

PERSPECTIVES on Science and Christian Faith

JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

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

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Perspectives on Science and Christian Faith
(ISSN 0892-2675) is published quarterly for \$35 per year by the American Scientific Affiliation, 55 Market Street, Ipswich, MA 01938-0668. Phone: 978-356-5656; Fax: 978-356-4375. E-mail: asa@asa3.org; www.asa3.org

Periodicals postage paid at Ipswich, MA and at additional mailing offices. POSTMASTER: Send address changes to: *Perspectives on Science and Christian Faith*, The American Scientific Affiliation, PO Box 668, Ipswich, MA 01938-0668.

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2. Authors must submit **an electronic copy of the manuscript formatted in Word** either on a floppy disk or 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.

ARTICLES are major treatments of a particular subject relating science to a Christian position. Such papers should be at least 2,000 words but **not more than 6,000 words in length**, excluding endnotes. An abstract of 50–150 words is required. Publication for such papers normally takes 9–12 months from the time of acceptance.

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How Do You Measure Up?

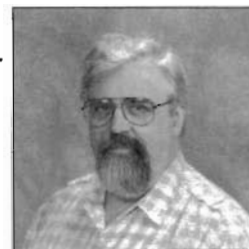
What kind of a person are you? Does superior, adequate, or below average describe your work and productivity? Does your body measure up to societal expectations? Or do you shop for portly or extra large jeans? Do friends characterize you as an obnoxious gabber, a wallflower, or a true comrade? Assessment and evaluation describe a process that consumes much of our attention and effort. How we measure up affects longevity on the job, the approval of our peers, and our sense of self-worth.

Foundation to the validity of the measurement process is the selection of the specific evaluation standard. Frequent standards of measurement include a comparison with the work of others, the general assessment of colleagues, or the extent of consilience to an "industry standard." In the world of academic scientific research, publication in a peer-reviewed research journal indicates that the investigator's work has met or exceeded the industry standard and that the laboratory work is elevated from hobby status to real science.

Why do we measure and evaluate each other or our work? We believe that this process both certifies excellence and motivates an individual toward enhanced performance. In an academic setting, receiving a grade of A versus a D for course work dramatically testifies to the performance and output of an individual student. The desire of a student to earn a high grade motivates study and mastery of course material.

What happens when we fail to meet the measured standard? What if we are not all above average or even average? What does it mean when we fall short of the mark? Does a grade of D or F on our work reflect a flaw in our character or our value? Frankly, I think the answer is yes. When we honestly assess ourselves, we find that all of us have areas where we perform admirably and other areas where we fail miserably! When resilient humans are given the choice, successes and high achievements are maximized in importance, while inadequacies are minimized. Peer pressure, spousal approval, or job

The View from Shepherd's Knoll ...



requirements force individuals to re-prioritize the importance of their tasks and frequently bring to attention those un-achieved areas of life and conduct.

Authors who submit manuscripts for publication to this journal begin this process because they expect that their work will be printed. However, the reality outstrips the expectation; most submitted manuscripts are not published. Some are immediately excluded by the editor because the manuscript focus does not deal with science and Christian faith; others are excluded because the quality of scholarship is inadequate. Most submitted manuscripts enter the peer review process to be read and critiqued by peer reviewers, primarily ASA members. After receiving and considering these reviews, the editor makes a judgment about the acceptability of the specific manuscript for publication. Anonymous reviewer critiques along with the editor's judgment are then shared with the author. More letters of rejection are written than letters of acceptance. Although this evaluative process involves a lot of effort and sometimes pain, we believe it positively contributes to the quality of our journal.

Measurement has eternal consequences. The teaching and example of Jesus Christ are the divine standards for Christians living on this earth. Furthermore, one day we will all appear before the judgment seat of Christ to hear the verdict of our future existence (2 Cor. 5:10). Will I meet the expectations of my Lord on that day? Fortunately for me, the outcome of Judgment Day is not dependent on whether my good deeds exceed my neighbor's good deeds or are perceived to be "above average" for most mortals. Some persons mistakenly believe that if they are more moral or kind than the average person then God will take notice and reward them with heaven. The Scriptures tell us that it simply does not work that way. All of our good deeds are as "filthy rags" and are unable to compensate for our failures and sins (Isa. 64:6; Rom. 3:10). However, God has provided a way for all of us to meet the divine standard, to fulfill the divine expectation, and to receive the approval of the divine Judge on that final day. The remedy for our sub par performance or failure is to repent from sin, receive God's gift of salvation, be renewed by divine grace, and walk in the power of the resurrection as a devotee to and a follower of the way of Jesus (Eph. 2:8-10). This "Jesus way" shapes us to humbly serve God through compassion and demonstrative love especially among the "least of these" or society's outcasts (Matt. 25:40). Jesus' words: "Whatever you did for one of the least of these ... you did for me" becomes a standard of how Christ's grace and compassion is working in our being.

Let's go and be it,
Roman J. Miller, Editor



In This Issue

In response to reader suggestions, a question/commentary format introduces articles published in this issue.

Four Articles ...

How can scientists make the claim that a particular rock strata is two million years old or that a skeletal artifact is 60,000 years old? In response to an invitation by the editor, Davis Young, who taught geology at Calvin College for over 25 years, writes a three-part series that explains many of the technical aspects of dating methods for the interested layperson. The first article explains the difference between relative and absolute dating methods and then describes several non-radiometric dating methods.

Why, in many of our acquaintance circles, do biologists greatly outnumber anthropologists? Do college science students, who are Christians, shy away from anthropology as a career because of perceived tensions between the science of anthropology and their Christian faith? Dean Arnold, long-time professor of anthropology at Wheaton College, describes and responds to four issues: human origins, cultural relativism, immersion and critique of culture, and the role of family in anthropological research. He emphasizes the need for Christian anthropologists to influence the academy and thereby make significant contributions for Christ and the church.

Does chance preclude purpose? Or, is purposeful chance an oxymoron? This is a central question in Thomas Woolley's article. After reviewing the conflict between chance and purpose, Woolley describes an understanding of contingency by an almost forgotten Anglican theologian, Leonard Hodgson, who was active in the middle of the twentieth century. After synthesizing Hodgson's ideas, Woolley, a professor of statistics at Samford University, concludes that chance is a part of God's creation and functions as a divine purposeful tool.

Should human embryonic stem cell research be encouraged because of the benefit it could bring or should it be banned because a human embryo is destroyed in the process? James Peterson, a professor of theology and ethics at McMasters University, describes a process in which a genetically altered nucleus is transferred (ANT) within an oocyte to form a resultant embryo that cannot develop or function past a certain point of development. Would such a change in the ontological status of an embryo subsequently affect the morality of stem cell research? Peterson reasons through this tangle and concludes that an ANT embryo used for research may be morally acceptable by some Christians.

Three Communications ...

What has been the outcome of the ASA 1986 publication, *Teaching Science in a Climate of Controversy*, that was mailed to about 40,000 high school science teachers? Jerry Bergman, adjunct professor at the Medical University of Ohio, takes a backward look at some of the responses received following this mass mailing. Many prominent scientists quickly criticized the booklet; public press reviews were generally negative. However, of the teachers who received the booklet and responded to a survey, 80% rated the booklet favorably. Bergman concludes by describing some lessons that can be learned from this experience.

What does it mean for humans to be created in the image of God? Harold Faw, professor of psychology at Trinity Western University, traces some of the ideas advanced by others to describe this reality. Faw proposes the idea that cognitive psychology in conversation with theologians may provide a harmonious concert that gives understanding to this aspect of God's creation.

What does Jesus have to say about embryonic stem cell research? A student-faculty team from Seattle Pacific University, Bryant Webber a biology major and Cynthia Fitch a professor of biology, answer that question using a unique approach. They analyze the words and concepts in Jesus' parables and apply those findings to the issue of stem cell research in the twenty-first century.

Other Sections ...

A sonnet written by editorial board member Walter Hearn takes the view and voice of God in reflecting on the creative efforts of humans.

Due to editorial policy, essay book reviews are a rarity in the pages of our journal. Yet occasionally when a very significant book is published that has broad appeal, we highlight that event for our readers. In response to an editorial invitation, J. W. Haas, Jr. writes a compelling description of *The Language of God* and extols the author, Francis Collins, as a spokesman for today. If you have not read this book, read this essay first and then read the book to be inspired and challenged.

In the Book Review section, nineteen published books are classified, briefly reviewed and critiqued.

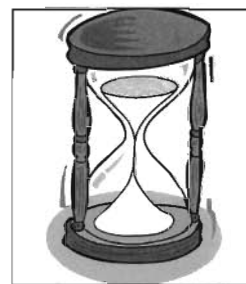
Three letters to the editor on various topics as well as a correction conclude this issue.

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Upcoming ASA Conferences

**August 2–5, 2007: University of Edinburgh
Edinburgh, Scotland**

**August 1–4, 2008: George Fox University
Newberg, Oregon**



How Old Is It? How Do We Know? A Review of Dating Methods— Part One: Relative Dating, Absolute Dating, and Non-radiometric Dating Methods

Davis A. Young



Davis A. Young

The essential ideas behind the major methods for assessing the relative ages of geological and archeological materials and events are reviewed. These include the principles of original horizontality, superposition, inclusion, cross-cutting relations, and cross-dating by index fossils (biological succession) or artifacts. Some general principles of absolute dating are introduced, and, as representatives of non-radiometric methods, tree-ring, thermoluminescence, obsidian hydration, and amino acid racemization dating are discussed with examples.

Until the mid-eighteenth century, Christians assumed that the history of the human race could be deciphered from Scripture, monuments, artifacts, and documents. No one conceived that the Earth had a very lengthy pre-human history. After all, Genesis presumably taught that God created the Earth mere days before he created Adam and Eve. Martin Rudwick has documented that, throughout the late eighteenth and early nineteenth centuries, “savants” and “natural historians” began to realize that the Earth does have an extensive pre-human history that can be deciphered from such natural “documents” and “monuments” as rock strata and fossils.¹ In the nineteenth century, archeology and paleo-anthropology began to extend the timescale of human history. Since then, researchers in a wide range of disciplines have developed a host of methods for determining both “relative” and “absolute” ages of rocks, minerals, fossils, trees, pottery, tools, occupation sites, art objects, and much else.

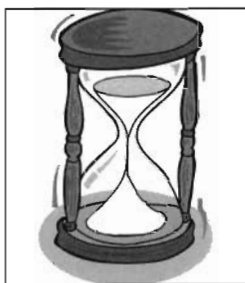
What, then, are the grounds on which we can assert that a particular body of rock is older than some other body of rock (*relative dating*)? And how do we know that a particular stratum in an ancient Near Eastern tell

is younger than another stratum? How can we be confident that a certain granite intrusion in the Sierra Nevada of California is 82 million years old rather than 80,000 years old or that an artifact is 12,000 years old (*absolute dating*)?

In this first part of a three-part series, we begin to answer these questions in a very brief review of fundamental principles of relative and absolute dating and of non-radiometric methods.² The second article will deal with radiometric dating methods used for determining ages of crystallization of minerals, rocks, and meteorites. The final article will address radiometric dating that involves cosmogenic nuclides, fission-track dating, and U-He dating, and will also consider some theological implications.

Since [the nineteenth century], researchers in a wide range of disciplines have developed a host of methods for determining both “relative” and “absolute” ages of rocks, minerals, [etc.].

After graduating from Princeton University, Davis A. Young received a M.S. degree from Penn State and a Ph.D. degree in geological sciences from Brown University in 1969. Dave then taught geology for five years at New York University, five years at the University of North Carolina at Wilmington, and 26 years at Calvin College. Upon retirement from Calvin in 2004, Dave and his wife Dottie moved to Tucson, Arizona, where they enjoy the view of the Santa Catalina Mountains and Dave vigorously pursues his hobby of birding. A fellow of ASA, Dave continues service as a member of the Editorial Board of Perspectives on Science and Christian Faith. He and his wife are members of Catalina Foothills Presbyterian Church in America.



Article

How Old Is It? How Do We Know? A Review of Dating Methods – Part One: Relative Dating, Absolute Dating, and Non-radiometric Dating

Relative Dating

Relative dating was first applied to rock strata in the mid-seventeenth century by a devout Christian anatomist, Niels Stensen (Steno) in his formulation of several basic stratigraphic principles that are still routinely applied by all geologists and, in modified form, by archeologists.³

Relative dating principles of great importance to geology are:

- *the principle of original horizontality,*
- *the principle of superposition,*
- *the principle of inclusion,*
- *the principle of cross-cutting relationships,*
- and
- *the principle of biological (or fossil) succession.*

The *principle of original horizontality* takes its clue from the observation that modern sediment layers, with exceptions such as the dipping sand layers in dunes and sediments that accumulate on moderate slopes, are commonly deposited very close to the horizontal. In applying this principle to layered sedimentary rocks such as sandstone, conglomerate, and limestone, one may safely infer that a stack of such rock layers that is tilted (dips) at a fairly steep angle must have experienced an episode of tilting subsequent to its original deposition as approximately horizontal layers. Because layered deposits of human origin, such as trench fillings, may be oriented at a steep angle, original horizontality does not always hold for layers at archeological sites.

The *principle of superposition* states that, in a stack of undisturbed layered rocks that were deposited on the surface of the Earth (sedimentary rocks or lava flows), any given layer must have been deposited before the layers above it, and is, therefore, older. Similarly, the layer must have been deposited later, hence is younger, than layers below.⁴ For example, there is no field evidence that the layered rocks of the Colorado Plateau, of which the Grand Canyon region is a small part, were flipped upside down. Therefore, the Tapeats Sandstone at the bottom of the horizontally layered sequence exposed in the canyon walls must be older than all the layers above from the Bright Angel Formation to the Kaibab Limestone at the top of the canyon walls. The Redwall Limestone, a unit forming a prominent cliff halfway up the canyon walls, must be older than the strata of the overlying Supai Group and younger than the underlying Muav Limestone. The principle of superposition is also routinely applicable to any stratified archeological site such as the ancient Near Eastern tells of Iraq or Israel, Native American mounds, deposits flooring a rock shelter, and deposits on the floor of a cave. Archeologists must exercise extreme caution

in applying superposition given that stacks of sediment layers at archeological sites are commonly subject to disturbance such as excavation of burial sites into older sediments or reworking by organisms.

Steno also introduced what we might call a *principle of inclusion*. A pebble, a crystal, or a fossil normally had an existence that preceded its incorporation into a developing mass of rock. There can be exceptions, however. Some crystals, for example, grow within a pre-existing rock at the expense of surrounding material. In such cases, crystal growth may cause visible deformation of the surroundings. Competent geologists can normally determine whether an included object pre-dates or post-dates its host rock. Similarly, a stone tool, pot, or figurine is generally older than the sediment layer that was deposited on and around it unless it can be demonstrated that it was subsequently buried in a lower layer.

The *principle of cross-cutting relationships* is especially important in deciphering temporal relations of igneous, metamorphic, and vein rocks. When the principle was first formulated is unclear, although James Hutton certainly used it in his claim that granite is an intrusive rock. In 1785, Hutton observed veins and dikes of granite projecting finger-like across the oriented structures of the surrounding gneisses and schists in Scotland's Glen Tilt. From these relations, he inferred that the granite veins must be younger than the gneisses. The principle maintains that a feature which cuts across layering or any other oriented structure of the surrounding rocks must have been emplaced after the surrounding rocks were already in place (Figure 1). This principle also applies to archeological sites. For example, the foundations of walls may have been set by excavation into a lower substrate and have the appearance of transecting the stratification immediately beneath.

Although a skilled geologist can quickly assess the probable sequence of events that affected the rocks exposed in an outcrop or road cut from all four of these principles, there is an additional principle of great importance to geology, the *principle of biological (or fossil) succession*. Similarly, archeologists may talk of cross-dating with index fossils or artifacts. During the second half of the eighteenth century, several students of the

Earth such as Georg Fuchsel and Giovanni Arduino recognized that rock strata typically contain characteristic suites of fossil remains by which they may be distinguished from other strata. Between 1790 and 1810, William Smith in England, and Georges Cuvier and Alexandre Brongniart in France, developed this principle. In conjunction with the principle of superposition, Cuvier and Brongniart especially showed that distinctive suites of fossils can be used to determine the relative ages of rock layers within a given region. Before long, geologists attempted to correlate rock layers in different areas.

On the basis of rock type alone, however, widely separated successions of strata cannot always be physically traced from one to another. Matching of similar rock types in different areas proved to be less than adequate for correlation because successions of strata commonly contain several layers of similar rock types. However, because fossil suites in thick undisturbed stacks of layered sedimentary rocks invariably occur in the same relative order, one could temporally correlate layers containing identical or similar suites of fossils from widely separated groups of rock (Figure 2). In some cases, all that is needed for satisfactory correlation is a single widely distributed fossil species, known as an index fossil, that is generally restricted to relatively small thicknesses of sedimentary rock.

From the late eighteenth well into the nineteenth centuries, geologists gradually constructed a geologic timescale by applying formal names to the groups of rocks contain-

ing distinctive fossil remains. Thus, assignment of Carboniferous age to a group of strata on the basis of its fossils means that the rocks in question are younger than underlying Devonian rocks and much younger than underlying Cambrian strata, and much older than overlying Tertiary rocks. The principle of biological succession has its archaeological counterpart. Widely separated sites might be temporally correlated thanks to the occurrence of fossil bones from identical species at each site. Correlation can also be done with cultural artifacts such as distinctive styles of pottery or tools. For example, Clovis points have typically been regarded as older than Folsom points.

Absolute Dating

Neither geologists nor archeologists are content with knowing when a given rock or occupation level was formed relative to other rocks or occupation levels. They also want to know exactly *when* the rock or layer was formed. A geologist might confidently state that a fossiliferous limestone formation has a Cambrian age and is, therefore, relatively quite old. But—how old? It is one thing to determine that a given stratum or rock body is older or younger than another stratum (relative dating). It is an entirely different matter to determine exactly when a given stratum or rock body was formed (absolute dating). Was it 50,000 years ago or 50 million years ago? Absolute dating makes historical reconstruction more accurate, provides insight into the lengths of geological events or culturally significant periods, and allows for calculation of the rates at which geological processes and cultural developments occurred.

Relative dating forms the basis of all absolute dating. Because there is no compelling reason to doubt that a layer at the bottom of a stack of undisturbed layers of sedimentary rock was deposited prior to deposition of all the layers above it, the principle of superposition serves as an important check on the *reliability* of claimed absolute dates. If an absolute dating method indicates that layer B is 50 million years old and that layer A is 20 million years old, but layer B



Figure 1. Pegmatite dike cutting across foliation (preferred orientation) of schist at base of Sugarloaf, Rio de Janeiro. In accord with the principle of cross-cutting relationships, the dike is younger than the schist. Photo by the author.

