heavenly realm, and would occasionally add the exclamation 'Gentlemen, there must be a God' to his mathematical demonstrations" (p. 43). For Peirce, enthralled by the divine character of mathematics, there was "little need for the intermediary of Christ. God would be revealed through equations" (p. 75).

The centerpiece of Cohen's book is the genesis of mathematical logic. Cohen claims to have uncovered the "hidden story" behind the origin and rise of symbolic logic in Great Britain in the religious motivation of its creators. Boole and De Morgan, he notes, did not share the secular agenda of twentieth-century logical positivists who used symbolic logic to demolish various metaphysical and religious perspectives as meaningless. Instead, logic was a tool they could use to rise above rigid orthodoxy and sectarian conflict by challenging certain dogmatic claims. Logical activity was to be pursued in the service of true ecumenical religion rather than as a way to undermine all religion.

Cohen's treatment of Boole and De Morgan gives the reader a broad and detailed intellectual context in which to place their work, and it helps one understand what religious ideas may have motivated each logician to develop and apply his mathematical ideas. Cohen is not the first to point out this aspect of the history. MacHale's 1985 biography George Boole: His Life and Work, for instance, does something similar, and at times is more nuanced and cautious in its use of questionable source material. Yet Cohen's presentation gives us a more fullblooded picture of the overall context in which Boole and De Morgan actually worked than that provided by the typical history of mathematics narrative. Such works tend to concentrate so heavily on technical details that the reader often loses track of the country and century in which the ideas arose. An internalist approach gives us too little history, is often anachronistic, and is usually out of touch with current trends in historiography, where context is more than window-dressing.

Cohen's monograph, by contrast, tells a well-written and interesting story about the mathematics as part of a bigger whole. Yet I should note there is something missing here that was present in the narrower narratives. One reads Cohen's book in vain to learn about the trends in mathematics or logic that fed into the new developments undertaken by Boole and De Morgan. This seems very peculiar to me. Why is there no discussion of the revival of deductive logic set in motion by the work of Richard Whately, William Hamilton, and others as a backdrop to

that of Boole and De Morgan? Why is there no discussion of the rise of a more formal analytic approach to mathematics and algebra promoted by members of the Cambridge Analytical Society and others prior to the 1847 publications by Boole and De Morgan on symbolic logic? These antecedent trends provide the specific logical and mathematical contexts for evaluating their work and are just as relevant as the religious and philosophical and educational contexts that Cohen so artfully discusses. Cohen seems to think the broader epi-mathematical context explains everything of historical importance for the mathematics that ensues, so he can afford to neglect the ways these new developments are situated within the mathematics and the logic of the time. He writes as if Boole's and De Morgan's desire to rise above sectarian squabbles and promote a more tolerant attitude toward religion is motivation enough to explain their logical discoveries. This surely overstates the case; much more is needed to flesh out the full picture and demonstrate just why their innovations are so important. Perhaps technical mathematics and logic lie outside Cohen's particular expertise, but then he should indicate just what he is bracketing out and not leave the impression that what remains is a full analysis of all relevant factors. I am not requesting a return to old-fashioned history of mathematics, just more attention to the mathematics and logic involved. In fact, I would even welcome Cohen's approach applied to the technical trends themselves: identify the underlying worldviews and philosophical outlooks that drive and give them meaning, too.

Aside from this criticism of the book's scope and intent, I found this a well-researched and engaging book, one that breaks through the traditional mold for writing history of mathematics. It conveys a wealth of information about some well-known mathematicians, and it challenges modern stereotypes about the relation between mathematics and religion. Not all readers will agree, but I find it also contains an instructive cautionary tale about the dangers of Christian Platonism, which still attracts many mathematicians today: taking mathematical ideas to be divine may have a pious motivation, but such a viewpoint has within it the seeds of a full-fledged anti-Christian religion stemming from its pagan pedigree.

Who would benefit from reading such a book? Certainly anyone interested in the topic of science and religion. Those of us with a special interest in history of mathematics will likely want our own copy of the book. It is one of the few examples we have of how mathematics and religion can be related in a scholarly work.

Reviewed by Calvin Jongsma, Professor of Mathematics, Dordt College, Sioux Center, IA 51250.



**ORIGINS: A Reformed Look at Creation, Design, and Evolution** by Deborah B. Haarsma and Loren D. Haarsma. Grand Rapids, MI: Faith Alive, 2007. 255 pages. Paperback; \$13.25. ISBN: 978159252276.

*Origins: A Reformed Look at Creation, Design and Evolution* is a theological and scientific analysis of the variety of creation-views held by evangelical Christians. Examining these views from the cosmological, geological, and biological perspectives, it provides a clear, concise introduction of the issues in a manner that is accessible (and of interest) even at the high school level. Its impact, however, will extend far beyond the high school level. This book provides such a clear and broad perspective on the various approaches that it will be of value even to those who have been thinking about origins for many years. Each chapter concludes with a fine set of discussion questions and several references. Interspersed throughout the narrative are text-boxes which refer the reader to the book's excellent website for a more in-depth analysis of a particular topic.

The book begins with an outstanding overview of the scientific process, how worldviews influence that process, and the harmony that ought to exist as we allow both God's Word and God's world to inform us about creation. The Creator speaks to us, the authors continually remind us, not just through the words of Scripture, but also through the "words" of creation itself. By using extensive scriptural references, and by writing in a tone that is truly worshipful, the narrative succeeds in fostering a sense of unity in the midst of Christian diversity. It is highly sensitive to, and deeply respectful of, the diverse viewpoints that exist within evangelical Christianity. Although written by physical scientists, the biological data are covered well and all of the data are continuously analyzed in light of theological considerations.

In order to put the many influences on the origins question into perspective, the book does a very fine job of comparing our current situation to the Galileo affair of four hundred years ago. The authors show that in Galileo's day scriptural proof-texting, political maneuvering, over-reliance on inadequate scientific and religious traditions, and super-egos, which obscured access to God's truth, all had an impact on the controversy. History, they aptly show, is repeating itself in today's world as well.

I especially appreciate their chapter on the scientific process. Here they clearly lay out the three different levels at which scientific data are interpreted: experimental, observational, and historical. Each, they show with very clear examples, is a valid way by which the scientific process enables us draw to conclusions about the natural world. They show that we cannot always do experiments, but that data based on other ways of knowing are equally valid.

Although the authors are very sensitive and highly respectful of diverse views, they nonetheless do not mince words when it is clear to them that certain approaches are inconsistent with scientific data and/or biblical interpretation. The earth is not young and life has been evolving, as they see it, for a very long time. Given the thorough nature of their analysis and the gentle way in which they explore the options, it is difficult to imagine anyone objecting to their style. So cautious are they in their desire to help the reader reach his or her own conclusions, it seems at times as though the book does not take a position on an issue. But it does, and they let the analysis speak for itself. This is writing at its best. I think this is especially true in their analysis of the Intelligent Design movement.

This book is an outstanding resource, especially for young people in high school and college who are trying to put their growing knowledge of science into the context of the traditional evangelical faith. Personally, I know of no book that does this better or that I would recommend more highly.

The one limitation of the book may well be its greatest strength. It is put out by the publishing arm of the Christian Reformed Church. The authors make it clear throughout that they are addressing the issues from within the Reformed tradition. Indeed, two of the three appendices are documents that are denominational position papers. As I see it, the fact that they were unabashedly writing from within a particular theological tradition allows them to explore issues in greater depth than they would be able to do if they were writing more generically. As a person highly influenced by a different theological tradition (Wesleyan/Arminian), there were times when I wished that those in my tradition had a book as powerful and carefully laid out as this one is. I imagine that there will be others from other traditions who will feel a need for their own special theological version of this wonderful book as well.

I have been waiting for a book like this for a long time. I have wanted a book that clearly lays out the options in a textbook-like fashion at the introductory level, one which allows the reader to come to his or her own conclusions without a sense of coercion, and one which provides a balance between theological and scientific considerations. This comes as close as any I have seen to being that book. I recommend it highly.

Reviewed by Darrel R. Falk, Professor of Biology, Point Loma Nazarene University, San Diego, CA 92106.



SCIENCE'S BLIND SPOT: The Unseen Religion of Scientific Naturalism by Cornelius G. Hunter. Grand Rapids, MI: Brazos Press, 2007. Paperback; \$14.99. ISBN: 9781587431708.

This book aims to show that science cannot stop offering natural explanations when it encounters nonnatural phenomena. When problems arise such as the discovery of complex design, the assumption is that a natural explanation will be found. What might be a nonnatural phenomenon will be explained as natural (pp. 44–5) even if the explanation is fictional and does not correspond to a reality (pp. 46–8). The assumption is that there is a problem with the research, not with what Hunter calls the naturalistic paradigm.

Hunter uses the term "theological naturalism" for this naturalistic paradigm. He means that the historic reasons for believing that nature runs on its own and that natural phenomena must be explained accordingly, that is, as a result of natural causes using human reason, were theological. God does not act in nature, for instance, because God is too great or cannot be too close to the evil one finds in nature. Thus the term "theological naturalism" means that naturalism had a theological justification although the subtitle—The Unseen Religion of Scientific Naturalism—suggests that the author also sees naturalism functioning as a religion or as a theology.

The strategy is to show that the history of science is littered with failed explanations. For most working scientists, failure is a reason to find good natural explanations. But Hunter takes the failures as having reached the point at which the paradigm of explanation in terms of natural causes needs to be questioned. For him the fact that this path is not taken shows that "the naturalistic paradigm" cannot be falsified. This allows him to level the playing field for the two explanatory alternatives. "[T]hose committed to naturalistic explanations, like those committed to supernaturalistic explanations, can always devise a theory to explain what we observe. Like supernaturalism, naturalism can never be judged a failure, for there is no test for failure" (p. 68).

The parade of failures is a mixed bag. In cosmology (chap. 4) he reviews explanations of the fact that the orbits of the then known planets were aligned roughly in one plane and that the planets including their known satellites orbited the sun in the same direction. The explanatory options considered at the time were divine design (Newton), one single cause (Laplace) and several independent causes (Bernoulli). Bernoulli calculated that the probability of independent causes resulting in the observed alignment was negligible. The requirement for natural causes ruled out Newton's explanation. Thus the rotating nebula was the only viable hypothesis left. But Hunter describes the situation as forcing "an either-or decision between independent causes (he calls this random chance) and a mechanistic process" (p. 56). It escapes me why he does not see both as mechanical explanations. He then reviews new problems in the recent history of the nebular hypothesis. While most practicing planetary scientists would take unsolved problems as characteristic for a science that deals with the *history* of the planetary system, Hunter counts it as evidence against the naturalistic paradigm-a failure to grasp the historical nature of planetary science and the role of interpretation in it. A more effective example is the fine tuning of the universe. Hunter points out that, while fine tuning could be explained in supernatural terms, only a naturalistic explanation in terms of many worlds is acceptable. The many-world hypothesis is a good example of science's blind spot: it not only commits science to anti-realism, but it is untestable in principle.

In reviewing evolutionary biology, the focus is on failed predictions rather than explanations. This issue arises because in chapter 5 Hunter introduces Popper's falsification view of scientific progress as the gold standard for science, and then spends chapters 5 and 6 listing failed predictions that should have led to falsification of the theory of evolution, but did not. Sometimes Hunter is on target: "Evolution is supposed to have produced a fine-tuned [molecular] machine that is, in turn, supposed to be the engine for evolution itself. This is circular, for without variation, natural selection is powerless to work" (p. 76). But he misses his target just as often. One prediction (chap. 6) is that species without a common ancestor cannot have similarities (no convergent evolution). Such species, however, do exist (pp. 84-5), and this is, according to Hunter, another falsification patched up with just-so stories. But on closer examination the similarities show many differences in detail. The differences in detail between the vertebrate eye and the squid eye are what make it possible to distinguish them from similarities due to common descent (homologies) in the first place. This applies to all convergencies such as those between marsupial and placental mammals as well as between African and American succulent plants. Thus common descent is not falsified and does not need to be patched up.

It is unfortunate that the evidence for the failures of naturalism is a mixed bag because he does not need them to show that science is unable to establish its own limits. The limits of science are not subject to scientific problemsolving because these limits do not belong to the material world and are not subject to causation. They belong to the metaphysical context of science. Thus the boundaries of science depend on one's beliefs about the nature of reality. In the eyes of a theist, a metaphysical naturalist like E. O. Wilson will re-describe reality such that what others consider to be nonmaterial (e.g., moral standards) or supernatural (e.g., God) is reduced to material reality and thus subject to explanation in terms of natural causes. But such boundaries do not exist for a materialist.

The book fails on two other important points. First, the failed explanations of science are not failures of explanation in terms of natural causes. Rather they are the inevitable result of a process of trial and error by which we learn. They originate in human limitation. By ignoring the successes of explanation in terms of natural causes, Hunter fails to see that it works better than explanation in terms of supernatural or nonnatural causes. Take the history of twentieth-century embryology. Parts of many embryos can develop into complete and normal organisms. Initially this ability was seen as the effect of forces characterized variously as nonnatural, psychic or nonmaterial. These explanations were replaced by accounts in terms analogous to a physical force field, the so-called embryonic field. In the late twentieth century, the material causes underlying this ability were identified as ribonucleic acids and proteins that could regulate the expression of genetic information. A natural reality replaced a supernatural reality.

Hunter also neglects the historical dimension of cosmology and biology. While the role of interpretation in historical biology is larger than in experimental biology, it can be tested. Take biogeography. The continents of Australia and South America were once connected via Antarctica. Pouched mammals are found alive in Australia as well as in South America. It was predicted that they had migrated from South America to Australia via the Antarctic continent. In 1981 a fossil pouched mammal was found on Seymour Island in the Antarctic (Science 218, no. 4569 [15 October 1982]: 284-6). Thus historical biology is not all interpretation and no prediction and testing. Moreover, in this example, we have consistency between two very different collections of evidence: geophysical and biogeographical observations and explanations match. In addition, each discipline accounts for its own distinct range of phenomena from global patterns of earthquakes and volcanism to the geography of plants and animals. With such a wide empirical scope, a theory has a large probability of being falsified. The fact that these two theories have not been falsified has turned them into strong accounts.

The conclusions of the book are confusing. Hunter praises as well as condemns what he calls naturalistic explanation. It seems he wants to introduce explanation in terms of supernatural causes into the natural sciences, a conclusion he supports with the observation that good science was possible without full-blown naturalism (p. 103). But here he mixes two very different roles of religion in science. Ideas about how God may have created the world have been fruitful as toeholds for research, regardless of whether they were justified theologically or were correct. But explaining natural phenomena as the result of divine action is a science stopper. Not only do we not know why God made things the way they are so that predictions might be made, but it is also impossible to manipulate God as a variable in a scientific experiment. I leave aside that going in this direction would be spiritually inappropriate and also that it is theologically questionable to assume that God's action in the world can be conceived in terms of causal action.

The author is not familiar with common philosophical terminology: scientific deduction is said to be based on empirical observation (pp. 59, 111). There are category mistakes: panspermia is classified together with special creation as a supernatural alternative to naturalistic explanation (p. 144). The science is not reliable. Altogether, this does not inspire confidence in the reliability of the book. Not recommended.