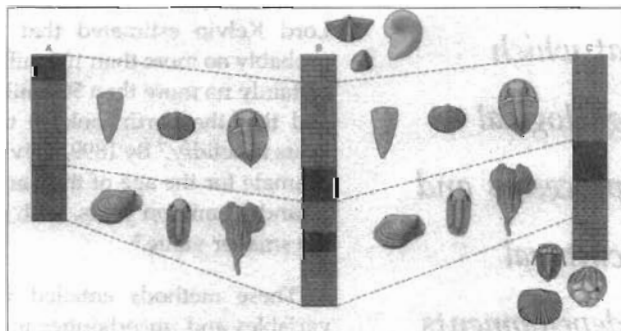
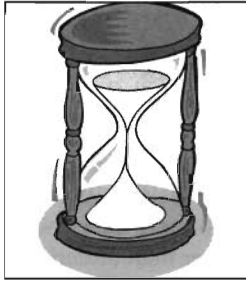


Figure 2. Diagram illustrating application of the principle of biological succession to temporal correlation of widely separated sequences of fossiliferous strata. Formations with similar fossil content are regarded as coeval. Reproduced from R. Wicander and J. S. Monroe, *Historical Geology* (Pacific Grove, CA: Brooks/Cole, 2000), 58.



Absolute dating makes historical reconstruction more accurate, provides insight into the lengths of geological events or culturally significant periods, and allows for calculation of the rates at which geological processes and cultural developments occurred.

Article

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is superposed on layer A and there is no physical evidence that the layers have been turned upside down, then either the absolute dating method is flawed, the analysis was done incorrectly, or the application of the method neglected some relevant factor. Likewise if we date a dike of igneous rock that cuts across a layer that we know is no older than 100 million years old, we should suspect the validity of our results if an absolute age of the dike is determined to be 370 million years old. Something is suspect in the absolute dating method employed.

In the nineteenth century, geologists could only estimate absolute geologic time. One method entailed measuring thicknesses of sedimentary rock sequences of different geologic ages, estimating the rates at which the sediments were deposited and compacted, and calculating ages from that information. Rough estimates of the duration of the various geologic time periods such as the Cambrian Period or eras such as the Mesozoic Era were advanced. Estimates of the age of the Earth based on sediment thicknesses ranged from three million to six billion years!⁵

A method for estimating the age of the ocean was based on the accumulation of salt in the ocean. The age was calculated by measuring the concentrations of salts (primarily sodium) dissolved in the ocean and in the rivers of the world and by estimating the rates at which dissolved salts are added to and removed from the oceans.⁶ Approximations of the ages of the Sun and the Earth were based on estimates of the Sun's and the Earth's initial temperatures, evaluation of additions of heat, and calculations of the rate at which these bodies had cooled. In 1862, Lord Kelvin estimated that the Sun was probably no more than 100 million years and certainly no more than 500 million years old and that the Earth took 20 to 400 million years to solidify.⁷ By 1899, Kelvin lowered his estimate for the age of the Earth to between 20 and 40 million years, with a bias toward the smaller value.⁸

These methods entailed far too many variables and uncertainties to yield reliable estimates of the age of the Earth, and the last two were not even capable of providing absolute ages of specific rock bodies. Since the beginning of the twentieth century, sci-

entists have developed a broad set of methods for calculating accurate absolute ages that entail physical, biological, or geological processes that proceed at known, measurable rates. Such processes include, among others, the spontaneous decay of radioactive isotopes in minerals, rocks, and glasses; the conversion of left-handed amino acids in organic materials to right-handed forms; the annual growth of tree rings; the growth of hydration rinds in obsidian fragments; or the dislocation of electrons in crystal structures by environmental radiation.

No single method is capable of dating geological and archeological materials from the entire range of ages. For example, the Sm-Nd radioactive decay method is useful only for dating minerals and rocks that are typically hundreds of millions to billions of years old. One cannot accurately date a 3,000-year-old piece of pottery by the Sm-Nd method. In contrast, radiocarbon or thermoluminescence methods are useful for dating materials that are only hundreds to a few tens of thousands of years old. These methods are of no value for dating a mineral that crystallized 250 million years ago. The K-Ar method is valuable for dating materials that are in the range of hundreds of thousands to a few millions of years.

No single method is capable of dating all kinds of geological events. To employ a suitable method geochronologists must ask what geologic event is being dated. Does an age obtained from analysis and calculation refer to the time of original crystallization, time of metamorphism, time during the cooling history of a rock when an accumulated daughter product ceased to diffuse out of the sample, time when a meteorite was first exposed to cosmic rays or when a rock was first exposed to the atmosphere, time of sediment deposition, time of diagenesis, time of uplift, time of burial, time of heating, or time of death?⁹ Not all dates have the same meaning. Because specific methods are generally well suited to dating only specific kinds of events, employment of a wide range of methods is most useful in reconstructing different aspects of the history of a given geological region.

No single method can be applied to any and every kind of geological and archeological material. A crystal of quartz cannot be dated by

Rb-Sr methods whereas thermoluminescence may yield information about quartz. One cannot accurately date a sample from a *submarine* basaltic lava flow by the K-Ar method because such lava flows commonly trap argon gas that was already dissolved in the original magma. As a result, any measured age will likely be spuriously high inasmuch as some of the ^{40}Ar in the sample was already present when the lava was extruded and did not result from the radioactive decay of ^{40}K in the sample. One cannot date zircon by the obsidian hydration method, but U-Pb methods are very effective when applied to zircon crystals.

Ideally geochronologists would like to apply as many methods that are applicable to the situation of interest as are affordable and feasible. The results may serve as a check on each another and yield greater insight into the history of a set of rocks than the results from only one method.

Non-radiometric Dating Methods

There are numerous non-radiogenic methods that are especially useful in archeological applications. We will briefly examine four of these methods. Other methods not discussed include amino acid epimerization, archeomagnetic dating, electron-spin resonance, and methods based on periodically laminated sediments.

Dendrochronology, or tree-ring dating, is the most accurate and precise chronometer because normally each tree ring represents an annual growth.¹⁰ Ideally each ring can be precisely dated to the year of its growth. As a result, dendrochronology has served as the standard for the last 10,000 years by which other methods such as radiocarbon are calibrated. Most tree species typically produce annual growth rings characterized by a light-colored earlywood band that grades into a dark-colored latewood band. The following year's growth ring is sharply demarcated from the preceding year's growth ring. Although many trees generate rings of approximately constant thickness from year to year, trees sensitive to stressful changes in environmental conditions such as temperature and humidity will produce rings that vary in thickness from year to year. Growth is generally promoted by higher average temperature and high precipitation. It is the *sensitive* tree species that are the best suited to dendrochronological dating because, to determine when a tree lived and died, portions of its ring pattern are matched to ring sequences with similar relative thickness variations in a standard master chronology (Figure 3).

Master chronologies are constructed from the ring patterns of numerous trees of diverse ages of the same species that grew in the same general region. Because these trees all experienced very similar environmental conditions, they each produced sequences of growth rings of similar relative thickness (Figure 3). Master chronologies

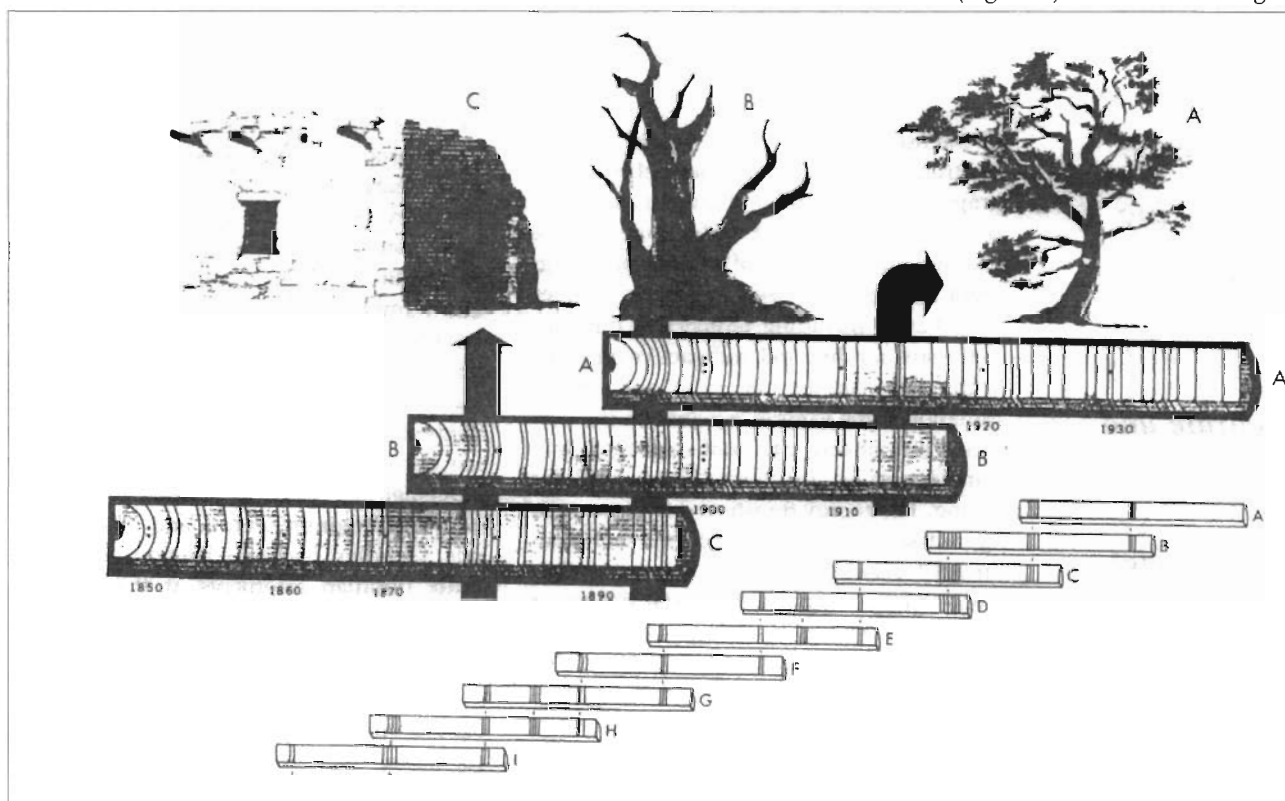
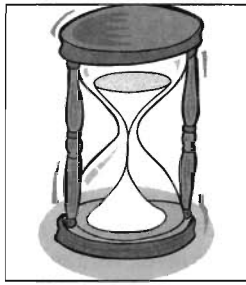


Figure 3. Schematic illustration of the construction of tree-ring chronologies from cross-dated ring sequences from A) living tree, B) dead tree, and C) old human structure. With the kind permission of Springer Science and Business Media this figure is reproduced from J. S. Dean, "Dendrochronology," in R. E. Taylor and M. J. Aitken, eds., *Chronometric Dating in Archaeology* (New York: Plenum Press, 1997), 38.



There are numerous non-radiogenic methods that are especially useful in archeological applications. ... Dendro-chronology, or tree-ring dating, is the most accurate and precise chronometer ...

Article

How Old Is It? How Do We Know? A Review of Dating Methods – Part One: Relative Dating, Absolute Dating, and Non-radiometric Dating

have been constructed for several regions around the world where environmental conditions promote variation in ring width. Examples include several chronologies that span more than 8,000 years based on bristlecone pine in the Great Basin of the western United States; a 3,220-year sequoia chronology for the Sierra Nevada in California; a 1,600-year baldcypress chronology for the southeastern United States; a 3,622-year alerce chronology for Chile; a chronology that encompasses 9,000 years for the eastern Mediterranean region; and a 12,000-year oak chronology for Europe.

Furniture, art objects, utensils, statues, tools, and timbers all provide suitable material for dating. The eruption of Sunset Crater in northern Arizona was dated at AD 1064 from timbers in nearby structures that contained ash from the volcano, and cliff dwellings in northeastern Arizona have been dated to the thirteenth century.¹¹

Several methods are based on the accumulation of electrons trapped in higher energy states within the crystal structures of minerals like quartz and calcite. We will consider thermoluminescence as an example.¹² Thermoluminescence dating is effective with materials that have been subjected to severe heating such as pottery, baked flint, or fragments of volcanic rock. Such episodes of intense heating restore already trapped electrons in the material to normal crystallographic sites. The thermoluminescence clock is thereby set at zero. Subsequent to the heating event, a piece of pottery or a fragment of flint is exposed to various sources of radiation including radioactive minerals in the surrounding soil, radioactive minerals within the sample, and solar and cosmic radiation if the sample remains on the surface. To minimize effects of solar radiation, buried samples are normally collected for dating. The energy transferred to the sample by radiation dislocates electrons to higher energy levels. Over time, the number of electrons that are trapped in crystal defects at these higher energy levels increases. When a sample to be dated is reheated to 300–500°C, electrons return to their normal energy levels in crystallographic positions, and low-intensity light is emitted from the sample (hence the term thermoluminescence).

To obtain a reliable age, the radiation dose must be determined by evaluating the ener-

gies and relative contributions of the various sources of radiation in both the sample and the environment in which it was buried. The rate at which the sample would accumulate trapped electrons in the radiation environment experienced by the sample must also be determined experimentally. As examples of applications, burnt flints associated with skeletons in cave sites in the Levant have suggested the presence of anatomically modern humans around 100,000 years ago, and stone artifacts in the lowest occupation levels of Malakunanja II in the Arnhem land of northern Australia indicate ages between 50–60,000 years.¹³

Obsidian hydration dating is based on the fact that a freshly spalled fragment of obsidian, a silica-rich volcanic glass, gradually absorbs water from its surroundings.¹⁴ As water diffuses into the glass, a hydration rind develops and increases in thickness. Rind thickness, as a function of time, is measured optically. To determine the age of a spalled obsidian fragment, it is necessary to determine the appropriate equation relating the age and thickness of the hydration rim. On the basis of experimentally induced hydration, most researchers assume that the age is approximately proportional to the square of the thickness such that $a = kt^2$ where a is the age, k is a constant and t is the thickness of the rim. The value of the appropriate proportionality constant is a function of chemical composition, temperature, and humidity and must be assessed experimentally from obsidians of the same chemical composition and environmental temperature and humidity as the obsidian to be dated. Because these variables are not easy to assess with high precision, obsidian hydration dating is best used in conjunction with other methods. In many instances, however, obsidian dating has yielded results in excellent agreement with ages provided by radiocarbon, thermoluminescence, and other methods. Obsidian hydration dating of Timber Butte obsidian fragments at the Western Idaho Archaic Burial Complex sites suggests an age of about 4,500 years.¹⁵

The final method we will note is amino acid racemization, a technique that is useful for dating shell and teeth and, to a lesser extent, bone.¹⁶ Virtually all amino acids in living organisms such as serine, aspartic acid, and isoleucine exist as left-handed

isomers.¹⁷ After the organism dies, amino acids gradually convert to the right-handed isomer, a process called *racemization*. Experiments on selected amino acids in various shelly and dental materials must be performed to determine the rates at which racemization occurs as a function of temperature. Then samples of unknown age are analyzed to determine the ratio of right-handed to left-handed isomers of specific amino acids, and the age is determined from the analyzed ratio. As an example, ostrich eggshell fragments were found at an archeological site in Botswana believed to be less than 30,000 years old.¹⁸ These shell fragments occurred in the vicinity of numerous pits that had been dug by Late Stone Age inhabitants into lower and, therefore, older occupation levels. The shell fragments had ratios of left-handed to right-handed isomers that indicated an age older than 30,000 years, consistent with a radiocarbon date of 37,200 years for the eggshells. From these data, it was inferred that the shell fragments had been dug up from the older occupation level.

In the March 2007 issue, Part Two of this article will examine radiometric dating methods used for determining ages of crystallization of minerals, rocks, and meteorites.