Reviewed by Jitse M. Van der Meer, Professor of Biology and History and Philosophy of Science, Redeemer University College, Ancaster, ON, Canada.

**PERSON, GRACE, AND GOD** by Philip A. Rolnick. Grand Rapids, MI: Eerdmans, 2007. 280 pages, index. Paperback; \$28.00. ISBN: 9780802840431.

Person, Grace, and God is another volume in Eerdmans' Sacra Doctrina series, which attempts to articulate "Christian theology for a postmodern age." It should not surprise the reader, then, that Philip A. Rolnick, professor of theology at the University of St. Thomas (Minnesota), critically engages both ancient and contemporary thinkers in this fascinating study of the human. It is common in such reviews to utilize adjectives such as "wide-ranging"; in this case, such a word would fail to communicate the breadth of Rolnick's engagement. He discusses - with intimate and authoritative knowledge - thinkers as diverse as Boethius and W. D. Hamilton, Hans Ur von Balthasar and Richard of St. Victor, Immanuel Levinas and Jean-Pierre Changeux, among many others. The volume is rich and deep, occasionally dense, more often eloquent, and seldom without value.

Rolnick is in search of the human person, perhaps in a search-and-rescue mission of sorts, to deliver the idea of personality from the neo-Darwinists, postmodernists, and monist neuroscientists who would obliterate the concept in the name of nature, language, or physicalism. Tellingly, he begins his anthropology with theology ("the question about humanity is necessarily a question about God," p. 208), providing a historical sketch of the Trinitarian and Christological controversies of the early centuries of the Church with a particular focus on how the concept of a divine "person" emerged as a means of uniting the church's commitment to divine simplicity (monotheism) with a Trinitarian understanding of God (as well as to the dual human/divine nature of Christ). His historical narrative ends with Aquinas, which is disappointing. One wonders if his study of the person could have been better informed by, for instance, Jonathan Edwards' reflections on "religious affections" and the role of will in human action.

The centrality of Aguinas eventually becomes clear, however, as Rolnick borrows Aquinas's understanding of relation as a means of understanding the Trinitarian paradox: "Uniquely, in God the real relations among Father, Son, and Spirit are a 'between' that is also an 'in.' The real relations are *between* the persons *in* the absolutely shared and common divine nature" (p. 195, emphasis in the original). Recognizing the uniqueness of the Trinitarian dynamic, Rolnick nevertheless draws from Aquinas this relational understanding of the human person. He locates the person in the gift of God, defined as grace, both the grace of life received from God and the specific soteriological grace of Christ. "Because we are recipients of creation and 'capable of receiving relation,' person and gift are mutually constitutive. If we think through the logic of creation, we cannot think our own existence without gift as its raison d'être" (p. 168, emphasis in the original).

For the readers of this journal, Rolnick's chapters on neo-Darwinist understandings of the person and the questions about human soul and mind raised by modern neurology may be of most interest. He is particularly interested in how the neo-Darwinists interpret altruism, which, unless redefined or explained in consequentialist terms, provides a powerful argument against Dawkins' "selfish gene" argument. Here he attempts to recover the notion of transcendence, linking human goodness to ideals of love, goodness, and beauty that serve ultimately as the basis for defining personality. "Incommunicability" is Rolnick's means of expressing the uniqueness of the human person, in contrast to those aspects of nature shared by all persons or material entities. Repeatedly, he finds such transcendent ideals located in God's activity toward humans and in the corresponding relations between humans.

If there is a criticism of this volume, it may be that Rolnick has attempted too much. There is room for a book-length critique of the more radical postmodernist deconstructions of the person; there is also need for an extended dialogue with the neo-Darwinists and with those who would assert a purely physical or monistic understanding of the human; there may also be opportunity for a fuller discussion of how Christian theologians have defined the human in their quest to better understand the divine. Each of these has its literature and language and few are sufficiently familiar with all of them to fully appreciate the thread Rolnick weaves through them. Nevertheless, he contributes something of value to each of these conversations and, as such, deserves a wide and appreciative audience.

Reviewed by Anthony L. Blair, Dean of Academic Affairs, Eastern University, St. Davids, PA 19087.

THERE IS A GOD: How the World's Most Notorious Atheist Changed His Mind by Antony Flew (with Roy Abraham Varghese). New York: HarperOne, 2007. 222 pages. Hardcover; \$24.95. ISBN: 0061335290.

This is an intriguing and controversial book. Taken at face value, it is a lively, almost chatty narrative of a prominent British philosopher's intellectual pilgrimage from atheistic humanism to deism and perhaps more. A distinguished analytical philosopher of religion and Gifford lecturer, Antony Flew, over the course of his long career, wrote a number of influential essays and books arguing against theism. Part I of *There Is a God*, "My Denial of the Divine," provides a highly readable summary of Flew's atheism. To put it far too briefly, Flew argued that since religious statements, especially about the existence of God, are incoherent and require endless qualification to become meaningful, the burden of proof rests with theism. For over half a century, Flew concluded that theism has failed to provide it.

For some time, especially since 2001, there have been rumors that Flew's commitment to atheism might be wavering. Then in December 2004, the Associated Press – followed by many major broadcast, print, and online outlets – reported that scientific evidence had now convinced one of the world's leading atheists to believe in God, albeit a God of the philosophers (particularly Aristotle), not of revealed religion. Only some kind of super-intelligence, the 81-year-old Flew now maintained, could account for the origin of life and sheer complexity of the natural order. Predictably, while Christian apologists and intelligent design advocates celebrated Flew's change of mind, atheists downplayed the significance of the defection.

Part II, "My Discovery of the Divine," briefly summarizes the reasoning behind Flew's conversion to deism, again in very accessible prose. Modern science, he argues, poses three questions that now point him to God: (1) How did the laws of nature come to be? (2) How did life emerge from nonlife? and (3) How do we account for the very existence of nature? Citing a variety of scientific and philosophical arguments from scholars familiar to readers of this journal-people such as Paul Davies, John Barrow, Richard Swinburne, John Leslie, Thomas Tracy, and Brian Leftow-Flew concludes that these questions are best answered by assuming "an Intelligence that explains both its own existence and that of the world[:] ... a self-existent, immutable, immaterial, omnipotent, and omniscient Being" (p. 155). While there is little new here for those well versed in the recent literature of science and religion, the account of Flew's engagement with this material is riveting. In some respects it represents an executive summary of an important part of the contemporary scienceand-religion conversation.

Publication of the book and Mark Oppenheimer's New York Times Magazine piece, "The Turning of an Atheist" (November 4, 2007), has created a firestorm of controversy, especially in the blogosphere. The major bone of contention is whether Varghese and others manipulated the aging Flew into accepting arguments he would have readily denied when he was more mentally agile. Flew apparently reviewed and signed off on multiple drafts of a manuscript Varghese composed from interviews, correspondence, and the philosopher's writings. The final version was then copy edited and rendered more "user friendly" by evangelical author Bob Hostetler. Troubled by Oppenheimer's account of its allegedly questionable origins, critics have charged that *There Is a God* is a "bogus book" and that Christian apologists have shamelessly exploited "a confused, elderly man in a state of cognitive decline." Offended by such charges, Varghese has responded that Oppenheimer's piece is clearly slanted; that there was nothing untoward in the writing process; and that it is insulting to portray Flew as just "a senescent scholar." In a statement released by HarperOne, Flew himself stated: "I may be old but it is hard to manipulate me. This is my book and it represents my thinking.

What to make of this intellectual conversion of the "world's most notorious atheist" — as the unfortunate subtitle labels Flew? The book's breezy style does fuel doubts about the degree to which Flew's best thinking is on display. Apart from the state of Flew's mind — whatever that may be — and the prose employed in the book, however, his gradual conversion to deism is believable on many counts, not the least being the force of the actual arguments advanced in the book. To be sure, *There Is a God* is not cutting-edge philosophy of religion, as theistic philosopher John Haldane concedes. It is not that kind of book. But it does put forth in shorthand some very important arguments.

Reviewed by Donald A. Yerxa, editor of Historically Speaking, The Historical Society, Boston, MA 02215-2010; Professor of History, Eastern Nazarene College, Quincy, MA 02170.

ANTICIPATING OMEGA: Science, Faith and Our Ultimate Future by Ted Peters. Göttingen: Vandenhoeck and Ruprecht, 2006. 221 pages. Hardcover; \$61.30. ISBN: 9783525569788.

"Begin at the beginning and go on till you come to the end: then stop," Lewis Carroll's King told the White Rabbit. It is a profoundly commonsense procedure and has been followed by, among others, theologians. They have usually begun their treatment of the God-world relationship with creation "in the beginning" and moved on through various loci to conclude with eschatology, the teaching about "the last things." "Of course," we are tempted to say. "How else would you proceed?"

Ted Peters suggests the reverse order in *Anticipating Omega*. He proposes a "retroactive ontology" (p. 11). The first of nine theses that he sets out in the first chapter of the book is unambiguous: "God creates from the future, not the past."

In recent decades, a good deal of theology has been oriented to the future. Teilhard's emphasis on an Omega Point, the theology of hope associated with Moltmann, and Pannenberg's memorable claim that "If Jesus has been raised, then the end of the world has begun" have been significant. Peters, a theologian at Pacific Lutheran Theological Seminary who has been heavily involved in science-theology dialogue, took the step in his systematic theology text, *God* – *The World's Future* (Fortress, 2000), of organizing his theology around the theme of prolepsis, "the invasion of the present by the power of what is yet to come." Now in *Anticipating Omega* he develops the implications of this idea with special emphasis on relationships between faith and science.

Peters' introductory theses encompass traditional ideas as well as hot topics in recent science-theology discussions. *Creatio continua* is emphasized along with *creatio ex nihilo*, and God is seen as primary cause acting through secondary causes. Evolutionary continuity with the natural world is emphasized. The Genesis creation stories are not neglected but they can be read eschatologically – Sabbath does not just lie in the past.

The key to all of this is the resurrection of Jesus as prolepsis of God's final future, a resurrection which is to be understood as a historical happening—and more.

Following the argument of Robert John Russell, Easter is to be seen as "the first instantiation of a new law of nature" (p. 40). That idea clearly opens fresh possibilities for reflection on relationships between Christian hope and scientific predictions about the distant future.

Insistence upon taking science seriously in this enterprise means that one must also take seriously doubts about faith, and the doubt within faith (p. 57), which science may provoke. Chapter 3 deals with the "Barriers to Grace in a Scientific Era." The next two chapters address specific areas of science which have been the subjects of theological controversy, genetics, and evolution.

Evolution, and especially the role of chance in the process, continues to be the most neuralgic area in many science-religion discussions. The randomness of evolution, and the apparent lack of purpose which this suggests, is especially disturbing to many Christians. Here a retro-active ontology, seeing things from the standpoint of the future while not neglecting the past, may be the new idea that is needed to shake discussions loose from old dead ends which they reached long ago. The role of chance is, Peters agrees, "the knottiest challenge of the Darwinian model of evolutionary biology." But he can respond to this challenge by arguing that "purpose comes from God's future"—it does not have to be built in at the start (p. 104).

New biomedical technologies allow us to go beyond the mere study of human evolution and introduce the possibility of trying to influence the course of evolution. Peters distinguishes three general uses of technology in this regard—for therapy, for enhancement, or to accomplish aims of transhumanism. Therapeutic aims are generally unproblematic, and he sees no fundamental objection to enhancement as long as its purpose is not to enable some humans to benefit at the expense of others. Transhumanism, on the other hand, is far more questionable. Belief that our ultimate hope is participation in the resurrection of Jesus will lead us to be very skeptical about such speculations as the downloading of our minds into computers.

Something that is lacking in many theology-science discussions is supplied here in chapter 8 with a treatment of "Science in Pastoral Ministry." Some guidance is given for relating scientific and theological worldviews with the aim of enhancing proclamation of the gospel and for dealing with a few of the issues that clergy are likely to encounter in their work.

Finally we come to the last chapter, which is the only place where eschatology, teaching concerning "the last things," would be dealt with in traditional dogmatics. In this work, however, there has been an eschatological emphasis all the way through. The fact that this chapter is titled "Proleptic Dignity, Proleptic Ecology, and Proleptic Politics" indicates that our understanding of God's final future is to influence thought and action in the present.

Anticipating Omega provides helpful approaches to a number of controversial topics, including some that I have not had space to discuss here. But readers need not limit their consideration to the ideas treated explicitly in this volume. The idea of retroactive ontology almost begs to be connected with suggestions about the sending of signals back in time which have been discussed by physicists. It should provide some insights on ways in which Christians are to read the Old Testament in light of the New. Other lines of investigation will undoubtedly emerge in the course of study. We have here not just the conclusions of one theologian but a work which I strongly recommend as a starting point for promising research.

This is the seventh volume in Vandenhoeck and Ruprecht's "Religion, Theology and Natural Science" series. It is encouraging to see a major publisher making available solid work in the science-theology field.

Reviewed by George L. Murphy, St. Paul's Episcopal Church, 1361 W. Market St., Akron, OH 44313.



HAVE A NICE DOOMSDAY: Why Millions of Americans Are Looking Forward to the End of the World by Nicholas Guyatt. New York: HarperCollins Publishers, 2007. 288 pages. Paperback; \$13.95. ISBN: 9780061152245.

Matthew 24:42 (NIV): "Therefore keep watch, because you do not know on what day your Lord will come." –Jesus

About fifty million Americans seem to believe, often fervently, that the apocalypse (Christ's Second Coming) will take place in the very near future (2002 CNN poll). Englishman Nicolas Guyatt, a "lapsed Catholic" professor of history at Simon Fraser University in British Columbia, investigates this phenomenon—to his mind, entirely irrational. He does so in a gentlemanly manner, interviewing several of the "prophecy superstars," Tim LaHaye, John Hagee, Todd Strandberg (founder of www.RaptureReady.com), Dave Reagan, Jack Kinsella (Hal Lindsey's assistant), Joel Rosenberg, and others.

Guyatt begins with questions that bothered him: "Why would apocalyptic Christians ... want to get involved in politics? ... If God is in charge, what's the point of electing a Republican Congress? ... Why do so many Americans believe that the world is about to end? And should the rest of us be worried ...?" (p. 8).

Most of the book covers the several interviews the author had with the players mentioned above. LaHaye's 1970s work with Henry Morris in the founding of the Institute for Creation Research and his continuing search for the Ark is covered briefly. LaHaye calculates that the Ark construction could have taken as few as eighty-one years. He is quite convinced that it will be found during the Tribulation. Hagee's unique perspectives on Israel are discussed in depth, probably more than they deserve.

Two messages come out of this fascinating volume. The first is that the Religious Right is severely fractured; not only do they not "speak with one voice" on many matters, they feud with each other. Second, and more disturbing, is that many of the leaders not only preach about their understanding of biblical prophecy, but move beyond it to political activism, appearing as "experts" on talk shows, advising some politicians, and acquiring, in Guyatt's words, "... a disquieting influence in Washington" (p. 267).

The fact remains, however, Guyatt argues, that the prophecy gurus have yet to make even one single definite prediction. Most of their warnings are vague; when they make specific ones (Guyatt gives examples), they are embarrassingly incorrect. And so, new editions of their writings appear, the gaffes erased as if they never existed.