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Notes

- ¹Martin J. S. Rudwick, *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution* (Chicago: University of Chicago Press, 2005). This magnificent work by Rudwick, arguably the prince among historians of geology, is an absolute must read for anyone wishing to understand the earliest recognition of the Earth's considerable antiquity in relation to Christian faith. Another valuable work that focuses on the role of fossils in understanding Earth history is Martin J. S. Rudwick, *The Meaning of Fossils*, 2d ed. (New York: Science History Publications, 1976).
- ²For details on geologically important absolute dating systems, see Gunter Faure and Teresa M. Mensing, *Isotopes: Principles and Applications*, 3rd ed. (Hoboken, NJ: Wiley, 2005) and Alan P. Dickin, *Radiogenic Isotope Geology* (Cambridge: Cambridge University Press, 1997). Also of great value are G. Brent Dalrymple, *The Age of the Earth* (Stanford, CA: Stanford University Press, 1991) and G. Brent Dalrymple, *Ancient Earth, Ancient Skies: the Age of Earth and Its Cosmic Surroundings* (Stanford, CA: Stanford University Press, 2004). For relative dating methods, consult any textbook on stratigraphy. For a review of archeologically important absolute dating methods, see R. E. Taylor and Martin J. Aitken, eds., *Chronometric Dating in Archaeology* (New York: Plenum Press, 1997). For stratigraphic principles pertaining to relative dating in archeology, see Edward C. Harris, *Principles of Archaeological Stratigraphy*, 2d ed. (London: Academic Press, 1989) and especially Michael J. O'Brien and R. Lee Lyman, *Seriation, Stratigraphy, and Index Fossils: The Backbone of Archaeological Dating* (New York: Kluwer Academic/Plenum, n.d.). This latter work emphasizes relative dating with particular reference to American archeology.
- ³On the life of Steno, see Alan Cutler, *The Seashell on the Mountaintop: A Story of Science, Sainthood, and the Humble Genius Who Discovered a New History of the Earth* (New York: Dutton, 2003). For Steno's enunciation of stratigraphic principles, see Niels Stensen, *Prodromus Concerning a Solid Body Enclosed by Process of Nature within a Solid* (New York: Hafner, 1968). In this paper, I have omitted discussion of the principle of original lateral continuity, also developed by Steno.
- ⁴An undisturbed stack of layers such as those in the Grand Canyon-Colorado Plateau region has not been overturned, has not had another set of layers thrust on top of it, and has not been injected by sills. Competent field geologists, recognizing any overturned layers, overthrusts, or sills, will still be able to apply the principle of superposition appropriately because they will understand points at which the temporal order of the rock layers has been disrupted.
- ⁵For a review of attempts to determine the age of the Earth by means of sedimentary rock succession thicknesses, see Charles D. Walcott, "Geologic Time, As Indicated by the Sedimentary Rocks of North America," *Journal of Geology* 1 (1893): 639-76.
- ⁶Building on the idea of Edmund Halley, John Joly was the foremost expert on the use of dissolved salts to compute the age of the ocean. See John Joly, "An Estimate of the Geological Age of the Earth," *Scientific Transactions of the Royal Dublin Society* 7 (1899): 23-66 and John Joly, "Geological Age of the Earth," *Geological Magazine*, New Series, Decade 4, 7 (1900): 220-5.
- ⁷William Thomson, "On the Age of the Sun's Heat," *Macmillan's Magazine* (March 1862): 388-93 and William Thomson, "On the Secular Cooling of the Earth," *Royal Society of Edinburgh Transactions* 23 (1862): 157-9.
- ⁸Lord Kelvin, "The Age of the Earth as an Abode Fitted for Life," *Science* 9 (1899): 665-74, 704-11. For an excellent overview of the efforts of Kelvin and his contemporaries to determine the age of the Earth, see J. D. Burchfield, *Lord Kelvin and the Age of the Earth* (New York: Science History Publications, 1975).
- ⁹Diagenesis is the technical term for the set of processes involved in the conversion of unconsolidated sediment into sedimentary rock.
- ¹⁰For more detail on dendrochronology, see Marvin A. Stokes and Terah A. Smiley, *An Introduction to Tree-Ring Dating* (Tucson, AZ: University of Arizona Press, 1996) and M. G. L. Baillie, *Tree-Ring Dating and Archaeology* (Chicago, IL: University of Chicago Press, 1982).
- ¹¹On Sunset Crater, see D. A. Breternitz, "Eruptions of Sunset Crater: Dating and Effects," *Plateau* 40 (1967): 72-6. On Arizona cliff dwellings, see Jeffrey S. Dean, "Chronological Analysis of Tsegi Phase Sites in Northeastern Arizona," *Papers of the Laboratory of Tree-Ring Research* 3 (Tucson, AZ: University of Arizona Press, 1969).
- ¹²Martin J. Aitken, *Thermoluminescence Dating* (London: Academic Press, 1985).
- ¹³On the Levant, see N. Mercier and H. Valladas, "Thermoluminescence Dates for the Paleolithic Levant," in O. Bar-Yosef and R. S. Kra, eds., *Late Quaternary Chronology and Paleoclimate of the Eastern Mediterranean* (Tucson, AZ: Radiocarbon, 1994), 13-20. On Malakunanja, see R. G. Roberts, R. Jones, and M. A. Smith, "Thermoluminescence Dating of a 50,000 year-old Human Occupation Site in Northern Australia," *Nature* 345 (1990): 153-6.
- ¹⁴M. Steven Shackley, ed., *Archaeological Obsidian Studies: Method and Theory* (New York: Plenum Press, 1998).
- ¹⁵M. G. Pavesic, "Cache Blades and Turkey Tails: Piecing Together the Western Idaho Archaic Burial Complex," in M. G. Plew, J. C. Woods, and M. G. Pavesic, eds., *Stone Tool Analysis: Essays in Honor of Don E. Crabtree* (Albuquerque, NM: University of New Mexico Press, 1985), 55-89.
- ¹⁶P. Edgar Hare, Thomas C. Hoering, and Kenneth King, Jr., eds., *Biogeochemistry of Amino Acids* (New York: John Wiley & Sons, 1980).
- ¹⁷Isomers are organic molecules that share the same chemical composition but have different structures. Amino acids can exist as left-handed and right-handed molecules that are mirror images of each other.
- ¹⁸A. S. Brooks, P. E. Hare, J. Kokis, G. H. Miller, R. D. Ernst, and F. Wendorf, "Dating Pleistocene Archeological Sites by Protein Diagenesis in Ostrich Eggshell," *Science* 248 (1990): 60-4.



Article

Why Are There So Few Christian Anthropologists?

Reflections on the Tensions between Christianity and Anthropology

Why Are There So Few Christian Anthropologists? Reflections on the Tensions between Christianity and Anthropology

Dean E. Arnold



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In his provocative book, *The Scandal of the Evangelical Mind*, evangelical historian Mark Noll decries the lack of an evangelical mind in the academy, and challenges evangelical Christians to consider the importance of the cultivation of the mind as a divine calling. Unfortunately, the Christian mind in anthropology lags behind many disciplines because, among other reasons, there are so few Christian anthropologists. Why is this? According to a Carnegie Foundation survey, anthropology is the most secular of the disciplines. It has a record of hostility to Christianity that is borne out by the experiences by many evangelical Christians. This essay elaborates some of the tensions between anthropology and Christianity and provides a response to some of these tensions. It suggests that evangelical Christians can influence the academy by immersing themselves in it and by pursuing pure research rather than just focusing on more applied concerns such as missions, development and the church.

In 1994, historian Mark Noll published a provocative book called the *Scandal of the Evangelical Mind*¹ lamenting the lack of intellectual impact of evangelical scholars upon the academy. Some of these themes were revisited and enlarged by Michael Hamilton in "The Elusive Idea of Christian Scholarship"² and by the responses of Joel Carpenter,³ Dorothy Chappell,⁴ and Don King.⁵ These scholars argue that evangelical history, combined with American pragmatism and utility, have degraded the value of exercising the mind for its own sake. Fur-

ther, the American values of achievement, individualism, and humanitarianism have focused attention on evangelism and helping others. While these tasks are important, evangelicals have often failed to love God with their minds. They have failed to grasp the importance of contributing to the secular academy, to recognize the latent significance of that contribution to the future of the church, and to cultivate the mind for its own sake as good stewardship of God's image. Evangelicals have failed to "tend the garden" of the knowledge of God's creation and to work toward redeeming it through that cultivation. Further, evangelicals have failed to recognize the importance of bringing glory to God by learning about him through the study of his created world.⁶

While all of these reasons are compelling, challenging, and relate to all disciplines, the problems between the Christian mind and anthropology go much deeper. In this paper, I want to explore some reasons why there are so few Christian anthropologists and why those that do exist have had little impact on the academy.⁷

Dean E. Arnold has published two major books by Cambridge University Press, *Ceramic Theory and Cultural Process* (1985) and *Ecology and Ceramic Production in an Andean Community* (1993), and many articles on ethnography, ethnoarchaeology and archaeology in academic books and journals in Western Europe and the Americas. A Fulbright Scholar in Mexico (1984) and Peru (1972-1973), he has done field work in Mexico, Peru, Bolivia, and Guatemala. In 1996, he received the "Excellence in Ceramic Studies Award" from the Society for American Archaeology, the scholarly association of anthropologically-oriented archaeologists. He was a visiting fellow at Clare Hall at the University of Cambridge and was a visiting scholar in the Department of Archaeology there on three occasions. He enjoys traveling, classical music (especially Mozart), visiting their two daughters (Michelle and Andrea), and doing virtually anything with his wife, June. Dr. Arnold, a member of the ASA, is professor of anthropology at Wheaton College and has taught there since 1973.

The Problem

In anthropology, the "Scandal of the Evangelical Mind" exists because there has been relatively little scholarship by Christian anthropologists directed to the academy. We have not "paid our dues" enough to establish credibility. Related to this problem is the hostility between anthropologists and missionaries, in particular, and between anthropologists and Christians in general. This hostility is not only borne out by my own personal experience and that of other Christian anthropologists and Christian students of anthropology, but is also reflected in a Carnegie survey of the religious and political views of departments in American colleges and universities.⁸ In that survey, 65% of respondents in anthropology departments answered "none" to the question: "What is your religion?" This percentage was the highest among all the disciplines, and was ten percent higher than the next highest department (philosophy). It was more than twice the average frequency (30%) of the "none" response among faculty in all disciplines.

The strong a-religious tendency of anthropologists is illustrated in a recent article by Christian anthropologist Robert J. Priest.⁹ Writing in the leading journal in the field, Priest documented how the phrase, "The Missionary Position"¹⁰ has become a powerful metaphor: (1) to disparage traditional Christianity and morality, and (2) to characterize asymmetric power and allegedly hegemonic relationships such as Christian missionary activity. The "missionary position" as a symbol:

... summarizes modernist objections to Christian morality as a morality of negation, as ethnocentric and as lacking adequate foundations. By post-modernists this symbol is employed to argue that modernism itself is a morality of negation, that it is ethnocentric and that it lacks adequate foundations. As a foundation for morality, rationality is as inadequate as God and special revelation.¹¹

Further, it:

... essentializes (and scorns) Christian morality as taboo morality and used this very scorn ... as a justification for imposing a taboo on speech form and explicitly religious subject position in academic discursive spaces.¹²

The hostility between anthropologists and Christians is also illustrated by a response from a Christian graduate student in anthropology: "I feel like I have been really inundated lately with the 'Christians are idiots'/'anthropologists can't be believers' sort of ideology ...". Another told me that her advisor had told her: "A Christian cannot be an anthropologist." Each year I learn of similar experiences of other Christian students of anthropology.

To some anthropologists, the term "Christian anthropologist" is an oxymoron. This perception betrays an important structurally-embedded assumption concerning

the relationship between anthropology and Christianity; they are simply incompatible. As a result, few Christians survive the attacks or the subtle (and often not-so-subtle) prejudice against them in the discipline.¹³ Those few who do exist are mainly missionaries or former missionaries and/or are heavily engaged in teaching and write primarily for Christians. They simply do not have the time or the resources to devote their lives to scholarship and speak to a sometimes hostile academy.¹⁴ The result is a largely invisible presence in the discipline and this invisibility reinforces the oxymoronic perception that Christians cannot be anthropologists.

A Brief History of Christians in Anthropology

The recent history of Christian anthropologists attending the annual meetings of the American Anthropological Association (AAA) affirms their meager numbers. Since 1964, I have attended roughly half of these meetings. In the late 1960s and early 1970s, a handful of Christians got together at the AAA over a meal or a cup of coffee. Over the years, different Christian anthropologists came to our gatherings, but there was never more than a few, and the total aggregate number over this period was approximately six to ten.

In 1976, following the meeting of the American Scientific Affiliation (ASA) in Wheaton, Illinois, Christian anthropologists stayed behind to have their own session and to discuss their position in the discipline. When the decision to organize was raised, considerable discussion ensued, and the group was split on the outcome. One group wanted to organize and another group believed that an organization of Christian anthropologists would only subject us to more harassment and anti-Christian prejudice. The argument was that we had already suffered from anti-Christian bias among secular anthropologists. So, why make ourselves a larger, more obvious target? As a result, the "nays" carried the day, and no organization of Christian anthropologists emerged.

By 1987, more Christian anthropologists were attending the annual meetings of AAA and the numbers had grown from the 1976 ASA meeting in Wheaton. At the 1987 AAA meeting, we decided to organize informally as a "network of Christian Anthropologists" since many of the anthropologists were missionaries and seminary professors and had already gotten together at the national missiology conferences. A decision was made to apply for a slot on the program at the 1988 AAA annual meeting and to request a room for our gathering. Since then, attendees have ranged between thirty and fifty annually. Each year usually brings two or three new Christian anthropologists (unknown to us) or a grateful student "out of the closet" who thought that no other Christian anthropologists existed.



Article

Why Are There So Few Christian Anthropologists?

Reflections on the Tensions between Christianity and Anthropology

The "Network of Christian Anthropologists" is an informal group of colleagues. It is "informal" in that one does not "join" it. There is no formal organization, and it has no creed or membership. But in the sometimes hostile, anti-Christian environment of anthropology, anyone who has the courage to call oneself a "Christian" and affiliate with us is welcomed and recognized as a brother or sister in Christ. As a result, our meetings have included Roman Catholics and Orthodox believers as well as Protestants from a range of creeds and denominations, including evangelicals and non-evangelicals alike.

In some respects, the Network of Christian Anthropologists is still a persecuted minority within the discipline. At the AAA meetings in 1993, in Washington, DC, we incurred the hostility from some of our professional colleagues when they would not vacate a room at the time that had been assigned to us. They had locked the two doors and would not let us into the room. When they finally allowed us to enter, some began chanting in derision, "Here come the Christians." In other years, we have been assigned a "postage stamp"-sized meeting room when the coordinator had asked for a larger room. There were other occasions, my colleagues tell me, when we were omitted from the program index, or scheduled at the most inconvenient time.¹⁵ Sometimes, our Network meetings bring curious colleagues who want to see who these "Christian anthropologists" are and what they are doing. Such visitors are always welcomed, and are always invited to go to dinner with the Network group afterwards.

Even with the growth of the "Network," the number of Christian anthropologists is still meager. With 30 to 50 people at the network meetings, the number of Christian anthropologists is minuscule compared to a usual meeting attendance of 4,000–5,000. Even at one percent of the total attendees at the larger AAA meeting, however, the number of individuals at the network meetings is deceptively inflated and does not represent the true number of professional Christian anthropologists in the discipline. Many Network attendees, for example, are students. Once one gets beyond the former missionaries and linguistic anthropologists attached to missionary organizations¹⁶ and seminaries, there are only a handful with Ph.D.s in

anthropology and very few that teach in colleges and universities. If one eliminates Christian colleges, there are precious few indeed! Based upon those whom I know from these meetings, I can only come up with four Christian anthropologists teaching at secular colleges and universities.¹⁷ Even at ten times my biased sample, the numbers of Christian anthropologists in the secular academy are minuscule.¹⁸

These meager numbers of Christian anthropologists are disproportionately distributed across the sub-disciplines of anthropology. Most are linguistic anthropologists with strong training in linguistics. The next largest group is the cultural anthropologists. In the subfield of archaeology, those Christians who also belong to the 6,800 member Society for American Archaeology are far less frequent; I know of only six Christian professionals in that sub-discipline.¹⁹ I have heard of one or two others, but I do not know them personally. At the Society for American Archaeology meeting in New Orleans, in the spring of 2001, three of us met but wrung our hands that, to our knowledge, we (and one other who could not meet with us) were the only Christians at a meeting of 4,000 attendees. As for the subfield of physical (or biological) anthropology, I know of no Christian who is a professional in the field and is active in the discipline.

If I am wrong and there are more Christian anthropologists than I have listed here, there is more of a "Scandal of the Evangelical Mind" than one might think. Those anthropologists who attend the national meeting and attend the network are only those who are active in the discipline. There may be others who choose isolation, professional inactivity, or remain "underground." Why? I suggest that both the dearth of Christian anthropologists and their lack of visibility in the academy are related to the tensions between Christianity and the discipline of anthropology.

Sources of Tensions

For secular anthropologists, a "Christian" anthropologist is an oxymoron because two of the fundamental ideological assumptions of anthropology, the "antiquity and evolution of humanity" and "cultural relativism," appear to contradict the teachings of the Bible. In reality, these contradictions are more

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illusory than real, but these perceptions are still a powerful ideology among anthropologists and part of their counter-cultural mystique.²⁰

Issues of Origins

The first significant tension between anthropologists and Christians consists of their different views of human origins. Anthropologists are committed to the evolutionary origins of humankind. One reason for this commitment is that the study of human origins is fundamental to anthropology because (as any introductory textbook to the discipline will testify) it is the discipline most involved in research on human origins. By way of contrast, the evangelical sub-culture has many Christians believing that so-called "creationism" is synonymous with "Christian" and a high view of the authority and inspiration of the Bible, while "evolution" is synonymous with "non-Christian" (or "liberal Christian") and a low view of biblical authority. I am always amused by this false distinction, but my mirth is always tempered with the reality that many Christians *really do* believe that the universe was created instantaneously less than 20,000 years ago and any evidence to the contrary not only goes against what the Bible says, but is a misreading (and some believe, a falsification, or deliberate fabrication) of the fossil evidence. To many anthropologists, this position is "Christian" and is fostered by a massive "creationist" literature that metaphorically reflects the creationist book title, *The Fossils Say No!*²¹ In reality, however, the fossils do not say anything at all without the presuppositions of the scientist—whether Christian or not. On the contrary, the Bible and science share common presuppositions about nature: it exists, it is inherently orderly, and it is knowable.

If Christianity and science share these presuppositions about nature, how does one integrate an anthropological perspective with a biblical perspective? Is there still a conflict when one gets beyond the level of these basic presuppositions? It would be erroneous to claim that there is no conflict between an anthropological perspective and the Bible. Nevertheless, the conflicts are not of the magnitude that many imagine.

One alleged conflict perpetrated by both Christians and anthropologists concerns a dichotomistic distinction between different agencies in the origin issue. Was "evolution" or "creation" responsible for the beginning of humans? Is the agency "divine" or "naturalistic"? Emphasizing such extremes obfuscates the underlying issues for the Christian.²² Divine agency ("creation") is not necessarily mutually exclusive from naturalistic agency ("evolution"). But, unfortunately, those who reject evolution and believe in a "young earth" model of origins have co-opted the term "creation." On the contrary, all Christians believe in the doctrine of creation.²³ That is, all that we know to be in the natural world has come into being through the willful act of an eternal and all-powerful divine personality whom we call "God." We could go further and say that the

"matter" or "stuff" of the natural world (such as chemical elements and energy) is not made out of the same substance of that triune personality, nor was it produced out of previously existing matter. Rather, the tangible substance that we call "matter" did not previously exist before creation. This means that the divine personality is totally "other" from what we know to be the tangible, natural world. Another way of talking about the "other-ness" of this personality is to use the term "spirit."

The Bible and science share common presuppositions about nature:

it exists,

*it is inherently orderly, and
it is knowable.*

The Bible affirms that this spirit is responsible for the beginning of matter as we see it and the origin of the universe as we know it. Elsewhere in Scripture, the text asserts that God is not just Creator, but also Sustainer of the universe and is involved in creation to accomplish divine purposes. Further, the "goodness" that Genesis attributes to creation suggests that nature reflects certain aspects of the character of God. The integrity of that reflection is so important that later in the Bible, it is averred that humans are responsible for knowledge about God from that created world alone.²⁴ Human sinfulness is insufficient to keep humans from knowing about God from creation.

Both science and the Bible thus assert an objective reality (called "nature") that is made of tangible "things" that have inherent patterns and structures and are knowable. To the Christian, these patterns and structures are consequences of the divine stamp on God's created world. Nature is God's revelation and humans come to know God by means of that revelation. One of the most important aspects of this "general" revelation is the human mind and its unique behavioral manifestation: language. Language permits us to understand God's special revelation, the written record of God's dealings with humans. Without a mind, human language, a tangible world that we can "see," and the integrity of nature that can be known, humans could never come to know God. Natural revelation is thus indispensable for understanding special revelation (the Bible).

Another, more traditional way of saying this is that God has revealed himself in two great books, nature and the Bible, and there should be no conflict between them because they have the same author. Both reflect God's



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hermeneutics
of nature.*

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character and both are necessary to know God and do his divine will. A mind, language, and an understanding of nature are all parts of general revelation that are needed to understand the Bible. Conversely, the meaning and purpose of nature cannot come from nature itself, but from our understanding of the Bible. One kind of revelation is necessary to more fully understand and give meaning to the other. Meaning does not come from "data" or cultural, biological, or physical facts but from beliefs, ideology, and worldview. Said differently, the great questions of life, "Who am I?" "Where did I come from?" "Where am I going?" (Or "What is the purpose of my existence in the universe?"), are not questions answerable by nature itself, but rather by the meaning given to it by God and by those who bear God's image.