I very much recommend this book for its unique perspective on our faith. As one who holds basic Christian beliefs, including one in Christ's Second Coming, it is instructive to see how an outsider views those of our company who have taken biblical prophecy perhaps a little too far.

Reviewed by John W. Burgeson, 8119 Bideford Ln., Houston, TX 77070.

THE JESUS LEGEND: A Case for the Historical Reliability of the Synoptic Jesus Tradition by Paul Rhodes Eddy and Gregory A. Boyd. Grand Rapids: Baker Academic, 2007. 479 pages, scripture index, general index. Paperback; \$24.99. ISBN 9780801031144.

In focused detail and in broad scope, with grand themes and precise formulation, The Jesus Legend: A Case for the Historical Reliability of the Synoptic Jesus Tradition sets a high standard for thoughtful consideration of the titled question. Eddy and Boyd work step by step through the disciplines and perspectives that seek to discern whether the synoptic gospels are accurate in their account of Jesus of Nazareth. The authors begin by considering, first, epistemologically based skepticism about miracles, and then, the claims of literary parallels of divine men from Judaism and pagan literature. Challenges are explained with copious footnote references to the most compelling primary sources for each argument. Then the arguments are carefully evaluated. The authors continue this clear and fair process as they further consider scholarly interpretations of both ancient non-Christian sources and those of Paul on the historical Jesus.

Turning their investigation to ancient oral cultures, the authors argue that early oral recounting of Jesus has shaped the gospel genre. The synoptic gospels convey the actual life and teachings of Jesus, but not by means of modern historiography. What the gospels carry is the voice of Jesus, even if the exact words are only recorded when the Greek text occasionally breaks into Aramaic. The church from the beginning translates what Jesus says into Greek, so that his message can be heard by the widest audience.

The authors conclude that the portrait of Jesus drawn from Matthew, Mark, and Luke is the most historically probable representation of the actual Jesus of history. In particular, the idea that the Jesus stories are legend neglects the findings of contemporary interdisciplinary studies of orally oriented ancient cultures. The synoptic gospels bear significant marks of being trustworthy history.

In 479 pages, Eddy and Boyd build a methodical and documented case that warrants the best attention of the interested scholar or serious student.

Reviewed by James C. Peterson, R. A. Hope Professor of Theology, Ethics, and Worldview, McMaster University Divinity College and Faculty of Health Sciences, Hamilton, ON L9G 4C3.



**QUANTUM PHYSICS AND THEOLOGY: An Unexpected Kinship** by John Polkinghorne. New Haven: Yale University Press, 2007. 128 pages, index. Hardcover; \$26.00. ISBN: 9780300121155.

When John Polkinghorne writes on the intersection of science and religion, one pays attention. Polkinghorne is one of the few individuals with credentials in both science and theology who is saying new things about arguments well worn. A former physicist, turned Anglican priest, Polkinghorne writes sympathetically from within both camps rather than from one to the other. He writes with humility and confidence, extending an open invitation to his readers to hear, appreciate, engage, and walk with him.

This, however, is not the book that one might expect from its title. One anticipates yet another plea that science and religion are complementary enterprises utilizing different methodologies to seek truth, and that the truth one finds through revelation is of a kind different from what one discovers through empiricism. This is not to say that Polkinghorne has not engaged in that discussion. But this is not the text to which one should turn for such matters. His concern here is epistemological, not metaphysical, and his method is analogy, not integration.

Looking specifically at quantum physics as a subdiscipline, he delineates how conclusions have been reached in that enterprise, and then compares that process to what he has encountered among theologians. His argument is that quantum physicists and theologians use much the same reasoning to arrive at their conclusions. His concern is that the practitioners of these respective enterprises are largely unaware of the analogical patterns he identifies. His hope is that, having become aware, they will be more sympathetic to each other.

Thus, the language of kinship pervades this volume. He notes in the Preface that "there are significant degrees of cousinly relationship between the ways in which science and theology conduct their truth-seeking enquiries into the nature of reality" (p. x). To make his case, however, Polkinghorne must attempt an epistemological *coup d'état*; he must convince modernists and postmodernists in both camps to forsake their more radical, oppositional epistemologies for "critical realism," a middle-of-the-road approach originally proposed by Michael Polanyi, the Hungarian scientist-turned-philosopher who penned *Personal Knowledge* in 1958. It is left unclear, however, to what extent his argument is dependent on this epistemology.

The primary question emerging from a reading of this work is whether argument by analogy really works. While there are obvious similarities between the way that scientists and theologians process information to arrive at conclusions, do similar-sounding debates truly reflect a shared commitment to inquiry? Do they simply reflect that all academic disciplines utilize similar cognitive processes in their enterprises? And, if not, is there something unique about the realm of quantum physics, with its toleration for counter-intuitive judgments, that is not the norm in terms of scientific inquiry? If so, the argument from analogy would be so localized as to be helpful only to those working within this particular sub-discipline.

Also, some of the comparisons are a bit stretched. For instance, Polkinghorne argues that miracles are "windows opening up a more profound perspective into divine reality than that which can be glimpsed in the course of everyday experience, just as superconductivity opened up a window into the behavior of electrons in metals" (p. 36). As an apologetic (and this text *is* an apologetic, of sorts), this analogy would leave something to be desired. Likewise, Polkinghorne includes several pages on the resurrection of Christ, drawing from N.T. Wright's argument for its validity as history, comparing this conclusion to the discovery of the particle nature of radiation (Compton scattering) by Arthur Compton in 1923. The correlation is not immediately obvious to the reader. In short, the argument from analogy is probably most persuasive to those already persuaded, although the comparisons are certainly intriguing and enjoyable to read.

However, it should be noted that Polkinghorne has captured a helpful metaphor or two. It indeed may be helpful to think of scientific inquiry and theological inquiry as related, cousinly endeavors. And it may be equally beneficial for relationships on both sides were theologians and scientists to acknowledge the similarities inherent in their activities, even if they were occasionally at odds regarding the import of their conclusions. That encouragement alone makes this a worthwhile volume for both groups.

Reviewed by Anthony L. Blair, Dean of Academic Affairs, Eastern University, St. Davids, PA 19087.

SAVING DARWIN: How to Be a Christian and Believe in Evolution by Karl W. Giberson. New York: HarperOne, 2008. 256 pages, index. Paperback; \$24.95. ISBN: 9780061228780.

Physicist and ASA member Karl Giberson offers an easyto-read book that nicely combines a historical analysis of the creation/evolution controversy with an advocacy for evolutionary theory. Giberson begins the book by describing his own journey from a fundamentalist creationism to an acceptance of evolution. He shares his story with a gentle touch of humor, maintaining a respect for the fundamentalists he once identified with. Throughout the book, Giberson examines both the scientific and cultural aspects of evolutionary theory, noting that "The creation-evolution controversy is only, in the most trivial sense, a scientific dispute. It is, instead, a culture war, fought with culture-war weapons by culture warriors."

After tracing his personal history, Giberson traces the history of evolutionary theory, beginning with a discussion of Charles Darwin. Here we learn of "three Darwins"—Lady Hope's "deathbed convert," the "sinister" Darwin who devised evolution out of a desire to undermine faith, and the "actual" Darwin. This third Darwin was thoroughly a Victorian, a fairly ordinary Christian who considered the ministry, but then fell away as he struggled with the various cruelties he saw in nature particularly the cruelty that claimed the life of his beloved 11-year-old daughter Annie. His loss of faith did not lead him to evolution; evolution and loss brought him to agnosticism. Giberson stresses this point as an argument against the second, "sinister" Darwin. At the same time, Giberson recognizes that many fundamentalists will still see the devil's influence in the "actual" Darwin's story:

His spiritual journey was at odds with fundamentalism, which holds that true seekers will inevitably find their version of faith. To fail to find this faith can only mean that one is not truly seeking; to *abandon* faith is simply perverted; and to create a theory that might compel people to reject faith is simply evil.