This approach to the relationship of nature and the Bible suggests that the conflicts between anthropology and Christianity do not come from the level of nature and the Bible, but from the level of our interpretations of the Bible and from our understanding of science based upon our hermeneutics of nature. These are genuine conflicts, but not the kind that many Christians may immediately recognize. First, there is the conflict between natural and supernatural explanations. Natural explanations are based upon materialistic presuppositions that provide scientific causes, while Christians believe that God is the cause. These two apparently opposing explanations, however, are not necessarily contradictory.

Naturalistic explanations are instrumental causes that are one kind of divinely created process by which divine power sustains the universe. But, God is also a "first cause," or "ultimate cause," who brought the naturalistic forces into being and who continually sustains them through divine power, fulfilling God's purposes throughout the history of the natural world. Biological characteristics are favored (or not favored) through natural selection (among other mechanisms of evolution), but God is sovereign over the forces of natural selection. Scientific explanations that rely on naturalistic and material explanations thus are not necessarily contradictory to first causes or ultimate causes because such explanations are only immediate and proximate to the phenomena studied

and may be instrumental for a sovereign God. No necessary conflict thus occurs between instrumental causes and ultimate causes because the methodology of science can only reveal immediate and proximate causes that are physically and tangibly expressed in knowable phenomena.

While the apparent conflict of supernatural versus natural causes for the origin and perpetuation of the universe can be handled as a matter of perspective, the conflict between anthropology and popular readings of the Bible is most apparent with regard to the beginning of the first humans.²⁵ At the end of the first chapter of Genesis, the writer says that humans are made with a divine imprint, or "image." Then, the text suggests that the first humans had a unique origin in the creative process such that God was more directly involved in fashioning a creature that exclusively and uniquely reflected God's divine character. This unique creation had the capability for language, but with personal responsibility. This responsibility involved the ability to make choices, but because this creature was a part of the rest of creation and interconnected with it, those choices had physical and nonphysical consequences.²⁶

From one popular reading of the Bible, Adam and Eve were the first humans, uniquely created by God, and all of humanity is their descendants. Theologically, the link between Adam and modern humans is essential for the responsibility of Adam's act of disobedience to fall on all humanity. This act had unintended consequences for Adam and reveals a link between the material and spiritual worlds and between what some might think is an amoral universe (nature) and the moral basis for that universe (God). From the beginning, however, humans had a moral responsibility to take care of their environment. When they failed to follow instructions, they were banished from the garden, and their failed responsibility had physical and spiritual consequences.

The Adam-modern human link is also important to account for God's image being transmitted to all humans, in some accounts, through sexual reproduction. To believe otherwise, leads us down the road of Manichaeism and a separation of the "spiritual" from the "physical." From an anthropological perspective, however, humans began

through a long series of changes in hominid populations (human-like creatures) that evolved from a common primate ancestor with chimpanzees²⁷ less than about seven million years ago.

Those Christians who want to bridge this chasm between the biblical and anthropological views may do so, for example, by writing off the first few chapters of Genesis as nonhistorical, or by appealing to God-guided evolution as an explanation. While both of these positions solve many difficulties, and are held by many scientists who are Christians, they leave some knotty problems. From an orthodox Christian perspective, these problems include the development of language, symbolic behavior, and human interconnectedness with the natural world, not just because humans are unique and part of that world, but because they bear responsibility for what they do—whether the consequences of their actions are intended or unintended. Their choices can have far-reaching and cosmic consequences. Can these characteristics be derived from biological evolution? In spite of speculation to the contrary, even some Paleolithic archaeologists recognize significant revolutionary cognitive differences at the beginning of the Upper Paleolithic that are associated with modern humans in Western Europe. Some have argued that this difference may have been caused by a genetic mutation. But, does this explain the human “mind”? Scientific explanations for human origins, however, speculative or not, will always be naturalistic and materialistic because of the nature of the presuppositions of science.

Another of the knotty problems of God-guided evolution consists of a uniquely modern version of the Gnostic problem: the biological aspect of humanity is totally different and separate from its “spiritual” side. Such notions tend to deny the biblical view of the unity of the human person by arguing that the human body and brain evolved first and the “spiritual” creation of humans in “the image of God” came later by a unique divine act.²⁸ The divine image was thus separate from the biological evolution of the human body and brain. The divine image, however, is not just some mystical quality infused into an animal at some remote point in the past, but rather has real biological and cognitive foundations that give it a physical basis. As near as we can tell, modern human cognitive and cultural capacities developed very late in the hominid sequence. They were in place by the Upper Paleolithic Period in Europe (about 35,000 BC at the latest), and seem to have a solid biological basis in the human brain. The Upper Paleolithic thus seems to be a likely beginning for the “embodied image of God.”²⁹

The price of this position of God-guided evolution³⁰ (as attractive as it might seem) is that it tends (but not always) to deny the historic character of the early chapters of Genesis.³¹ In evolution, populations evolve. With the biblical text saying that the first humans were a single cou-

ple, one is left struggling with the theological implication of how this couple can be reconciled with a “population” for the evolutionary origin of humans. More important, if one takes the Genesis account as, at least, theological history, it is difficult to understand how a population collectively bore the responsibility for disobedience against the divine will, and how it could have emerged in any way other than through a single couple. This problem, of course, can be eliminated by arguing that humans began with a divinely-selected “first couple” from a larger group of pre-existing hominids. But, this position still leaves questions about the Gnostic separation of the biological beginnings of humans and the subsequent divine imprint and questions about the social, and potentially sexual, interaction of this couple with other members of non-Adamic hominid populations at the time. Are the “image of God” and “original sin” passed on by means of a physical lineage through normal sexual reproduction? Or, is there some other means of transmission?

Scientific explanations for human origins, ... speculative or not, will always be naturalistic and materialistic because of the nature of the presuppositions of science.

Among other reasons, a historical basis of an initial human pair has validity for Christians because it accounts for the unusual and unique place of humans in the natural world, why evil is so pervasive in humanity, and why humans have responsibility for it. Needless to say, these fundamental issues set the stage for understanding the need for redemption and Christ’s atoning death. It is this latter point and the analogy between Adam and Christ made twice in the New Testament that are the strongest biblical evidence for a historical Adam. Both strengthen the position for a historical Adam that was uniquely created, whatever that unique creation or “divine image” in humans might mean materialistically.

Sadly, much of what is available to lay people about these issues is sloppy or questionable scholarship at best and outright deception at worst. While purporting to provide Christian answers to origin issues, some publications may, in fact, erode the very message that they are trying to proclaim: The God of the Bible is a God of truth and integrity, and the world that God has created is real, bears the stamp of the Creator’s character (despite nature’s



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challenges
the truth
of the
God
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fallen state), and it can be known (despite human's fallen state). Further, nature itself and the Bible's use of the metaphors of nature help humans understand who God is and how to know him. A doctrine of creation that affirms the integrity of natural revelation as a reflection of the character of God is thus absolutely essential to be able to know about, and proclaim a God of Truth who can be known from the Bible. The God of the Bible is not an aloof deity of disembodied and immaterial spirit that bears little or no relationship to the integrity of the world (and its past) that is a product of divine creation. Authors that undermine a scientific approach to the past are thus the poster villains of Noll's book. For those of us who are Christian anthropologists, they are "Exhibit A" of the "Scandal of the Evangelical Mind." Their message of the Gospel is undermined by their implicit denial of a God who proclaims the divine character in nature and can be known from it. As Christians, we need to be committed to the pursuit of truth, wherever it may be found, and no matter how inconvenient or threatening it may seem—anything less challenges the truth of the God we worship. Truly, as Noll has written, there is a scandal of the evangelical mind and it appears to be greater in anthropology than in any other discipline.

Cultural Relativism

Besides the issues of human origins, the second ideological conflict between Christianity and anthropology concerns cultural relativism. Notions of relativism in the history of American anthropology have their roots in works such as Ruth Benedict's *Patterns of Culture*³² and those by Melville Herskovits.³³ Historically, however, cultural relativism was a methodological reaction to the ethnocentrism of nineteenth century anthropology that used western European culture as a standard of comparison for cross-cultural description and theory construction. To counter this tendency, the first American anthropologists formulated the notion of cultural relativity: in order to study a society and understand its cultural practices, one must see those practices from the perspective of the members of that society. For some, especially ethicists, philosophers, scholars in multicultural studies, and some anthropologists, this methodological relativism was extended to moral and ethical

relativism. To them, cultural relativism was a belief that all cultural diversity, including morality, is relative to the culture in which it occurs and that no ethical or moral pattern ought to be universally applied to all cultures.

Although this fusion of "cultural" and "ethical" relativism was also propagated by some anthropologists in the first half of the twentieth century, it has been abandoned by anthropology since 1971, when the American Anthropological Association developed a code of ethics.³⁴ Such a document is hardly one that would be expected in a discipline that is reputedly ethically and morally relative. Some contemporary anthropologists, however, still believe in a kind of ethical relativity, but officially, anthropology has moved beyond this, and cultural relativism (as moral and ethical relativism) has not been an issue since the Vietnam War stimulated reflection about the responsible uses of anthropological research. Rather, cultural relativism simply has come to mean the suspension of judgment and of one's own cultural biases until one better understands the culture under study. Then, moral judgments and moral action are possible and anthropologists *do* make moral decisions about issues such as refugees, immigrants, indigenous rights, war, the loss of land of indigenous peoples, and female genital mutilation. Throughout the last thirty years, anthropologists increasingly have committed themselves to causes that protect the people that they study, and champion causes of the poor and exploited people of the world.

Relativistic morality dies hard in a post-modern world and ethical and moral variations of cultural relativism still persist in disciplines outside of anthropology such as those concerned with pluralism and multiculturalism. More important for anthropology, however, is the underlying methodology that led to the development of relativism and still profoundly influences the discipline: immersing oneself in a foreign culture in the "field" as a participant-observer. The importance of this approach was eloquently described by the late Joseph B. Casagrande.

[Field research is a challenging scientific undertaking, an adventure of both the mind and the spirit.] Immersed in the life around him, the anthropologist may experience an exhilarating sense of coming to understand another peo-

ple and of being accepted by them. He may also at times undergo a shattering feeling of isolation, of strangeness and disorientation, and yearn for the comfort of accustomed things. Herein lays the dilemma, for he is neither full participant in the life he studies, nor simply a passive background observer of it. He is something of both, a role nicely summarized in the double term, "participant-observer." Not born to the alien culture or committed to it, the anthropologist must stand at a certain psychological and emotional distance from it. If he is an objective scientist, he cannot "go native." Neither can he hold himself aloof and observe human behavior as a naturalist might watch a colony of ants; with fellow humans there is both the possibility and necessity of communication. One's capacity for imaginatively entering into the life of another people becomes a primary qualification for the anthropologist. For him, the "field" is the fountainhead of knowledge, serving him as both laboratory and library.³⁵

The "field" is holy ground to the anthropologist and going there is almost a sacred rite of passage. Casagrande called it both "laboratory" and "library." This "rite of passage" gives anthropologists a different, more objective view of another culture, less tainted by one's own cultural biases. A similar perspective is reflected by Georges Condominas in his Distinguished Lecture to the annual meeting of the American Anthropological Association in 1972.

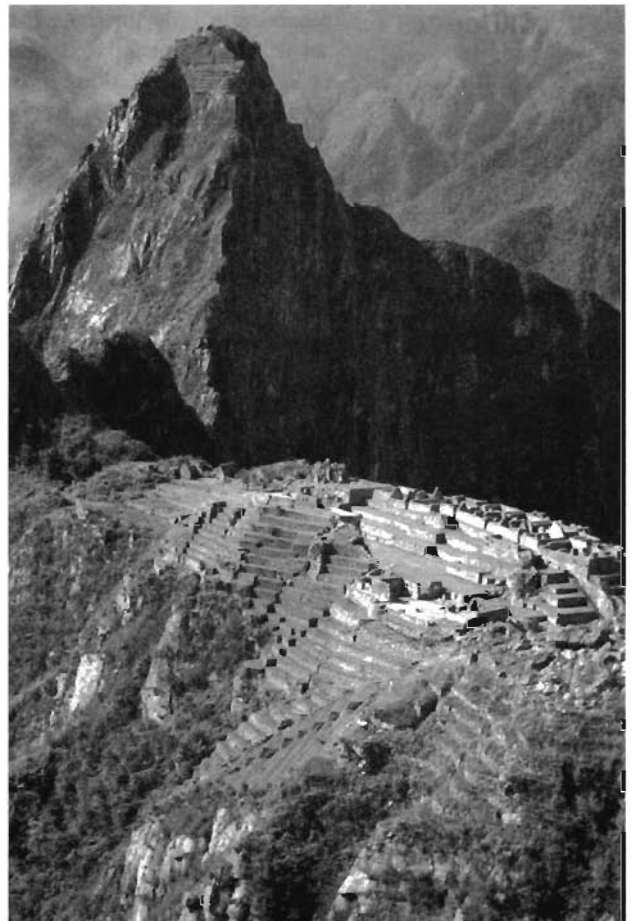
... the most important moment of our professional life remains field work; at the same time our laboratory and our *rite de passage*, the field transforms each of us into a true anthropologist.³⁶

These quotes powerfully reflect the anthropological mystique: fieldwork using participant-observation is historically the "heart" of anthropology. It is an essential prerequisite for the collection of data and it is an indispensable component in the training of every anthropologist. For many of us, fieldwork is the reason that we found anthropology attractive in the first place. All of the talk about holism, generalization, theory, and the "science of humanity" is trumped by one very important personal bias: we love fieldwork and look forward to the time when we can return again "to the field."

Anthropological fieldwork is different than that of the missionary, tourist, development worker or diplomat. It is different than any other science or social science that does work in the "field." Immersion in the life of the people is not living on expatriate compounds, obtaining one's food from the embassy commissary, going to cocktail parties with local movers and shakers, or having the comforts of home in a foreign setting. In order to truly understand another culture, one must live with the members of that

culture, eat their food, and try to see the world as they see it. This takes deep commitment to the people one studies, and the experience can be difficult, uncomfortable, and disagreeable. The results can be greatly rewarding, however, and an anthropologist can come to understand a group of people relatively quickly. Indeed, during a visit to Bolivia some years ago, one missionary admitted to me that an Argentine anthropologist had learned more about her community in six months than she had learned in seven years.

Fieldwork using participant-observation thus makes a significant contribution to the ideology of cultural relativism. Once one is immersed in another culture, and understands it from within, the anthropologist sees just how "relative" cultural practices can be. Becoming a participant-observer thus reinforces anthropological beliefs about cultural relativism and gives the belief personal power and meaning.



Anthropologists often go to remote locations to do their field work. Although well-known and highly popular, the Inca site of Machu Picchu is located in the jungles of southeastern Peru, and except for a tourist hotel, living and working there means living without the comforts of home. Research can also be challenging physically such as investigating the site of Huayna Picchu, the peak in the center of the photo (with terraces on the top of it). Ascending the stairway to the top can be challenging as well as dangerous.



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On the other hand, anthropologists believe that Christians are ethnocentric, arrogant, and "pre-judge" cultural practices before they understand them. For the Christian anthropologist, however, it is the empathy and understanding of the people that one studies that makes the experience of cultural immersion similar to the Incarnation. No secular anthropologist would admit it, but ideally, the anthropologist tries to have an experience that metaphorically mirrors much of the Incarnation. If one compares the Incarnation with fieldwork as a "participant-observer" described above by Casagrande, then one can see the similarities. Jesus subjected himself to the institutions of human culture without losing his divinity; he was a "participant-observer" without losing objectivity of who he was, or why he came. Further, Christ also withheld judgment, reserving it only for the self-righteous, and set it aside in order to accomplish another task, the reconciliation of humanity with God.³⁷ The anthropological experience of participant-observation, however, differs from the Incarnation in the purpose of the immersion experience and few anthropologists would admit a desire to transform or redeem the culture that they study, at least initially.

For the Christian anthropologist, field research and one's own experience as a participant-observer take on a new meaning. His or her non-Christian professors and student colleagues inevitably ask the hard questions: Why not just leave these foreign cultures alone? Do they really need a western religion? Do they really need a western God? Are they really as bad off as missionaries would lead one to believe? These issues also go deeper for Christians because questions about the cultural embeddedness of Christianity force them into deep reflection about the relationship of their faith to the anthropological perspective. It causes them reflect on the cultural and social dimensions of Christianity.

Anthropology as Cultural Critique

Cross-cultural immersion provides the basis of a critique of Christianity that challenges one's faith and its social and cultural dimensions. It provides another explanation for the antagonism between anthropology and Christianity and contributes to the paucity of Christian anthropologists. While being a participant-observer gives anthropologists a different, more objective view of another



A wife and children of a potter in Ticul, Yucatan. Participant-observation provides great empathy and understanding of a different way of life. Most potters live on the edges of poverty, often suffer great tragedies (hurricanes, sickness, and lack of sales), and have few material resources on which to draw in these times of crisis.

culture and is less tainted by one's own cultural biases, it also provides them with a more objective and critical view of themselves and their own culture. For Christian anthropologists, the experience also provides a different view of their faith, missionary activity, and its social and cultural dimensions.