Darwin was also Victorian in that he believed in progress. Even as he promoted a theory that depends, in part, on randomness, he did expect that life would be propelled forward.

Darwin's tendencies have solidified over time as Darwinism has been used to support both atheism and Social Darwinism. Giberson first critiques Richard Dawkins and other well-known atheists-drawing on some of the work he did recently with Mariano Artigas, The Oracles of Science: Celebrity Scientists versus God and Religion (2007). As part of his analysis, Giberson argues that biblical criticism was initially much more problematic for Christians-even fundamentalists-than evolutionary theory. Giberson then ventures where very few evolutionary scientists dare to go: into an examination of Social Darwinism. In a solid, well-written book, the chapter on "Darwin's Dark Companions" stands out; this chapter alone makes the book worth buying. Here Giberson admits that Social Darwinism and its resulting eugenics programs have not been "a historical aberration," but a logical (although not inevitable) conclusion of natural selection. He argues that by ignoring or denying this connection, evolutionists have only made it easier for creationists to reject evolutionary theory.

Social Darwinism certainly was a major concern of William Jennings Bryan, prosecutor in the Scopes trial. Giberson thus transitions into a series of chapters on the various evolution/creation trials, stretching from Scopes to more recent Intelligent Design cases. He credibly assesses the arguments and explains why creationists and ID advocates cannot win these cases.

Giberson concludes *Saving Darwin* with a comparison of physics and its grand theories with biology and evolutionary theory. Unlike many physicists, Giberson demonstrates a deep respect for the "otherness" of biology. He observes that

Evolution is a solid and robust scientific theory, because it explains things about the world and relates countless otherwise disconnected facts to each other. It is *not* a science because it resembles physics.

Evolutionary theory certainly has contained some mistakes (which Giberson briefly examines) and is underdetermined, but it still has incredible scientific support and explanatory power.

Saving Darwin offers a powerful analysis of evolution's scientific and cultural impacts. Despite this book's gentle tone, however, it probably would not be a convincing text for an ardent creationist, and may even be threatening for many young students who have not yet questioned creationism's claims. Instead, this book should be a useful guide for the student who has already started to examine his or her creationist beliefs, and who is seeking a way to re-think and reconcile his or her faith with modern

biology. Giberson's book will also be a useful resource for anyone interested in the science-religion dialogue.

Reviewed by Rebecca J. Flietstra, Professor of Biology, Point Loma Nazarene University, San Diego, CA 92106.

TOWARD A THEOLOGY OF SCIENTIFIC ENDEAV-OUR: The Descent of Science by Christopher B. Kaiser. Burlington, VT: Ashgate Publishing Company, 2007. 260 pages, bibliography, indexes. Paperback; \$29.95. ISBN: 9780754641605.

Christopher Kaiser is professor of historical and systematic theology at the Western Theological Seminary. With doctorates in astro-geophysics and Christian dogmatics and divinity, it is natural for his writing to involve both science and theology. His 1991 book, *Creation and the History of Science*, won a John Templeton Prize for Outstanding Books in Science and Religion. His new book reflects his belief that science and theology should not be viewed as two unrelated disciplines, and that it would be desirable for theology to address questions that are also related to other disciplines.

The author endeavors to go beyond the questions that science normally asks and examine the foundations that have made the current state of science possible. The foundations of scientific endeavor that he discusses are the existence of a special kind of universe, a special form of human intelligence, a historically conditioned culture of belief, and an industrial infrastructure. Following an introductory chapter, there are chapters devoted to each of these four foundations, explaining the question and then showing how there is a theological perspective on it. A final chapter summarizes the author's conclusions.

The first chapter notes that the universe is subject to laws. Science requires a lawful universe in order to study it. But why should a universe (or a multiverse, if it exists) be lawful? A Cosmic Lawgiver can be posited to resolve this issue, and the author argues that this lawgiver need not be impersonal and removed from nature and history but can be the God of the prophets.

The second chapter deals with an anthropological foundation. It concerns the genetic basis for human intelligence capable of doing science. Just as there are people today whose brains are capable of the type of reasoning necessary for advanced scientific research, there must have been people in the paleolithic age with the same genes as produced these modern brains. Can natural selection account for this sort of intelligence? If so, what were these mental capabilities used for? The suggested solution that the author describes relates to religion (shamanism) in the paleolithic. Cave paintings have been interpreted as giving evidence of belief in soul journey, travel to and from a spirit world. Mental processes are suggested that may be involved both in such religious practice and in scientific research.

In the third chapter, the question is raised as to why people want to do science. The author recounts the history of science-fostering beliefs from ancient Babylon and Egypt to modern scientists. He sees a continuous theological tradition in which the world is governed by mathematical laws and humans can discern and describe these laws. He sees this as countering the widespread notion that religious faith and scientific research are entirely separate.

The fourth of the foundations of scientific endeavor is societal. Our present advanced state of science has been made possible by the availability of the necessary technologies, and the industries that produce them are driven by economic factors. The author gives examples of recent major scientific discoveries that would not have been possible without new technological advances. However, he sees market-driven concerns as secularizing the technical professions. Thus the needed specialization requires the de facto separation of science and spirituality, a contradiction of the results of the analyses in the previous three chapters. He concludes that this paradox calls for a theology of history and an eschatology of scientific endeavor.

In the summary chapter Kaiser outlines his ideas as to how theological discourse can recover something of the wholeness that characterized theology in pre-industrial times.

This is a scholarly work appropriate for the author's peers in academia but would also appeal to anyone who is interested in science and likes to ponder deep philosophical or religious questions. The interested reader is likely to agree that the author has correctly identified the foundations of scientific endeavor and is also likely to be prompted to give deep thought to questions suggested in the book and whether he might be able to expand on the author's answers.

Reviewed by Gordon Brown, 1220 NW State St. #28, Pullman, WA 99163.



**CULTURE MATTERS: A Call for Consensus on Christian Cultural Engagement** by T. M. Moore. Grand Rapids, MI: Brazos Press, 2007. 172 pages, notes, study questions. Paperback; \$16.99. ISBN: 1587431874.

Does culture matter? Author T. M. Moore has set out to argue that it matters very much. Moore is dean of the Centurions Program of the Wilberforce Forum, which exists to train Christian leaders to effectively analyze, critique and engage the culture around them from a Christian perspective. Moore is eminently qualified to speak to the issue of culture and faith. He is the author or editor of twenty books and has essays, reviews, articles, papers, and poetry in dozens of highly regarded journals and websites.

In this book, the author is looking for principles from history to inform an authentic contemporary Christian cultural consensus. Although he has written convincingly that culture does in fact matter, he has not accomplished the goal implied by his subtitle, to create a consensus on Christian cultural engagement. The consensus contained in the last chapter is vague and theoretical, with much to ponder from a theoretical perspective but little of substance for how my life and profession might better engage culture.

Moore has used an interesting approach, each chapter being a historical look at a person or event that is a good example of the gospel engaging and transforming culture, followed by a modern example of a person, work, or trend that resembles it. For example, he links Augustine's The City of God to the journal First Things, and the Celtic approach to Christian art to the work of guitarist Phil Keaggy. John Calvin's approach to Christian education and Dutch statesman Abraham Kuyper's role in politics make for fascinating reading on effective cultural contributions in previous generations. He also highlights the work of musician David Wilcox and poet Czeslaw Milosz as modern examples of cultural engagement. Interesting guestions for study or discussion follow each chapter.