Some Christians emerge from their field experience and graduate training having left their faith behind. Indeed, some secular anthropologists came out of evangelical and fundamentalist backgrounds and became disillusioned with Christianity during their doctoral program, and/or had a "social science" conversion experience. In this experience, they recognize the western cultural assumptions in the praxis of Christianity and see it myopically as a product of western civilization and American values such as those elucidated by Arensberg and Niehoff.³⁸ I personally know of seven professional anthropologists who are former missionaries, or who came from evangelical backgrounds, for which their "Christian experience" is no longer real or relevant. I suspect there are many more. One, Elmer J. Miller, went public with this crisis of faith by saying that he could no longer affirm the uniqueness of the Christian claim to truth.³⁹

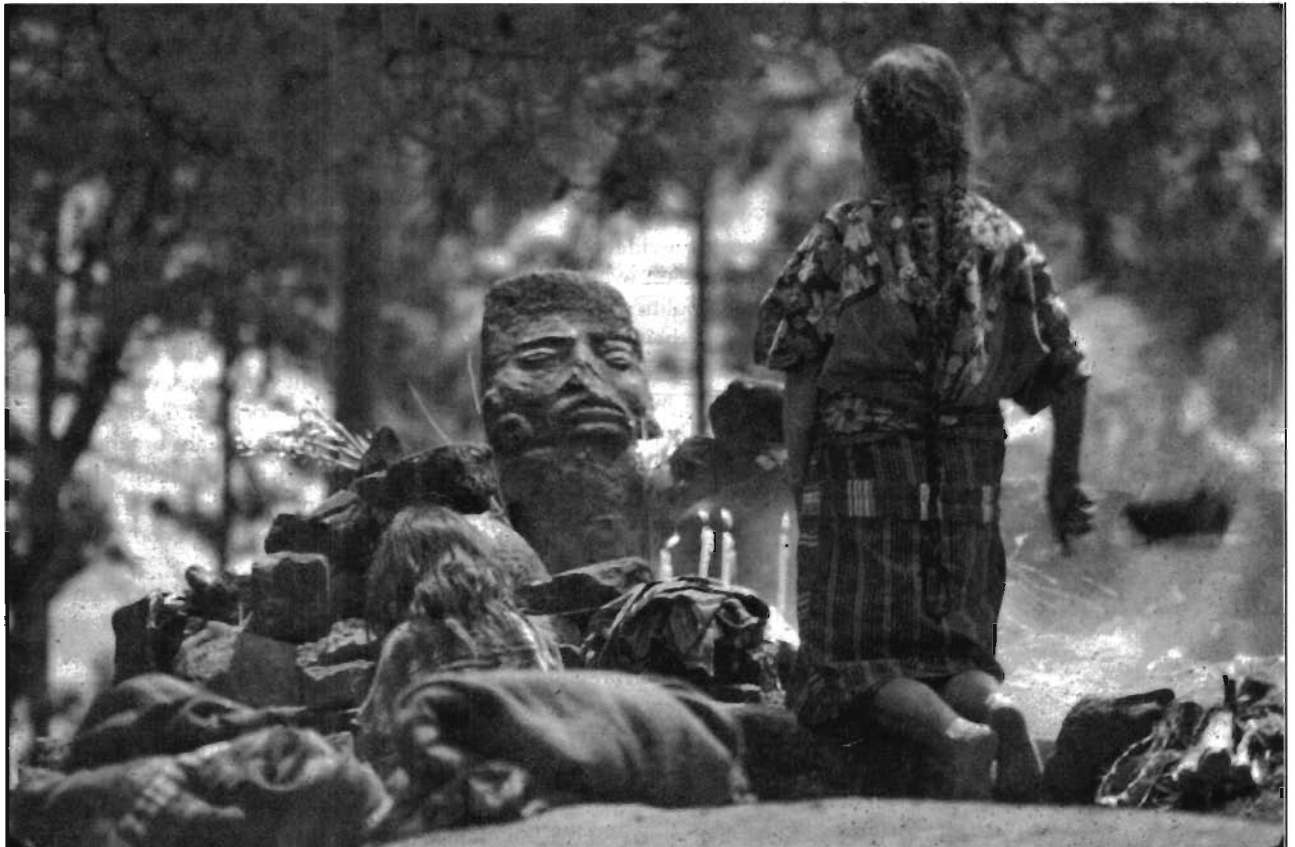
Such a crisis of faith is not limited to Protestants. Joanne Mulcahy recounts her own struggles with the faith of

her childhood during her field experience in Alaska. She recounted how the sensory richness of an experience in a Russian Orthodox Church overrode her intellect and carried her back to the Roman Catholic ritual of her youth, but she refused to submit to that memory.⁴⁰ Later, she longed for the faith that an informant described and imagined it similar to her own childhood belief:

But almost as quickly as the longing surfaced, I wriggled from its grip. I had replaced religion with the structural elegance of linguistics, folklore, and cultural anthropology. The patterns of social science, I concluded, would tame the power of the incomprehensible.⁴¹

While fieldwork and anthropological training can challenge one's faith, field experience also creates a different perspective of the anthropologists' own culture even without a crisis of faith. This experience makes them a rather "different" group of people. In many respects, they become mavericks—counter-cultural gadflies who see the world differently and challenge traditional worldviews and social institutions.

The training of anthropologists provides them with insight that may be threatening to social structures of Christian organizations. This insight leads to critiques that challenge the cultural assumptions of the American evan-



A Quiche woman shaman offering incense to the mountain god on an altar near the town of Chichicastenango in highland Guatemala. Christian anthropologists often find themselves observing rituals and ceremonies not in harmony with their Christian faith and must learn to understand.



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gelical subculture and those of Christian institutions such as the church, para-church organizations, missions, and confessional colleges. Such critiques are important for the church because the Christian community needs to be more accountable and responsible in understanding how its culture affects its ministry, evangelism and biblical interpretation. It should recognize that the cultural expressions of Christianity are different than the transcendent reality that Christians engage through their "faith." This reality is an intangible, totally separate, all-powerful personality who came to earth in human form to establish a relationship with humans. It is very different from the organizations of Christians in America, or in any other society. Such critiques, however, exist more between anthropological explanation and Christianity as a social and cultural institution, and between anthropology and the Bible as a cultural document, than it does between anthropology and what the Bible actually teaches. There *is* a conflict between Christians and anthropologists, and between Christianity and anthropology, but not necessarily between anthropology and the historic Christian faith. Indeed, little of what most of us know tangibly as "Christianity" transcends cultural barriers, and it desperately needs to be critiqued anthropologically to fulfill the mission of the church more effectively.

These problems become evident when Christian leaders pontificate on everything from issues of origins to politics, and are more than happy to assert their power on issues that are rather distant from biblical values and from their own academic and professional field of study. The flap over the "gender inclusive" translation is a marvelous example of the use of ideology and beliefs to legitimize a position of power as an inheritor of the "truth" as rightful privilege. This conflict is so foreign to biblical values of humility and the dangers of power that the Christian anthropologist is virtually forced to use a structural interpretation: power elites manipulate ideology to reinforce and legitimize their position of power. To anthropologists, whether an ideology is true or not is not the point. Rather, they recognize the importance of elites acquiring and maintaining power through the use of ideology. This is true of churches, denominations,

para-church organizations, political parties as well as nation-states such as our own.

Such a cultural critique can be disturbing to Christians because when it is applied to Christianity, it demystifies their religion, challenges the sacred, upsets popular views, and challenges charismatic leaders. While the presence of God in our world and his sovereignty is primary and sufficient as an explanation, we are also humans who are bound by sin and selfishness, our culture and our social structures. Such structures and the values that they embody may be evil, unchristian, and unbiblical. Explaining them with pious religious language elevates them to a level of being the only explanation, and ignores the role of structure and the social and cultural values that drive that structure. Further, such verbal explanations may be manipulative, hypocritical, and arrogant, and may be used to preclude challenge by dissenters that would ensure accountability.

Religious language, however, consists of symbols that bind people together, convinces them that they should keep the rules, and thus reinforces the power and structure of the leader of the organization. This union of structure and ideology and its latent functions with other conscious explanations was recognized by Karl Marx in the nineteenth century when he called religion the "opiate of the people." In this quote, he was expressing a very simple explanation that anthropologists (whether Christian or not) know too well: that the religious explanations and religious symbols, regardless of their truth value or metaphysical basis, can be used to reinforce existing social and political structures. If such structures are organized hierarchically and lack accountability, then they can be used to perpetuate evil by convincing others that they are doing good.

Such critiques of Christianity can prove fatal to Christian fellowship and can discourage a career in anthropology, or they can force Christian anthropologists underground and render them "invisible." But, such critiques can, on the other hand, also strengthen one's faith and give Christian anthropologists biblical basis for social justice. They can also refine and focus the mission of the church and make it more effective, if it has the will to change.

The Role of Family

A fourth reason for the tension between Christianity and anthropology concerns the effect of fieldwork on family life. In anthropology, field work is essential to be credible in the secular academy. Such research, however, takes anthropologists to locations to which travel is often expensive for a family. The financial and time demands for this research and the emotional stress required by immersion of a spouse and children can be difficult. Separation from one's family in order to undertake field research can also be difficult. Isolation without immersion can be alienating, but immersion, in spite of its similarity to the Incarnation, creates suffering and trauma—as was the case for Christ. Life on the field can be incredibly lonely without the support of friends, family, and the symbols of home.

The challenge of immersion and living as close as one can to the people whom one studies creates great hardship such that even basic necessities such as obtaining food, staying healthy, and answering the call of nature can produce challenges undreamed of in America. There are also physical challenges such as a different climate, a different

altitude, and intellectual challenges such as learning the local language. And, there are the emotional challenges to survive the inevitable conflict of one's own values with those of the new culture.

If Christians work in the field with secular colleagues, they may experience a "double whammy" because they must deal with the conflict of the values of their non-Christian colleagues as well as those of the culture being studied. On top of all this, they must do their work, develop relationships with their informants, and collect data. Often, the strain is too great for a spouse. Subsequently, the anthropologist may not go to the field.

Sometimes the loneliness and isolation of the field create dependency on the use of drugs and alcohol. At other times, this loneliness creates a deep desire for intimacy and makes one vulnerable to the temptation of a sexual tryst with a colleague or a native.

As I write this, example after example of these kinds of problems flood into my memory from people I know, from my experiences in the field (both alone and with



Quechua-speaking Andean peasants taking a break from threshing barley to drink cane alcohol and maize beer near the town of Sangarara in a very remote section of southern Peru. The people in the Andes have a tradition of ritual drinking, and Christian anthropologists must make lifestyle choices that relate to their Christian faith in these situations. Life in the Andes is also physically challenging. With no place to sleep and nowhere to eat in Sangarara, I asked the police to sleep in the jail, but they offered me a bed in their dormitory instead. When I went to shave the next morning, I discovered that the shaving water had frozen because the village is located about 13,000 feet above sea level. Although I arrived on the back of a truck, in order to leave the village, I had to walk some 15–20 miles to find a truck to take me to Cuzco.



Christian anthropologists ... tend to see their scholarship through American cultural glasses. This perspective emphasizes pragmatism and utility ... and focuses on the traditional mission of the church ... [It] fails to see scholarship as a stewardship of one's mind, and as an activity that simply brings glory to God regardless of its utility.

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colleagues), and from the informal "culture" of the discipline. Needless to say, these problems are hard on marriages, and in the last forty years, I have seen many marriages of my anthropological colleagues break up. Hardly a year passes that I do not learn of a break up of a marriage of at least one colleague whom I know, or learn of a problem of another with drugs and alcohol. In sum, the "culture" of the discipline can be hard on Christians, especially because of lifestyle issues, and can deeply affect the quality of marriage and family life.

Problems Stemming from the Church's Values

Besides the tensions between anthropology and Christianity, another contribution to the limited impact that Christian anthropologists have made on the secular academy concerns the fact that they tend to see their scholarship through American cultural glasses. This perspective emphasizes pragmatism and utility ("What can I do with it?") and focuses on the traditional mission of the church ("How will it make a difference in missions or implementing the 'great commission'?"). This singularly American pragmatism and concern with American values fails to see scholarship as a stewardship of one's mind, and as an activity that simply brings glory to God regardless of its utility. In other words, professional scholarship is an activity that must be practical in some way as a means to an end rather than an end in itself.

The application of anthropology to missions has a long and distinguished history of more than fifty years. While such scholarship is essential for Christians and for missions and it is scholarly, it is not a kind of anthropology that has influenced the secular academy in the discipline. Similarly, writing for Christians, about Christian themes or from a Christian perspective—as important as it is—is not sufficient to influence the academy. Non-Christian anthropologists probably will never read nor engage this literature, and it probably will never be influential in the anthropological world. In anthropology, anti-Christian prejudice is one bias which is, and has been, politically correct. This point is masterfully documented in the article by Robert Priest cited earlier in this paper.

Anthropology and Education

Besides the tensions between anthropology and Christianity and a preoccupation with the church's cultural values, another reason for so few Christian anthropologists concerns education. The model of Christian scholarship is largely a "humanities" model and is geared almost exclusively to reading, the hearing of written language, and writing. We favor the student who reads well, learns what he or she has been told to learn, can write about it well, and can do so efficiently. The learning is cognitive and favors a learning style that is based upon written language. Linear, rather than visual and contextual thinking is selected for and synthesis and distillation are emphasized more than intellectual creativity. Encouraging students with this style of learning to consider a life of scholarship has great value. But, if we persist in training these kinds of students exclusively, then we will never have many Christian anthropologists who need to be creative, nor visual and experiential learners who can analyze, describe experience, and synthesize their observations.

My best experiential learners, with the most sensitivity, insight, and creativity in analyzing themselves and other social settings are not the academic "stars." My worst experiential learners are those who cannot handle the ambiguity of nonlinear contextual learning, and they are often "good" students in other disciplines. It does not matter that life experience is visual, contextual, and ambiguous. Rather, the most successful experiential learners are not necessarily the most academically successful, but are often sociology/anthropology majors and some literature and science majors who are used to translating experiences into words and who are good writers. Christian higher education is such that it will continue to produce history, philosophy, literature, political science, and theology scholars, but few scholars in fields where the frontiers with Christianity are the greatest such as anthropology.

Traditional scholarship in anthropology has emphasized a "scientific model" of scholarship which has focused on the discovery and description of new information based largely upon sense experience, not written documents. For the biologist, the sense expe-

rience comes from observation in the field or the laboratory. For the anthropologist, that sense experience comes from "the field," in the immersion in the life of another culture in its natural setting. This is one of the lessons that one learns in the "professional culture" of anthropology: the field, as Casagrande put it, is the "fountainhead of knowledge."

This problem is also illustrated in the funding of Christian scholarship. The model chosen for Christian scholarship is the "humanities" model. The problem is not that the model is bad, but that it is exclusive, Gnostic, and firmly embedded within the values of American culture: "Christian scholarship" must be on religious topics, for Christian ends, with explicit Christian presuppositions. Scholarship, however, is socially and somatically embedded and Christian influence on the secular academy comes from this embeddedness rather than from disembodied ideas on a printed page. Just like the Incarnation, Truth is embodied in a person—not in good ideas. "Christian" scholarship and its influence on the academy thus ultimately depends just as much on how we live our lives as scholars and what we do, than just upon the disembodied ideas we have—as important as they are.

Conclusion

Given all of the reasons for the tensions between anthropology and Christianity, and the dearth of Christian anthropologists, can Christians in anthropology survive under the pressures described here? Can they make a contribution to the secular academy? The problem of the dearth of Christians in anthropology is not because there is no evangelical mind. Rather, in anthropology, the "scandal of the evangelical mind" exists because of a complex set of reasons that involve tensions between Christianity and some of the most basic ideologies of anthropology, the cultural critique of Christian institutions that anthropology provides, the problem of family, the problems stemming from the church's values, and the orientation of Christian higher education.

Given these problems, how can the Christian anthropologist influence the academy? Pure research in a climate of professional competency is a crucial first step in influencing anthropology positively with a Christian viewpoint. Influence requires learning about the professional subculture in graduate school. It requires consistent attendance, interaction, and presentation of papers at professional meetings over years, not just an occasional participation when these meetings occur within a few hours drive of one's home. Influencing the discipline requires fieldwork at the proper time during those graduate years. It requires publication in professional journals and the willingness to turn one's back on the value of pragmatism and utility and see scholarship as glorifying God with one's mind, and loving and influencing other

scholars positively, as a Christian, for Jesus' sake. It also requires grace, prayer, and discipline.

Scholarship, like evangelism, is not the propagation of "good ideas" for their own sake, but rather scholarship, like the gospel, must be socially and somatically embedded, just like the Incarnation. We influence people first with the "fruit" of our character, not just with our words. Just like the Epistle of James, our lives must demonstrate that the words of Truth are not just words, but emulate the reality of transcendent Truth that we call "God" who came to earth in human form to reestablish contact with us. As Christian anthropologists, we need to begin with our scholarship, our life, and our interpersonal interactions. Influence in the academy does not occur with just words or disembodied ideas. Christians are not selling a religion, another good idea, or another brand of toothpaste that is



Developing relationships with people is one of the great rewards of being an anthropologist, and a desire to learn and understand another culture provides a great basis for rapport and mutual respect. In 1984, the members of the potters' religious brotherhood asked me to place the crown on the head of one of their daughters whom they had chosen to be their ambassador to the community. In this photograph, women are waiting to begin the procession for similar brotherhood. These processions and ceremonies express the ethnic identity of the participants, social memory, and allow women to dress up in their finest in the hope of attracting potential suitors.



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Article

Why Are There So Few Christian Anthropologists? Reflections on the Tensions between Christianity and Anthropology

only based on words. Just as missions needs more of an incarnational orientation, so Christian scholars should be reflecting the living Christ in a personally-embedded way, in scholarship and in our lives, that *shows* that our words, and the words of the One we worship are *true*, not just because we say so, or because the Bible says so. The future of Christian scholarship for anthropology and its influence on the academy and intellectual life thus rests on pure research by scholars who are recognizably Christian, not just by their explicit engagement of a Christian perspective.

Christian anthropologists have traditionally been powerless in the profession. And, as I have come to experience it, we suffer from discrimination in the field. The only way to change this position is prayerfully and thoughtfully to allow oneself to participate in the networks of power by presenting professional papers and writing for the profession—not just for Christians. In anthropology, having a Christian voice can only occur through careful cultivation of the vineyard of scholarship that is recognized by the academy. We cannot set our own rules, or our own agenda, but we have to abide by the unwritten norms and social structure already in place. The Christian mind should not be disembodied on the printed page, but should be physically embodied and socially embedded, as much as it can be, in the life of the secular academy. When it is, and meets the standards of the scholarship and interaction in the academy, *perhaps* we can begin to have a Christian voice that may be influential in our profession. But, our main task should be to bring glory to God with our mind by what we do—whatever kind of research it involves.

At the same time, Christian anthropologists have a responsibility to the church, to educate Christians about the importance of anthropology for its mission, and to teach with integrity about the conflicts between anthropology and their faith. Exposing error and challenging traditional syntheses and answers are parts of this process. Further, all Christian scholars have a responsibility to encourage students and others struggling with the issues elaborated here. A conversation, or some words of encouragement, may be critical in the life of a struggling student. Sometimes, simple openness and honesty

that there are no ultimate answers communicates love and acceptance by God, and that there is nothing wrong with a faith that exists in the midst of uncertainty and tension. **

Acknowledgments

This article has been percolating for many years, and I am grateful to a number of colleagues and students over the years who read and suggested improvements to it: Thomas Headland, Mark Noll, Steve Cassells, Alex Bolyanatz, Charles Ellenbaum, Dorothy Chappell, Brian Howell, Stan Jones, Amy Hirshman, and Tim Larsen.

My wife June read the manuscript critically in several drafts and greatly improved it.

Lindsey Wiersma, Christy Reed, and Devin Goulding checked and verified bibliographic entries.