I agree with Moore that many Christians are escaping culture and creating safe enclaves, and need to reconsider how to truly be salt and light in the world. However, I am not convinced that cultural engagement is as central to the Christian life as he would make it. For example, he makes the statement that "... the followers of Christ today are not becoming any better equipped for the inescapable work of engaging and critiquing contemporary culture, or the glorious challenge of creating viable Christian cultural alternatives." Is "creating Christian cultural alternatives" really the goal of the gospel? The coming of the kingdom of God in Christ was not nearly so "culturally engaged" as it appears Moore would wish the church were today.

The book is something of a "Colson advertisement," which makes sense considering the author is dean of the Centurions Program of the Wilberforce Forum, connected to Colson's Prison Fellowship ministry. Simplistic conclusions such as "all the failing Christian education projects" were somewhat irritating, considering that those people conducting these "failing projects" are at least as committed to the cause as Moore and his Centurions Program.

As a person deeply committed to and involved in cultural engagement, I heartily agree with the gist of this book, in spite of my occasional frustrations. It makes for good reading and addresses a major challenge for the church. This book could well be used in a college course on faith and society, with many opportunities for further research on the people and events introduced in the book.

Reviewed by Mark A. Strand, Shanxi Evergreen Service, Yuci, Shanxi, China, 030600.

**BEYOND RACIAL GRIDLOCK: Embracing Mutual Responsibility** by George Yancey. Downers Grove, IL: InterVarsity Press, 2006. 197 pages. Paperback; \$15.00. ISBN: 0830833765.

George Yancey outlines clearly the positions of racism within the US today: colorblindness, "no judgments based on race because race will carry no social importance"; Anglo-conformity, "the real source of racial strife is economic disparity"; multiculturalism, "a society in which distinct racial and ethnic groups preserve their own identities"; and white responsibility, where "the dominant group creates problems of race and ethnicity."

Yancey outlines the strengths and weaknesses of each position by examining their history and how Christians have adapted to them. White responsibility, for example, identifies the power of sin in creating racial conflict, yet leaves out the important features of forgiveness and redemption. Multiculturalism recognizes the arrogance and selfishness that resides in each culture, yet implies that people of color are superior to the majority group. Yancey wisely concludes, "In an ideal world, multiculturalists would challenge European American culture
but not criticize it any more than they criticize other cultures" (p. 63).

Yancey suggests that the origin of the Angloconformity model can be found in a famous 1965 report by Daniel P. Moynihan, who proposed government programs for black families to "rescue black subculture from the lasting effects of racial oppression" (p. 43). Yancey, however, believes that the model insists that class issues outweigh race issues and thus fuels the "race versus class" debate.

The flaw of colorblindness is that it assumes that once race is unimportant, then racial inequalities will fade. But ignoring race leads to strife because it minimizes the pain of considering a particular race as inferior. The philosophy that underlies this perspective is one of a political ideology where the best person wins as people of other races compete against one another. Yancey concludes that such a model is built on individualistic ideas of sin and does not address the structural aspects of racism.

The second part of the book attempts to articulate a Christian approach to deal with racism by examining spiritual issues. Yancey describes a "mutual responsibility model" that will help bring about racial reconciliation. Because of our sinful nature and racial mistrust, we need to examine the results of historical and institutional racism. This will include how we have stolen Indian land, fled to the suburbs, and allocated money for education and crime prevention. What follows must be individual and corporate repentance where interracial friendships and racial healing take place. Corporate repentance will assure racial minorities that they will have help in their struggles.

Similarly, minorities must recognize the moral nature of attitudes and actions and not complain that tensions are the result of a power struggle. Yancey cautions minorities not to play the race card. He concludes that the "only way to break the cycle of abuse is to be ready to forgive one's former oppressors" (p. 109).

Jesus, of course, is the "ultimate reconciler" who not only prayed that Christians might be united, but demonstrated (for example, with the "woman at the well") that arrogance and paternalism were not the answers. Yancey reminds us that God has not given us a spirit of fear and yet fear is a powerful factor in race relations today.

Fear prevents European Americans from being willing to enter into genuine dialogue ... because they do not want to say something that will get them categorized as racist. People of color fear being ridiculed and labeled as troublemakers, so the fear of one group plays off the other and a cycle of dysfunctional race relations results.

So, how do we begin to solve the impasse? Yancey suggests that we focus on multiracial churches, social networks, political activism, and a revision of attitudes and practices at Christian academic institutions. If we can put aside group interests, are open to repenting and forgiving, are accountable to other races and have a teachable spirit, we can commence activities that imitate Jesus and make a difference in our own attitudes and ultimately in our society.

Reviewed by Karl J. Franklin, International Anthropology Consultant, SIL International, 7500 W. Camp Wisdom Road, Dallas, TX 75236.



#### A Response to Paul Seely's Response to Carol Hill's Worldview Alternative

I am having a difficult time responding to Paul Seely's communication "Genesis 1–11 in the Light of Its Second Millennial Worldview: A Response to Carol Hill's Worldview Alternative" (*PSCF* 60, no. 1 [2008]: 44–7). I think that my difficulty must stem from a misunderstanding of what Seely means by "accommodation" and "concordism."

In my understanding, "creation science" tries to fit science with the Bible (that is, with one traditional interpretation of the Bible); "concordism," on the other hand, tries to fit the Bible with science. "Accommodation" is the idea that God accommodated his revelation to the knowledge of the biblical writers. Or, as stated by Seely in his Letter (*PSCF* 55, no. 2 [2003]: 138),

God has spoken in Scripture ... as a Father to his little children, as a tutor, accommodating his theological lessons to the mentality and preconceptions of his young children, aware that in time they will learn better of both history and science.

Seely states in his March 2008 communication (p. 46) that I am a concordist. I do not think that I am, and probably neither does Hugh Ross, who is a concordist (see the debate between Paul Seely and Hugh Ross in the March 2007 *PSCF*). For example, in my worldview alternative article that Seely critiques, I go into a lengthy discussion of how Chapter 1 of Genesis does *not* concord with the science of geology. To me, Genesis 1 is not concordist *or* accommodationist. The text merely copied the style in which people wrote such epic narratives in those days. It was in that format, and containing the pre-scientific notions of that day, that the revelation of God was written down. This may go against evangelical hermeneutics and the notion of inerrancy marked by concordism, but then I consider myself to be a "worldviewist," not a concordist.

What I am advocating is a different approach to biblical interpretation. Essentially, the main idea of the worldview approach is that God enters human history as it is being played out in real time and space, so that the "cultural trappings," or worldview, of the biblical authors get incorporated into the text alongside God's revelation. This involves no condescension or accommodation of God to the limited mentality of his children-attributes in my opinion that contradict God's omnipotent and unchanging nature. God simply gave his revelation to people in that age by his Holy Spirit, as he still does to us today. When we are given God's revelation, he does not reveal to us the science of the twenty-second century, and if we write down this revelation, errors in our scientific thinking will be incorporated into the text. Does this mean that God is accommodating our false way of thinking? I do not think so. We accommodate his revelation into our way of thinking; he does not accommodate our way of thinking into his.

Denis Lamoureux's article "Lessons from the Heavens: On Scripture, Science and Inerrancy" (*PSCF* 60, no.1

## Letters

[2008]: 4–15) offers an approach to inerrancy without concordism, and I think it is commendable that different approaches to biblical interpretation are being considered and discussed. I would encourage others in the ASA and elsewhere to enter into this discussion.

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#### Response to P. G. Nelson's "Numerology in Genesis"

This is in response to P. G. Nelson's letter to the editor entitled "Numerology in Genesis" (*PSCF* 60, no. 1 [2008]: 70–1). Since I am not a mathematician, I have sought the advice of Iain Strachan, a mathematician who works in statistical pattern recognition. I quote Iain (with his permission):

In the first of Nelson's objections, he assumes the formula you used was 5x + 7y - a formula that can represent any number greater than 23, given the correct choices of x and y. However, he does not seem to have taken on board the fact that the values of y in the actual data set are highly constrained. If the numbers (A, B, C) denote age at birth of son, years lived after, and age at death, then for the A and B values, the formula is only ever 5x or 5x + 7; or in other words, y is only ever zero or one. This allows the possibility that for the C value which is always A + B, that one can have 5x + 14, or a value of 2 for y. This means that all of the numbers can only end in 0, 2, 5, 7, or 9, with 9 only possible as the C value. Clearly, then, only half of the possible numbers can be represented, not all of them as Nelson claims. As regards the ages of Nahor, I think his point is irrelevant (that you can use multiples of 6 x 2 months to produce any age). He has failed to see that it is part of a constrained pattern involving the number 6.

Iain, however, does point out a mistake in my "Making Sense of the Numbers of Genesis" article (*PSCF* 55, no. 4 [2003]: 239–51, Table 2): my claiming odds of one in a billion for the patriarchal numbers before the Flood. These odds were based on 30 numbers (10 patriarchs, 3 ages for each) ending in only half the digits (no numbers end in 1, 3, 4, 6, or 8). Again, quoting Iain:

The third number of each triplet is entirely determined by the sum of the first two and hence can't be treated as independent. Thus, the truly independent calculation has 20 numbers that end in 0, 2, 5, 7, a probability of 1 in  $0.4^{20}$ , which is around one in 90 million. Ninety million to one are also extremely long odds, and this does not affect the end conclusion.

The end conclusion of my Numbers article is that *it is inconceivable that these are real ages*. Surely, if all of the ages listed in Table 2 of my Numbers article are statistically random numbers, as should be expected for real ages, such numerical improbabilities would not exist. The patriarchal ages of Genesis are *not* real numerical ages. They are *sacred* numerological ages, the purpose of which was to impart a spiritual or historical truth to the text, one that to the ancients surpassed the meaning of pure rational numbers. Thus, these ages cannot be used to construct a 6,000-year-old universe or planet Earth.

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# Comments on Ackerman's and Swartzendruber's Articles

The articles by Ackerman and Swartzendruber (PSCF 59, no. 4 [2007]: 250-64; 265-7) address the issue of global warming and Christian responses to this subject. Ackerman first admits that controversy on this subject exists among evangelical Christians. Later he labels all who differ from his position on global warming with different names, but asserts that they are "opponents of the science of global warming." In fact, many evangelicals are scientists who are skeptics of the position adopted by Ackerman-for example, the Intergovernmental Panel on Climate Change (IPCC) position. Ackerman labels such people as "denialists," a term with negative associations ever since Ellen Goodman, a Boston Globe journalist, first coined the term "denier." She applied the term to global warming skeptics, with an analogy to the holocaust deniers. (This prompted some bloggers to propose Nürnberg-type trials and penalties for the leading deniers on global warming.)

Fair-minded Christians should refrain from such name-calling. Even the popular media and some who agree with the IPCC position have reflected this spirit in recent events. An international conference on climate change was held in New York City in March, resulting in a report of the views of skeptics on global warming the Non-Governmental International Panel on Climate Change or NIPCC. The distinguished scientist, Frederick Seitz, wrote the foreword in the NIPCC report before he passed away. Obituaries, e.g., in the *Los Angeles Times* and the *Associated Press* described Seitz as a long-time "skeptic" on global warming and refrained from using terms such as "denialists."

The media also noted the participation in the NIPCC conference by celebrities like John Stossel of ABC-TV and Vaclav Klaus, President of the Czech Republic, without applying any labels like "denialist." In much the same spirit, the magazine *Skeptical Inquirer* (which is in general agreement with the views of Ackerman on global warming) moved away from name-calling by publishing an article by a prominent skeptic, Bjorn Lomborg, entitled "Let's Keep Our Cool about Global Warming" (vol. 37, no. 2 [Mar/Apr 2008]: 42–6).

The article by Swartzendruber is friendlier toward skeptics. His position is basically one of "better safe than sorry" (that is, described by the modern equivalent, the "Precautionary Principle"). Missing, however, is the recognition that overreaction via the precautionary principle to the global warming problem could consume resources better expended elsewhere for the benefit of the poor and underdeveloped countries in the world—compare the writings of Lomberg, for example.

John M. Osepchuk ASA Fellow

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"Upholding the Universe by His Word of Power"		Hebrews 1:3
Editorial		
Faith and Scientific Practice	73	Arie Leegwater
A -4'-1		
The Challenge of Jelem's Critique of Technology	75	Eabort Sobuurmon
Optimistic Evolutionists: The Progressive Science and Religion of	84	Mark A. Kalthoff
Joseph LeConte, Henry Ward Beecher, and Lyman Abbott	05	Duesell C. Dierk
Human Evolution: How Random Process Fulfils Divine Purpose	95 103	Graeme Finlay
		-
Student and Early Career Forum		
Staying on the Road Less Traveled: Fulfilling a Vocation in Science	115	Keith B. and Ruth Douglas Miller
A Compass for Christian Graduate Students	118	Mark Strand
Essay Book Review		
From Intelligent Design to Quantum Divine Action—Recent Accounts of God and Nature	122	J. W. Haas, Jr.
Book Reviews		
Heat: How to Stop the Planet from Burning	128	George Monbiot
Exposed: The Toxic Chemistry of Everyday Products and What's at Stake for American Power	128	Mark Schapiro
I ne Stem Cell Debate Mind, Life, and Universe: Conversations with Great Scientists of Our Time	129	Lvnn Margulis and
	400	Éduardo Punset, eds.
The Spiritual Brain: A Neuroscientist's Case for the Existence of the Soul	130	Mario Beauregard and Denyse O'Leary
Our Day to End Poverty: 24 Ways You Can Make a Difference	131	Shannon Daley-Harris and
The Archimedes Codex: How a Medieval Prayer Book Is Revealing the	132	Reviel Netz and William Noel
True Genius of Antiquity's Greatest Scientist	100	
Equations from God: Pure Mathematics and Victorian Faith Origins: A Reformed Look at Creation, Design, and Evolution	133 134	Daniel J. Cohen Deborah B. Haarsma and
		Loren D. Haarsma
Science's Blind Spot: The Unseen Religion of Scientific Naturalism	135	Cornelius G. Hunter
There Is a God: How the World's Most Notorious Atheist Changed His Mind	130	Antony Flew
		(with Roy Abraham Varghese)
Anticipating Omega: Science, Faith and Our Ultimate Future Have a Nice Doomsday: Why Millions of Americans	138 139	Ted Peters Nicholas Guvatt
Are Looking Forward to the End of the World	100	Nicholas Odyatt
The Jesus Legend: A Case for the Historical Reliability of the Synoptic Jesus Tradition	139	Paul Rhodes Eddy and Gregory A. Boyd
Quantum Physics and Theology: An Unexpected Kinship	140	John Polkinghorne
Saving Darwin: How to Be a Christian and Believe in Evolution	140	Karl W. Giberson
Toward a Theology of Scientific Endeavour: The Descent of Science	141	Christopher B. Kaiser
Beyond Racial Gridlock: Embracing Mutual Responsibility	142	George Yancey
l etters		
A Response to Paul Seely's Response to Carol Hill's Worldview Alternative	143	Carol A. Hill
Response to P. G. Nelson's "Numerology in Genesis"	144	Carol A. Hill
Comments on Ackerman's and Swartzendruber's Articles	144	John M. Osepchuk

June 2008