Members of my senior anthropology capstone course in 2002 (Heidi Biddle, Mandy Cairns, Amber Davis, Chris Ebersole, Tiffany Grant, Phil Hooper, Jeremy Kirchoff, Arthur Kraai, Jessica Madigan, Josh McClain, David Nelson, Christy Reed, Mark Snider, Matthew Stewart, Jennifer Stube, Matthew Talley, Alice Toher, and Jeremy West) were particularly helpful in making many refinements to this article.

I am also grateful for the critical comments of Devin Goulding and the editor of this journal for suggestions for shortening it. This article has also benefitted from the comments of three anonymous reviewers.

Notes

¹Mark A. Noll, *The Scandal of the Evangelical Mind* (Grand Rapids, MI: Eerdmans, 1994).

²Michael S. Hamilton, "Reflection and Response: The Elusive Idea of Christian Scholarship," *Christian Scholar's Review* 31, no. 1 (Fall 2001): 13–31.

³Joel A. Carpenter, "Response to Hamilton," *Christian Scholar's Review* 31, no. 1 (Fall 2001): 21–4.

⁴Dorothy F. Chappell, "Response to Hamilton," *Christian Scholar's Review* 31, no. 1 (Fall 2001): 24–7.

⁵Don King, "Response to Hamilton," *Christian Scholar's Review* 31, no. 1 (Fall 2001): 28–30.

⁶Besides the reasons enumerated here, there are also practical and infrastructural reasons. These reasons include, but are not limited to, the availability of funds for research and writing, and time off from teaching in institutions that typically have heavy teaching loads, substantial committee work, and a commitment to student care and counseling.

⁷The measures of the impact of Christian anthropologists on the academy should be empirical rather than based upon anecdotal information. One way to assess this impact empirically is to compile the number of citations of Christian anthropologists in one or more of ISI's citation indices (the Social Science Citation Index, Arts and Humanities Citation Index, or the Science Citation Index) and compare them with randomly chosen individuals from comparable secular colleges or universities. Anthropology journals are indexed in both indices. Google Scholar is an easier way, but it is crude, and the basis for inclusion in the database does not appear to be explicit.

⁸"Politics of the Professorate," *The American Enterprise* (July / August 1991): 86–7.

⁹Robert J. Priest, "Missionary Positions: Christian, Modernist, Postmodernist," *Current Anthropology* 42, no. 1 (2001): 29–68.

¹⁰The term was first used in the Kinsey Report to refer to a position of sexual intercourse, but Priest showed that the term (as well as the position) was absent both in the Christian and missionary literature and in the anthropological literature prior to the publication of the Kinsey Report in 1948. Consequently, its use in that report was the result of shoddy scholarship at best, and/or outright anti-Christian bias at worst.

¹¹Priest, "Missionary Positions: Christian, Modernist, Postmodernist," 40.

¹²*Ibid.*, 45.

¹³As recently as 1980, Christian anthropologist Claude Stipe was hard pressed to find explicit condemnations of Christian missionaries in the anthropological literature in spite of the rather open condemnation of it informally and pedagogically in the classrooms of the discipline (Claude Stipe, "Anthropologists Versus Missionaries," *Current Anthropology* 21 (1980): 165–8). This has now changed and Robert J. Priest has written a thorough article (see note 9) detailing the attitudes of anthropologists to missionaries. In the responses to that essay, it is clear that there is antagonism toward Christians.

¹⁴Talking about the need for scholarship by Christians is one thing, but in reality, scholarly research (whether by Christians or not) takes funding, and outside of Christian colleges and universities, there appears to be little vision for support of Christian scholars, particularly those doing the "pure research" of which Hamilton speaks.

¹⁵Thomas Headland, personal communication, April 29, 2002.

¹⁶With twenty-one current members with Ph.D.'s in anthropology, the Summer Institute of Linguistics, the academic arm of Wycliffe Bible Translators, probably has more Christian anthropologists than any other single organization. In 1997, there were 260 Ph.D.s in this organization, but most of them were in linguistics (Thomas Headland and Kenneth L. Pike, "SIL and Genocide: Well-Oiled Connections," *Anthropology Newsletter* 38, no. 2 (1997): 4–7). By April 2002, 307 SIL members had earned doctorates and 257 of them were Ph.D.'s (Thomas Headland, personal correspondence, April 19, 2002).

¹⁷There may be other Christian anthropologists who teach at secular universities and will not associate with us. The existence of such individuals is obviously difficult to verify, but I know of at least two such anthropologists who were supported by a foundation that supports Christian scholarship. To my knowledge, they have never associated themselves with the "Network." On the other hand, I know others who come to the national meetings, but attend symposia that conflict with the scheduled time of the Network gathering.

¹⁸Both from my own experiences and from those of other Christian colleagues, one of the reasons for the small number of Christian anthropologists is the prejudice against Christians in the discipline. Christians without the symbols of Christian involvement on their vita have fared the best. Those with missionary credentials and those with degrees from Christian colleges and seminaries have fared the worst and have suffered the most prejudice.

¹⁹Christians in archaeology usually specialize in Biblical, Near Eastern, or Classical archaeology and appear to be more interested in

issues of biblical apologetics and interpretation than the broader theoretical issues that appeal to anthropological archaeologists. Although the latter are usually archaeologists of the New World, the area of research interest no longer separates the two kinds of archaeologists, and anthropological archaeologists now work in virtually any area of the world. Anthropologically-trained anthropologists tend to belong to the Society for American Archaeology while others belong to the older Archaeological Institute of America, but there is some overlap.

²⁰These perceptions have been used to deny an informed and anthropologically competent Christian voice from being heard in the discipline. There are many examples of this type of prejudice from fellow Christian anthropologists, but an elaboration here is outside the scope of this article.

²¹Duane Gish, *Evolution: The Fossils Say No!* (Green Forest, AR: Master Books, 1979, revised 1985).

²²These oppositions force thinking students into one of two extremes: an intellectual rejection of Christianity for the sake of participation in the scientific community, or an anti-intellectual rejection of science for the sake of participation in the Christian community. These oppositions, however, are as counterfeit as they are unfortunate and are latter-day manifestations of the early Christian heresies of mind (spirit)/matter dualism such as Manichaeism, Gnosticism, and Docetism. See Mark A. Noll, *The Scandal of the Evangelical Mind* (Grand Rapids, MI: Eerdmans, 1994), 49–56.

²³This discussion of origins is the result of forty years of reflection and study. I am not going to attempt to document each assertion, but rather present my own distillation integrating anthropology with Christian concerns. A slightly more expanded version of these ideas with some more documentation occurs in Dean E. Arnold, "How do Scientific Views on Human Origins Relate to the Bible?" in *Not Just Science: Questions where Christian Faith and Natural Science Intersect*, ed. Dorothy F. Chappell and E. David Cook (Grand Rapids, MI: Zondervan, 2005), 129–40. See also note 29 below.

²⁴Romans 1:19–20.

²⁵The dating of the first human and its relation to the Bible is a very complex issue that is of lesser importance than those issues discussed here. To summarize these problems adequately, however, goes beyond the scope of this article.

²⁶This is, I believe, one of the strongest messages of Genesis: Humans live in a vastly interconnected seen (material) and unseen (spiritual) world and the choices that humans make have tangible and intangible consequences. What is fascinating about the Genesis account is that humans are deemed responsible for the consequences (whether intended or unintended) of those choices because they were uniquely in charge of their environment. But, they were only the caretakers, not the owners, of creation.

²⁷In fact, some members of one of the reputed human ancestors, the Australopithecines, looks very similar to the Bonobo chimpanzee (*Pan paniscus*), and the earliest tools (Oldowan chopper tools) attributed to hominids are similar to a tool made by a Bonobo to solve a food acquisition problem in a lab experiment.

²⁸The irony of this issue is that the scientific evidence tends to support it. Bipedalism, brain size, and skull morphology appear to have become modern well before one sees the development of cognitive and symbolic capacities of humans in the Upper Paleolithic.

²⁹The relatively sudden appearance of a new and unique kind of culture in the Upper Paleolithic (without clear antecedents in many cases) supports a Christian view of the uniqueness of modern humans and their relatively "sudden" appearance. The evidence to support such points, however, is very controversial among paleoanthropologists and Upper Paleolithic archaeologists. It is true, however, that the cognitive and mental capabilities of modern *Homo sapiens* of the Upper Paleolithic is different than their predecessors, the *Neanderthals* (See Frederick L. Coolidge and Thomas Wynn, "Executive Functions of the Frontal Lobes in the Evolutionary Ascendancy of *Homo sapiens*," *Cambridge Archaeological Journal* 11, no. 2 [2001]: 255–60; Michael S. Bisson, "Interview with a Neanderthal: An Experimental Approach for Reconstruct-

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ing Scraper Production Rules, and their Implications for Imposed Form in Middle Paleolithic Tools," *Cambridge Archaeological Journal* 11, no. 2 [2001]: 147-63; and S. Mithen, *The Prehistory of Mind* [London: Thames and Hudson, 1994].) Assuming that the modern human mind began in the Upper Paleolithic, proponents of a more recent date (say at 10,000 BC) for Adam must accept the origin of humans as God-guided evolution that is essentially Gnostic, separating a "spiritual" Adam from all of the human intellectual, cognitive, symboling, and cultural capabilities that developed tens of thousands of years earlier.

³⁰This may be called "theistic evolution," but in reality, God-guided evolution includes a number of positions of which only one has been traditionally labeled "theistic evolution."

³¹For simplicity, I simply mean that Adam and Eve were real individuals who really did make bad choices in a spatially and temporally situated "Garden of Eden."

³²Ruth Benedict, *Patterns of Culture* (Boston, MA: Houghton Mifflin, 1934).

³³Melville J. Herskovits, *Cultural Relativism: Perspectives in Cultural Pluralism* (New York: Vintage Books, 1973). This book is a compilation of previously published articles on the subject.

³⁴This code of ethics can be read at the Association's web site: <www.aaanet.org/committees/ethics/ethcode.htm>.

³⁵Joseph B. Casagrande, *In the Company of Man* (New York: Harper and Brothers, 1960), xii. The value of the participant-observation approach in anthropology is illustrated by the prominent place-

ment of this quote, as the equivalent of "scripture" (such as the Twenty-third Psalm) on the program for the memorial service for Casagrande after his death. This quote provided here is exactly that provided for the program from his memorial service. In the Casagrande book, however, the sentence in brackets was placed at the beginning of the paragraph following the remainder of the quote.

³⁶"Ethics and Comfort: An Ethnographer's View of his Profession," by George Condominas, Distinguished Lecture, 1972, *Bulletin of the American Anthropological Association*, 1973.

³⁷I am grateful to one of the anonymous reviewers of this paper for this elaboration of this idea.

³⁸These American values include two-fold judgments, moralizing, effort and optimism, egalitarianism, separation of work and play, material well-being, nature is something to be conquered, and humanitarianism (Conrad M. Arensburg and Arthur H. Neihoff, "American Cultural Values" in *Introducing Social Change: A Manual for Americans Overseas* [Chicago, IL: Aldine Publishing Company, 1964], 153-83).

³⁹Elmer S. Miller, *Nurturing Doubt: From Mennonite Missionary to Anthropologist in the Argentine Chaco* (Urbana, IL: University of Illinois Press, 1995), 98.

⁴⁰Joanne Mulcahy "Belief, Resurrected: Through an Alutiiq Midwife's Struggle to Bridge Old and New Cultures, Lost Faith Is Rediscovered," *Science & Spirit* (May-June 2001): 38.

⁴¹Ibid.

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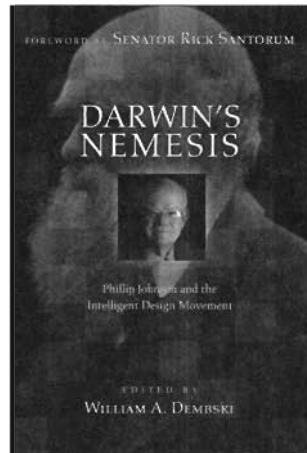
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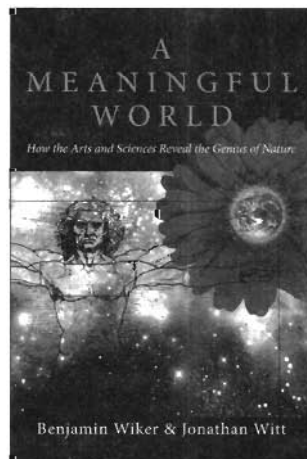


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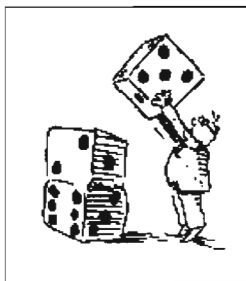
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Article

Chance in the Theology of Leonard Hodgson

Chance in the Theology of Leonard Hodgson

Thomas W. Woolley



Thomas W. Woolley

A now forgotten theologian at the University of Oxford, Leonard Hodgson, strongly argued for a positive role for chance in achieving God's purpose for creation.

In his now widely-referenced philosophical work *Chance and Necessity*, Jacques Monod offered a reasoned, albeit polemical, case for the meaninglessness of human existence; if through the self-organization of matter, the eventual development of life has occurred fundamentally by chance, by way of truly random genetic mutations, then traditional philosophical and theological views of destiny or purpose are undermined. In sum, Monod made the case that chance and purpose are mutually exclusive within the general context of the biochemical evolutionary process, but more specifically, in human development. Arthur Peacocke attempted the first comprehensive refutation of Monod's primary philosophical thesis in 1978. Then, in 1984, statistician David Bartholomew built on Peacocke's ideas in a thorough treatment of the interface of chance with Christian theology. More than two decades before Peacocke's seminal work, however, a now forgotten theologian at the University of Oxford, Leonard Hodgson, strongly argued for a positive role for chance in achieving God's purpose for creation. Who was Leonard Hodgson? How much of contemporary thinking about the role of chance in creation did he anticipate? And what contributions might his body of work make to the present-day theological discussion about the chance worldview?

Few would dispute that the contemporary scientific worldview could be well characterized as a "chance worldview."¹ Regardless of whether one considers random mutations at the biochemical level of evolutionary biology or the uncertainty inherent in elementary particles according to the dominant Copenhagen interpretation of quantum physics, "chance rules."² As the backdrop for many significant scientific theories, chance has evolved into a considerable topic of discussion in the burgeoning discipline of science and religion, particularly Christian theology.³

Chance may be apparent in more personal ways, as well. In July 1991, a commuter flight from New Orleans crashed on its

approach to the Birmingham International Airport. All but two aboard that plane perished; the lone survivors were the pilot, who was thrown through the front windshield into a nearby house, and a local Christian attorney. After his recovery, this attorney recounted his story of having survived the accident. He recalled looking out the windows and seeing treetops and roofs of houses. All the while he was holding the hand of his law partner who was sitting across the aisle from him. Later, as he lay recovering in his hospital bed, he gave thoughtful consideration as to why God had plucked him from disaster while allowing his friend and colleague to die. After careful review of at least half a dozen archetypes for the kind of God that could reign over such an event, he concluded that although the universe had been created by an omnipotent being, this same God stood back and now watched the progress of a creation governed by natural law and chance. He supported his contention by reference to scientific evidence of a universe seemingly designed around chance (e.g., evolutionary processes and quantum theory) as well as biblical passages such as, "... the race is not to the

Tom Woolley, an ASA member, received a B.S. in the Biological Sciences and his Ph.D. in Statistics and Research Design from the Florida State University. After many years in academic medical research, he has served for the past thirteen years as Professor of Statistics in the School of Business at Samford University in Birmingham, Alabama. In 2000, he was named the Carnegie Foundation/CASE Alabama Professor of the Year. Tom was selected as a Templeton Fellow from 2003 through 2005 to participate in the Templeton Oxford Seminars in Science and Christianity at the University of Oxford. Tom's research interests include the philosophy and theology of chance, indeterminacy in business, Bayesian analysis and outlier methodology. He has been married to Mary Lyn for twenty-four years and they have two children.

swift, nor the battle to the strong, nor bread to the wise, nor riches to the intelligent, nor favor to those with knowledge, but time and chance happen to them all" (Eccles. 9:11, ESV) and "... for he makes his sun rise on the evil and on the good, and sends rain on the just and on the unjust" (Matt. 5:45).⁴ A catastrophic life event had transformed this attorney into an Enlightenment-style deist, poignantly illustrating the impact that chance can have on individual lives.

Despite impeccable academic credentials, Hodgson's ideas have been omitted from all serious dialogs concerning the theological implications of the chance worldview that has come to form the backdrop of the contemporary science and religion discipline.

In his now widely-referenced philosophical work *Chance and Necessity*,⁵ biochemist and Nobel Laureate Jacques Monod offered a reasoned, albeit polemical, case for the meaninglessness of human existence. That is, if through the self-organization of matter the eventual development of life has occurred fundamentally by chance, by way of truly random genetic mutations, then traditional philosophical and theological views of destiny or purpose are undermined. In sum, Monod made the case that chance and purpose are mutually exclusive within the general context of the biochemical evolutionary process, but more specifically, in human development. Some seven years later, Arthur Peacocke, in his 1978 Bampton Lectures published under the title *Creation and the World of Science*⁶ and more directly in his paper entitled, "Chance and the Life Game,"⁷ attempted the first comprehensive refutation of Monod's primary philosophical thesis. Peacocke suggested the clever metaphor that chance serves as God's "search radar,"⁸ arguing that only through chance can the "potentialities of living matter"⁹ be fully and efficiently explored.

In 1984, statistician David Bartholomew built on Peacocke's ideas with his thorough treatment of the interface of chance with Christian theology in *God of Chance*¹⁰ and four years later in his paper, "Probability, Statistics and Theology."¹¹ Although chance has attracted the attention of numerous contributors to the science and theology

dialogue, only Bartholomew has formal education in chance as a professional matter, through the study of statistics and probability theory. He acknowledges that in the current worldview, science is the benchmark against which truth is measured. Within this context, certainties once accepted by many Christians have been replaced by doubt. In *Uncertain Belief: Is It Rational to be a Christian?*¹² Bartholomew's contention is that a rational person's belief must rest upon uncertainties. It is probability theory that provides the methodology for measuring uncertainty and therefore provides the Christian with the best opportunity for fashioning a rational basis for belief. Bartholomew admits, however, that many issues central to chance and theology remain to be worked through.¹³ Richard Swinburne¹⁴ and others have explored related themes and drawn similar conclusions.

Bartholomew's approach to integrating chance into Christian theology tends toward a traditional view of natural theology that often gives knowledge of God through the world primacy over revelation. As Alister McGrath¹⁵ and others have argued, a saving knowledge of God proceeds only through biblical revelation and in the person of Jesus Christ, though a deeper understanding of the nature of God may be arrived at through observation of the natural world. In other words, the Bible is illuminated, rather than contradicted, by science. Is there, then, an interpretation of chance processes in creation that acknowledges our understanding of the world as characterized by science while simultaneously preserving orthodox Christian truths?

The primary purpose of this paper is to briefly introduce the "theology of chance" of a leading mid-twentieth century theologian, Leonard Hodgson, who anticipated Monod's assault (and Peacocke's response) by two decades. Despite impeccable academic credentials, Hodgson's ideas have been omitted from all serious dialogs concerning the theological implications of the chance worldview that has come to form the backdrop of the contemporary science and religion discipline. The position I will take is that Hodgson's theology (1) anticipated significant components of the contemporary scholarly discussion and, (2) continues to offer substantive contributions to our understanding of the role of chance in the universe from an orthodox Christian perspective.

What Is Chance?

Chance, though widely discussed, is a surprisingly difficult concept to pin down. Donald McKay, in his Riddell Lectures, takes a very conservative Christian interpretation that denies the existence of pure chance.¹⁶ Though accepting Monod's science, MacKay sees chance (and the pragmatically probabilistic portrayal of the world by science) as nothing but a way of describing our ignorance. Alternatively, Arthur Peacocke espouses a liberal theological interpretation of chance viewed as a teleological tool



*It was
Hodgson's
Gifford
Lectures of
1955–1957,
published
under the title
For Faith and
Freedom,
which would
become his
magnum opus
and a serious
entrée into the
science and
Christianity
dialogue.*

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used by God in creative processes, though many of the foundational creedal Christian beliefs (e.g., the virgin birth, bodily resurrection) become casualties in his theology.¹⁷ John Polkinghorne describes at least five interpretations of chance that have been referenced in the science and religion dialogue and agrees with Peacocke, though less explicitly so, that chance may be considered a tool used by God to achieve God's purpose(s).¹⁸ Although Polkinghorne accepts the possibility of a positive role for chance in creation, he has argued more for a world rife with chaotic systems that are epistemologically indeterminate though ontologically determined.¹⁹ In light of this and more, Bartholomew has carefully argued (like Peacocke and Polkinghorne before him) that chance is not the antithesis of purpose. The case that chance is not inherently anti-teleological has been made statistically through appeals to both stochastic processes (Peacocke) and chaos theory (Polkinghorne). The concept of chance remains ambiguous.

However, for purposes of this article, I will adopt Bartholomew's "common sense" epistemological definition: chance events are "those for which no causal explanation can be conceived of in the present state of knowledge."²⁰ In other words, the presupposition of philosophical realism is adopted in which chance is accepted to be what it appears to be as described by science.²¹

Decades before the earliest of these attempts to address the implications of chance for Christian theology, evangelical²² Oxford theologian Leonard Hodgson, in his Gifford Lectures (1955–1957), anticipated the idea put forth by Peacocke, Polkinghorne, Bartholomew and others that chance could be a tool of God and not anti-teleological. An attractive feature of Hodgson's theology is that it retains its orthodox Christian character while incorporating chance as a positive theological concept. Seemingly, Hodgson possessed insight far ahead of its time.

Leonard Hodgson

Hodgson was born on October 24, 1889 at Fulham in the United Kingdom, the son of Walter, an official shorthand writer for the House of Commons in Parliament, and Lillias. A good student, Hodgson was awarded a scholarship to Hertford College

of the University of Oxford where he earned first class honors in Greats and theology. He was ordained deacon in the Church of England in 1913.

Though very successful in his professional life, he showed clear signs of his humanity as a young man. In June 1917, he met Dorothy L. Sayers, eventually to become one of Britain's greatest novelists, through a mutual friend, Basil Blackwell, bookshop owner and publisher. On one occasion in Oxford, she needed help launching a punting boat and Hodgson, Vice Principal of St. Edmund's Hall, was nearby and able to assist. Following that introduction and several additional brief encounters, Hodgson had become infatuated with her. One month later he appeared, uninvited, at the Blackwell's home on an evening when they were hosting Ms. Sayers for dinner. After dinner, and much to her surprise, Hodgson proposed marriage. In letters to her mother, Sayers described Hodgson as "a perfectly delightful padre" but that in response to his proposal all she could say was "Oh Lord!" and that she had "never for a second" considered him in that connection and that "she certainly did not care for him" as marriage material.²³ Not to be deterred, Hodgson married Ethel Margaret du Plat in 1920 and they subsequently had two children.

After a series of church and academic positions, in 1919 Hodgson became Dean of Divinity and theology tutor at Magdalen College of the University of Oxford. He was active in the ecumenical movement ultimately helping to found the *World Council of Churches*. In 1938 he received the Bachelor of Divinity and Doctor of Divinity degrees from Oxford and succeeded Oliver Chase Quick as Regius Professor of Divinity in 1944. Hodgson's inaugural lecture on this occasion, "Theology in an Age of Science,"²⁴ showed his growing awareness of the importance of science in society and the necessity for theologians to recognize that fact and adapt. He stated:

One may safely prophesy that we have entered upon an age in which science prescribes the prevailing tone and temper of public opinion ... as the education of the laity becomes progressively more scientific in character, the education of the clergy will render them progressively more unfit to under-

stand and be understood by more than a minority of those to whom they are called to minister.²⁵

It was Hodgson's Gifford Lectures of 1955–1957, published under the title *For Faith and Freedom*,²⁶ which would become his *magnum opus* and a serious entrée into the science and Christianity dialogue. Of chance he said:

For the rational purpose of ensuring fair play we create conditions in which decisions shall be left to chance; for the furtherance of His purpose in creation God gives to His universe a mode of reality which admits of the existence and occurrence of such irrationalities as contingency, freedom and evil.²⁷

Mark Chapman observed:

He communicated a dynamic, rational and attractive theology to a wide audience both at home and abroad. His focus on the interaction between the material and the spiritual, between grace and freedom, as "the obverse and reverse sides of a single process,"²⁸ helped shape English theology's continuing concern with the reconciliation of modern science and the claims of religion.²⁹

Hodgson retired from the University of Oxford in 1958.

It is difficult to grasp the incongruity between Hodgson's stature during his life and his virtual anonymity within the theological community, both then and now. Hodgson achieved an exalted position in academia, established meaningful relationships as a parish priest³⁰ and was a high-profile and active participant in the ecumenical movement,³¹ yet he has seldom been referenced by historians of theology or theologians, and he did not appear in the *Oxford Dictionary of National Biography* until 2004.³² Fisher Humphries affirms:

[Hodgson] seemed to realize that in much of what he was doing he was alone, a maverick who would not let the popularity of an idea turn his head from what he believed to be the real issue, the important theme.³³

Regardless, Hodgson published eleven books, fifteen pamphlets, over twenty-five journal articles, as well as a number of letters, sermons, and unpublished manuscripts that are archived at Christ Church, Oxford.

Chance in the Theology of Leonard Hodgson

Capacity for Human Reason

Hodgson was a philosophical realist; he placed great confidence in humankind's ability to reason, not in a deductive sense, but rather through the ability to recognize truth. He asserted that the "fact surely is that the primary function of human reason is not the construction of chains of argument, but the *recognition of truth*."³⁴ Reason in this

sense assumes that the world is a logical place. Hodgson believed that "[o]ur fundamental act of faith is that the universe of our experience somehow or other makes sense."³⁵ This is a necessary beginning to any line of rational scientific inquiry.

Hodgson presupposed two components to apprehension of the truth, "... something to be known and a mind capable of knowing it."³⁶ He considered the process of apprehension of the truth to be "a lively exchange between the necessarily subjective seizing upon of reality by a human mind and the necessarily objective reality of the world which it experiences."³⁷

The Relationship between Reason and Revelation

Hodgson believed that "all truth is God's"³⁸ and that "[t]ruth is a quality of statements."³⁹ In other words, there is no distinction between truth as revealed to humankind by God and truth discovered by reason. Hodgson asserted:

Revelation and reason are not alternatives appropriate to different fields of inquiry ... they are the divine and human sides involved in all man's growth in knowledge.⁴⁰

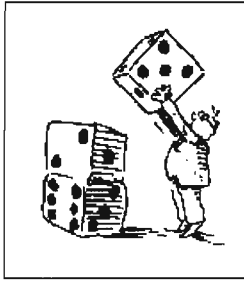
This was nicely illustrated by an example that should resonate particularly well with academics.

In teaching the teacher is giving out from the store of knowledge and (let us hope) wisdom which is already there in his own mind—giving out in such measure as the pupil is able to receive. That is the process as seen from the end of the teacher. The same process, as seen from the pupil's end, is the history of the growth of the pupil's mind, as step by step he becomes capable of assimilating more of what he is given.⁴¹

To Hodgson, revelation came not through words, but through the acts of God. The ability of certain people to see God's acts for what they were, often labeled inspiration, is itself one of those acts of God. This is similar in nature to the physician who is gifted with diagnostic insight beyond that of her colleagues.⁴² Humphreys says of this conception of revelation: "It is the act itself, and not the interpretations of it, which is normative for human understanding."⁴³

According to Hodgson, "[h]owever much men may be inspired by God to recognize his working in natural phenomena or historical events, they can only see with the mental eyes of their age and culture."⁴⁴ He further characterizes God's acts as either creative or redemptive:

I have distinguished between the two modes of God's self-revelation: the revelation of His creative activity which we receive through study of the universe in general, and the revelation of His redemptive activity given in the events to which the Bible bears



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both of which
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According to
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witness. In both His method is the same: He reveals Himself by doing things and inspiring men to grasp the significance of what He does.⁴⁵

As such, Hodgson viewed the characterization of theology as natural versus revealed as a false dichotomy. Since all truth is God's, his redemptive activity is revealed through the historical acts chronicled in the Old and New Testaments whereas his creative activity is revealed through science. In other words, science is a conduit for revelation. Neither form of revelation reigns supreme. However, the distinctive quality of Christianity as a religion is its recognition of redemptive revelation, Jesus Christ being the most complete revelation of God to humanity. Hodgson was clear: "To the eye of Christian faith the revelation in Jesus Christ is the clue to the understanding of everything else."⁴⁶

Alternatives to a Doctrine of Creation

According to Hodgson, the nature of the world is not transparent and one

must consider what sort of postulate about the nature of things will make most sense; the Christian philosopher postulates an eternal Reality who is perfect and whose relation to the universe is like the relation of a maker to what he has made. The universe may thus be designated "creation" and God is "Creator."⁴⁷

Hodgson himself describes the Christian doctrine of creation as "the belief that God, for some purpose of His own, calls into existence the universe, giving it the being and the mode of reality which that purpose requires."⁴⁸

Two primary alternatives to a doctrine of creation were examined by Hodgson: materialism and idealism. Materialism has been defined as "the view that the proper explanation of the universe is simply the assertion that the universe is all that is the case."⁴⁹ This leads Hodgson to conclude that materialism necessarily results in the conviction that there is no meaning to the existence of the universe. However, as Humphreys points out, Hodgson also argued that materialism is empirically deficient; materialism cannot

account for human freedom, i.e., human choice.

In affirming the reality of freedom Hodgson did not deny the reality of material objects. But neither would he permit the materialist to assert that, since there are material objects, man's experience of choice is illusory and must be explained in some terms other than genuine freedom. The denial of the reality of freedom is absolutely essential to materialism; once one admits that the personal life of freedom is real, materialism crumples. Hodgson felt that a true empiricist must reject materialism when he recognizes the reality of freedom.⁵⁰

Hodgson agreed with idealism in that materialism failed to acknowledge a reality beyond what could be empirically documented. Idealism asserts "that since there is an eternal perfect Reality, the world must be an illusion or, at best, a mode of appearance of the perfect Reality."⁵¹ Among other criticisms directed at idealism, Hodgson believed that, like materialism, idealism simply does not account for all of the facts; idealism accounts for neither contingency (chance) nor human freedom, both of which he asserted must be recognized as real by empiricists. In sum, Hodgson addressed the failure of idealism and materialism thus:

If everything happened according to an unbroken order of determinate causal sequence, then all events could be fitted into a materialist philosophy. If all freely willed actions were the intelligently planned expression of good wills, then all events could meet the requirements of an idealism for which the real is the rational. Our accidents, errors and sins will not fit into either scheme without being either ignored or explained away as being in reality something else in disguise.⁵²

According to Hodgson, only a doctrine of creation can account for all of the facts.

Creation, Hodgson believed, took place through the evolutionary processes described by science.

All that I mean to assert by saying that we have an evolutionary idea of creation is that we commonly take it for granted that the world of our experi-

ence has come into its present condition through a series of changes in which inorganic matter, organic matter, vegetable life, marine life, animal life and human life followed one another in chronological sequence.⁵³

Platts points out that when "... Hodgson writes of man as subject to the evolutionary process in the *Essays in Christian Philosophy* he clearly has "emergent evolution" in mind, rather than the theories of Darwin."⁵⁴ He goes on to define emergent evolution as:

the theory which maintains that novelties occur in the time process, that the processes which create these novelties are not "mechanistic," that the novelties which emerge exhibit a new kind of relatedness in their internal and external relations, and that the emergence of such novelty is not predictable.⁵⁵

A further example is provided using the water molecule: the first hydrogen atoms to join with an oxygen atom to form a molecule of water would be considered an "emergent"; every subsequent formation of a water molecule, however, would be labeled a "resultant."⁵⁶

Order in Creation

In Hodgson's theology, the evolutionary process consists of three fundamental elements: causal order, purposive order and freedom. Of the first two he said:

In our ordinary, everyday outlook, before we begin to philosophise or psychologise (if one may coin the word) we commonly distinguish between events which we ascribe to the physical order and events which we ascribe to conscious purpose.⁵⁷

It is through the causal order, or necessity (to use contemporary jargon), that God provides us with a universe of predictability and reliability, i.e., natural law. Hodgson actually deemed causal order, not purposive order, to be the more difficult to comprehend: "[t]he events of the purposive order are, as a matter of fact, more intelligible to us than those of the causal. We experience them, so to speak, from the inside, while the others are only observed from without."⁵⁸ Science, therefore, is a gift from God to be treasured by Christians.

In nature there is that orderliness which is necessary to provide man with a world in which rational study can increase human control, a world in which he can be reasonably sure that to light a fire will not warm him on one occasion and freeze him on another, with no reason why sometimes the one thing should happen and sometimes the other. This orderliness, then, is due to God's provision of an orderly world.⁵⁹

Likewise, belief in God is not a threat to science, as argued by Hodgson in his inaugural address as Regius Professor of Divinity:

Why is it that some scientists seem to shrink from such a belief in God as though to admit it were treachery to their scientific loyalties: It is, I believe, at bottom because scientific inquiry presupposes that its objects belong to a rationally dependable order of being, and they think that to ground all events in the purposive will of God is to introduce an incalculable element of caprice which cuts the nerve of scientific endeavor. Here Christian theology needs to make its voice heard. It is the exposition of what God has revealed to us of Himself, and it asserts that there is nothing chancy or capricious about God.⁶⁰

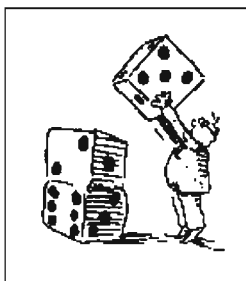
Beyond this, on the same occasion, Hodgson implored his theological colleagues:

However much humanistic studies may rightly be the normal introduction to theology, we shall not meet the needs of the age unless we devise a method by which men whose previous education has made them first and foremost scientific may be welcomed into the ranks of professional theologians.⁶¹

Besides causal order and purposive order, Hodgson identified freedom as the third fundamental order in the evolutionary process.

Besides causal order and purposive order, Hodgson identified freedom as the third fundamental order in the evolutionary process. Interestingly, it has been noted that Hodgson offers an "oblique admission" that in his earlier years he had denied freedom, though his finally coming to accept freedom for what it appeared to be may have been the single greatest catalyst for Hodgson's theological thinking.⁶² Hodgson argued that in neither materialism nor idealism could human choice be accepted for what it appeared to be but rather it was explained away as something else; the true empiricist, however, could not ignore the reality of human choice, or freedom.

Freedom was not defined by human choice alone. The ability of humans to make choices in life was referred to as Freedom A by Hodgson. As far as he was concerned, this was undeniable, particularly for "unphilosophical men." This type of freedom, to be distinguished from causal order which disallows choice, is a reflection of the spiritual nature of humankind, that is, one who is "the individualized subject of self-conscious, intelligent, purposive life."⁶³ However, Hodgson defined another type of freedom, Freedom B, which addressed one's ability to act on one's



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choice. For example, the alcoholic wakes up and faces a new day by choosing not to take a drink for twenty-four hours. Before the sun sets, however, he has imbibed. The alcoholic has clearly made a choice though he was unable to act on that choice, be it due to the contingencies (temptations) faced during the course of a busy day, the grip of the psychological baggage accumulated over a lifetime, the dictates of a biological disease mechanism loosed in his body or the Christian conviction as to the sinful nature of humankind.⁶⁴ Hodgson contrasted Freedom B not with causal order but with the notion of personal slavery. It is this understanding that Hodgson holds to be the key to understanding God's purpose in the universe: to create persons who possess not only the ability to choose but persons with the ability to act on those choices. He makes this clear in his Gifford lectures when he states:

My central thesis in these lectures is that to see the will to create genuinely free finite persons as the determining factor in our understanding of God's creative activity is the master clue to making sense of the whole.⁶⁵

Purpose in Creation

Humphreys' describes Hodgson's view of the interrelationship of causal order, purposive order, and freedom thus:

... the causal order is a means to an end, never an end in itself; it further means that freedom to choose is merely one stage along the journey, the destination of which is the freedom to do what one sets out to do.⁶⁶

To Hodgson, the goal of humankind is to be able to turn one's will over to the will of God for oneself; only when God's will becomes one's personal will does one achieve Freedom B.

The perfection of freedom, as I envisage it in the life of the city of God, involves on the part of its citizens such characteristics as honesty, unselfishness and self-control⁶⁷ [such that] the end of the process is the creation of finite individuals who themselves are not merely free, but good ...⁶⁸; [w]hen from the observation of what actually exists and happens we try to get some idea of what God is aiming at in the

creation of it all, the answer will be a community of persons, each in the perfection of his freedom making his contribution to the common life.⁶⁹

Causation, Purpose and Chance in Creation

Hodgson had much to say on the interrelatedness of causation, purpose, and chance in the evolutionary process of creation. More often referring to chance as contingency, he described it as "the apparent fact that often there is an open possibility of things happening this way or that."⁷⁰ Most importantly, Hodgson's emphasis was on the factual nature of chance. That people use chance devices, the outcomes of which are consciously unknowable, is commonplace: the coin toss at the beginning of a football game to determine which team gets the ball first is but one example. From this Hodgson concluded:

Perhaps in God's plan of creation [contingencies] are needed to perform a function similar to that for which we invoke chance, and for that reason He has given to the universe a mode of reality which admits of their being really themselves.⁷¹

In the current stage of evolution of the human, there is contingency, evil, and freedom present in the universe. Contingency is but one of the irrationalities defined by Hodgson.⁷² These irrationalities are real, but incidental, to God's purpose. By accepting contingency as real, Hodgson did not simply mean human ignorance of outcomes, but also God's ignorance of outcomes. Of this he said:

If God's creative activity includes the creation of contingent events, that means the creation of events opaque to His thought; this is one element in the Divine self-limitation involved in His creative activity.⁷³

This, however, leads to the antinomy that "[t]he world is important even though God is perfect."⁷⁴ Several implications of the problem as drawn out by Hodgson have been suggested:

1. God has limited his impassibility (i.e., his ability to be acted upon by another) in creating the universe;

2. God has limited his immutability (i.e., "God is eternal and unchanging, and yet he acts in the changing process of time"⁷⁵);
3. God has limited his omnipotence by overcoming self-prescribed limitations in working with humankind (i.e., the Incarnation); and
4. God has limited his omniscience to enable the existence of contingency in creation.⁷⁶

Hodgson concluded that it was for the purpose of creating a universe that included finite, genuinely free beings that God limits himself. In his creative act, God creates the antinomy "that He is not acted upon, yet He is; that He does not change, yet He does; and that He is without limitations, but He limits Himself."⁷⁷ Only in terms of his purpose can that antinomy be reconciled; "... the source of the two irreconcilable truths was God Himself, and [Hodgson] believed that, though they were irreconcilable to men now, they would not remain so always."⁷⁸

The point needs to be made that if Hodgson were contributing to the current science and theology discussion, he would no doubt come down on the side of open theism and not process theology. Hodgson envisioned God as complete in all his perfection; any limitations were self-imposed for the furtherance of his purpose for creation. This, he believed, was scriptural. On the other hand, he did not see God as evolving with limitations imposed from without, as process theology would dictate.⁷⁹

Implications for Orthodox Christian Theology

Regardless of one's stance on the implications of Hodgson's ideas for Christian apologists, it must be acknowledged that he anticipated by more than two decades much of contemporary theological thinking with regard to contingency. Only in 1978 did Arthur Peacocke, in his Bampton Lectures, make the theological case for the positive role of chance in creation.⁸⁰ Peacocke said:

... it would be more consistent with the observations to assert that the full gamut of the potentialities of living matter could be explored only through the agency of the rapid and frequent randomization which is possible at the molecular level of the DNA.⁸¹

However, in the case of Peacocke, it is also safe to say that science takes authority over theology, leading to such conclusions as the bodily resurrection of Jesus Christ being scientifically untenable.⁸² As noted before, others, while giving science primacy over theology, though not generalizing to such liberal theological conclusions, have echoed Peacocke's opinion that chance may be used by God as a tool to achieve his purpose.⁸³

Hodgson's theology, taken as a whole, is largely consistent with the historical Anglican faith. Springing directly from Luther's bondage of the will, he affirms the classical Christian vision of humankind as fundamentally sinful by nature. Ashley Null, well-known scholar and student of Thomas Cranmer, stated the idea well when he said:

... what the heart loves, the will chooses, and the mind justifies. The mind doesn't direct the will. The mind is actually captive to what the will wants, and the will itself, in turn, is captive to what the heart wants.⁸⁴

Such a view of personal will is counter-intuitive by today's worldly standards. It is precisely this perspective, however, that is espoused by Hodgson in his conception of Freedoms A and B.

[Chance] may be viewed as a tool used by God to achieve his purpose. God's purpose is to create genuinely free beings, leading to the conclusion that free will is an illusion ..., though free choice is not.

What are the implications of Hodgson's theology of chance, or contingency, for contemporary evangelical scholarship in the area of science and theology? We live in the era of the chance worldview. If one takes science at face value, chance must be viewed as real and fundamental to God's creation. Rather than the antithesis of purpose, it may be viewed as a tool used by God to achieve his purpose. God's purpose is to create genuinely free beings, leading to the conclusion that free will is an illusion (i.e., our wills are bounded by sin, psychological baggage, the increasing constraints of our personal lives through time, etc.), though free choice is not. Irrationalities such as evil (in the forms of ignorance, ugliness, suffering and sin) are incidental to God's achievement of creating genuinely free beings, and it is sin that is the most fundamental as it prevents us from combating the other forms of evil. The world exists as a complex mix of certainties and contingencies with a partially open future.⁸⁵ Furthermore, because revelation is a process, not an outcome or an event, God continues to speak to us about his redemptive and creative natures through the Bible and through the natural sciences, respectively, leading to the conclusion that "natural theology" is a myth. All truth is God's, whether revealed through the Bible or through the natural sciences. **

Acknowledgment

The author acknowledges the support of the John Templeton Foundation through its sponsorship of the Templeton Oxford Seminars on Science and Christianity and is grateful for the Foundation's support as well as that of the Council for Christian Colleges & Universities. Also, numerous constructive comments from three anonymous reviewers were sincerely appreciated. All remaining ambiguities and/or errors are entirely the responsibility of the author.

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¹⁹For example, J. Polkinghorne, *Faith, Science & Understanding* (New Haven, CT: Yale University Press, 2000) and —, *Belief in God in an Age of Science* (New Haven, CT: Yale University Press, 1998).

²⁰Bartholomew, *God of Chance*, 68.

²¹Though not directly related to the definitional issues surrounding the concept of chance, I would be remiss if I did not acknowledge the work done related to chance among intelligent design scholars. Going a step beyond simply definitions, William Dembski describes a process very much like statistical significance testing that he purports can eliminate the chance hypothesis leaving "intelligent design" as the most likely (probabilistically, speaking) alternative. See, W. A. Dembski, *The Design Inference: Eliminating Chance through Small Probabilities* (Cambridge: Cambridge University Press, 1998) and —, *No Free Lunch: Why Specified Complexity Cannot Be Purchased without Intelligence* (Lanham, MD: Rowman & Littlefield, 2002).

²²Because the term *evangelical* can carry with it various interpretations, I think it wise to explicitly state in what sense I believe Hodgson to be an evangelical Christian theologian. Careful study of Hodgson's work makes it clear to me that his theology adheres to the *Evangelical Alliance of the UK* (www.eauk.org) definition of an evangelical:

1. An evangelical believes in God as sovereign in Three Persons; Father, Son and Holy Spirit, being three Persons but one God, sovereign in creation, providence, revelation, redemption and final judgment.
2. An evangelical believes in the divine inspiration of the Holy Scripture and its consequent entire trustworthiness and supreme authority in all matters of faith and conduct.
3. An evangelical believes in the universal sinfulness and guilt of fallen mankind, making him subject to God's wrath and condemnation.
4. An evangelical believes in the substitutionary sacrifice of the incarnate Son of God as the sole and all-sufficient ground of redemption from the guilt and power of sin, and from its everlasting consequences.
5. An evangelical believes in the justification of the sinner solely by the grace of God through faith alone in Christ crucified and risen bodily from the dead.
6. An evangelical believes in the illuminating, regenerating, indwelling, sanctifying and empowering work of God the Holy Spirit.
7. An evangelical believes in the priesthood of all believers, who form the universal Church, the Body of which Christ is the Head and which is committed by his command to the proclamation of the Gospel throughout the world.
8. An evangelical believes in the importance of the local church for spiritual growth, fellowship and service.
9. An evangelical believes in the divine institution of the ordinances of baptism and the Lord's Supper.
10. An evangelical believes in the expectation of the personal, visible return of the Lord Jesus Christ in power and glory.

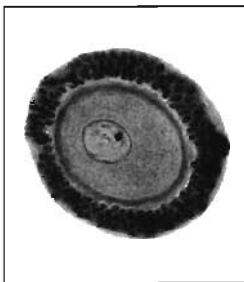
- ²³D. L. Sayers and B. Reynolds, *The Letters of Dorothy L. Sayers, 1899–1936: The Making of a Detective Novelist* (New York: St. Martin's Press, 1995), 130–3.
- ²⁴L. Hodgson, *Theology in an Age of Science* (Oxford: The Clarendon Press, 1944).
- ²⁵*Ibid.*, 4.
- ²⁶L. Hodgson, *For Faith and Freedom: The Gifford Lectures, 1955–1957 in the University of Glasgow, Volume I* (London: SCM Press Ltd, 1968).
- ²⁷*Ibid.*, 150.
- ²⁸L. Hodgson, *Essays in Christian Philosophy* (London: Longmans, Green & Company, 1930), 48.
- ²⁹M. D. Chapman, "Hodgson, Leonard (1889–1969)," *Oxford Dictionary of National Biography* (Oxford: Oxford University Press, 2004 [accessed 17 Nov 2004: www.oxforddnb.com/view/article/58805]).
- ³⁰See, for example, the column written by Hodgson for the church newsletter, *The North End Review*, addressed to the parishioners of St. Mark's Church, Portsmouth, years after he had moved on from parish ministry. It is a sincerely sentimental love letter in which he says:
- I cannot close without adding that throughout I have never ceased to be thankful that my ministry started where and how it did ... I learned something of what the Church of England can be in the life of the country. The people of North End enriched my education by giving me what books could never teach. The longer my experience of academic life, the more I have come to realize and be thankful for what I owe to St. Mark's (from a copy of the letter in the Leonard Hodgson archives of Christ Church, Oxford; accessed July 2004).
- ³¹As evidence consider letters exchanged between Hodgson and Dietrich Bonhoeffer in 1935 and 1939 concerning the Reichskirche and Bonhoeffer's attendance at Faith and Order Movement meetings, in E. Band, *Gesammelte Schriften* (München: Chr Kaiser Verlag, 1958), 230–9, 279–86.
- ³²Chapman, "Hodgson, Leonard (1889–1969)."
- ³³F. Humphreys, *God in the Theology of Leonard Hodgson* (diss., New Orleans Baptist Theological Seminary, 1972), 5.
- ³⁴L. Hodgson, *The Place of Reason in Christian Apologetic* (New York: Appleton, 1925), 4.
- ³⁵Hodgson, *For Faith and Freedom, Volume 1*, 46.
- ³⁶Hodgson, *And Was Made Man: An Introduction to the Study of the Gospels* (London: Longmans, Green & Company, 1928), 209.
- ³⁷Humphreys, *God in the Theology of Leonard Hodgson*, 37.
- ³⁸Hodgson, *Essays in Christian Philosophy*, 121.
- ³⁹Hodgson, *For Faith and Freedom, Volume 1*, 49.
- ⁴⁰*Ibid.*, 91.
- ⁴¹*Ibid.*, 152–3.
- ⁴²*Ibid.*, 98–9.
- ⁴³Humphreys, *God in the Theology of Leonard Hodgson*, 40.
- ⁴⁴L. Hodgson, *The Bible and the Training of the Clergy* (London: Darton, 1963), 45.
- ⁴⁵Hodgson, *For Faith and Freedom, Volume 2*, 104–5.
- ⁴⁶Hodgson, *For Faith and Freedom, Volume 1*, 116.
- ⁴⁷Humphreys, *God in the Theology of Leonard Hodgson*, 59.
- ⁴⁸Hodgson, *For Faith and Freedom, Volume 1*, 136.
- ⁴⁹Humphreys, *God in the Theology of Leonard Hodgson*, 62; note that in contemporary discussions the term naturalism is considered more appropriate than materialism.
- ⁵⁰*Ibid.*, 63; as pointed out by Humphreys, see also L. Hodgson, *Christian Faith and Practice* (New York: Scribner, 1951), 24.
- ⁵¹*Ibid.*, 64.
- ⁵²L. Hodgson, *The Doctrine of the Atonement* (New York: Scribner, 1951), 42.
- ⁵³Hodgson, *For Faith and Freedom, Volume 1*, 124.
- ⁵⁴T. C. Platts, *A Comparative Study of the Theologies of Leonard Hodgson and John Baillie* (D. Phil. diss., St. Cross College, University of Oxford, 1988), 181.
- ⁵⁵*Ibid.*, 194; see also the passages in Hodgson's writing that lead Platts to these conclusions: Hodgson, *Essays in Christian Philosophy*, 55–7.
- ⁵⁶*Ibid.*, 194.
- ⁵⁷Hodgson, *Essays in Christian Philosophy*, 16.
- ⁵⁸Hodgson, *For Faith and Freedom, Volume 1*, 138.
- ⁵⁹L. Hodgson, *The Christian Idea of Liberty* (London: SCM Press Ltd, 1941), 66.
- ⁶⁰L. Hodgson, *Theology in an Age of Science: An Inaugural Lecture Delivered before the University of Oxford on 3 November 1944* (Oxford: The Clarendon Press, 1944), 15.
- ⁶¹*Ibid.*, 5.
- ⁶²Humphreys, *God in the Theology of Leonard Hodgson*, 76.
- ⁶³Hodgson, *For Faith and Freedom, Volume 1*, 161.
- ⁶⁴I wish to thank Wolfhart Pannenberg for offering this example in a conversation at Wycliffe Hall, University of Oxford, August 8, 2003.
- ⁶⁵*Ibid.*, 183.
- ⁶⁶Humphreys, *God in the Theology of Leonard Hodgson*, 79.
- ⁶⁷Hodgson, *For Faith and Freedom, Volume 1*, 195.
- ⁶⁸L. Hodgson, *Towards a Christian Philosophy* (London: Nisbet and Company, Ltd., 1943), 177; and L. Hodgson, *The Doctrine of the Atonement*, 111.
- ⁶⁹Hodgson, *For Faith and Freedom, Volume 1*, 185–6.
- ⁷⁰*Ibid.*, 136.
- ⁷¹*Ibid.*, 144–5 and Hodgson, *Towards a Christian Philosophy*, 177.
- ⁷²Hodgson considers such things as contingency, freedom and evil (of which he identifies four types: ignorance, ugliness, suffering and sin) as irrationalities since they can be accounted for neither by causal nor purposive order. Of the irrational evils, it is sin which is at the core since ignorance, ugliness and suffering happen to people; it is inner corruption that is responsible for sin, or wickedness, and therefore the greatest hurdle to the eradication of the other three evils.
- ⁷³Hodgson, *Essays in Christian Philosophy*, 55.
- ⁷⁴Humphreys, *God in the Theology of Leonard Hodgson*, 86.
- ⁷⁵*Ibid.*, 87.
- ⁷⁶*Ibid.*, 88–9; see also critics such as B. Ware, *God's Lesser Glory: The Diminished God of Open Theism* and J. Piper, J. Taylor and P. K. Helseth, *Beyond the Bounds: Open Theism and the Undermining of Biblical Christianity*.
- ⁷⁷*Ibid.*, 88.
- ⁷⁸*Ibid.*, 89.
- ⁷⁹For example, see J. B. Cobb and D. R. Griffin, *Process Theology: An Introductory Exposition* (Westminster Press: Philadelphia, 1976).
- ⁸⁰A. R. Peacocke, *Creation and the World of Science: The Bampton Lectures, 1978* (Oxford: The Clarendon Press, 1979).
- ⁸¹*Ibid.*, 94.
- ⁸²From a lecture to Samford University students, Daniel House, Samford University London Study Centre, March 23, 2001.
- ⁸³Notably, see: D. J. Bartholomew, *God of Chance*; —, "Probability, Statistics and Theology," 137–78; —, *Uncertain Belief: Is It Rational to be a Christian*; —, "Chance Versus God."
- ⁸⁴Anglican Church League, "Interview with Dr. Ashley Null on Thomas Cranmer: Primary author of the Book of Common Prayer," Sydney, Australia, September 2001, www.acl.asn.au/null.html (accessed July 20, 2005).
- ⁸⁵For an excellent exposition of this aspect of open theism, see Gregory A. Boyd, *God of the Possible* (Grand Rapids, MI: Baker, 2000). Also see, C. Pinnock, R. Rice, J. Sanders, W. Hasker and D. Basinger, *The Openness of God: A Biblical Challenge to the Traditional Understanding of God* (Downer's Grove, IL: InterVarsity Press, 1994). For opposing views, see B. Ware, *God's Lesser Glory: The Diminished God of Open Theism* and J. Piper, J. Taylor and P. K. Helseth, *Beyond the Bounds: Open Theism and the Undermining of Biblical Christianity*.

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Article

The Ethics of the ANT Proposal to Obtain Embryo-Type Stem Cells

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James C. Peterson



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A proposed new technique, Altered Nuclear Transfer (ANT), would alter a cell nucleus to remove its ability to guide implantation in the womb.

Protocols are investigating whether human stem cells can be coaxed into replacing tissue lost to disease or injury. What has been ethically controversial is if those stem cells are obtained by destroying human embryos. One recent proposal has been to alter a nucleus before transfer to a human oocyte (ANT) so that any resulting entity would not be able to develop into a fetus. The intent is that lacking a full complement of genes and potential, the resulting entity would not warrant protection as a fellow human being and so could be taken apart as a ready supply of embryo-type stem cells. The success of the proposal depends on the specific reasoning followed to establish the moral status of human embryos. This article describes how the Christian tradition thought about developing human life in the past and then traces more recent responses to the new challenge of technologies such as ANT that intervene in the earliest days of human development. Which arguments are persuasive for embryo status will largely determine whether ANT is morally acceptable.

In December 2004, William Hurlbut, a member of the USA President's Bioethics Counsel, made a proposal to obtain embryo-type stem cells by developing a new technique of Altered Nuclear Transfer (ANT).¹ A cell nucleus would be altered to remove its ability to guide implantation in the womb. The otherwise complete nucleus would then be transferred to an egg. The resulting entity would function as an embryo except it would not be able to grow into a normal fetus. It is argued that the entity could be used as a source of embryo-type stem cells since in lacking the potential to develop further, it would not actually be an embryo and since not an embryo, it would not be a human being. The success of this proposal hinges on how one reasons about the moral status of a human embryo.²

Research skills and funding are finite. Why direct already over stretched resources to developing such a technique? Stem cells are in demand as a way to replace lost tissue. If stem cells could be obtained from an adult patient, we could have a perfect tissue match for the person being treated with no risk of rejection. Such stem cells would be immediately helpful for research and eventually might save countless lives from Alzheimer's, Parkinson's, and other painful and chronic diseases such as arthritis and spinal cord injury paralysis. To find a way to do so would be a kind and fruitful expression of love for neighbors in need. Such healing and relief is well worth pursuing. It may some day be possible, but it is not yet, and it will not be easy to achieve.

While most nucleated cells have all the instructions for a complete human body, an adult cell has formed into the most effective structure for its role. A tiny fraction of its DNA is guiding the cell's work. The information is there to make everything in the body, but the DNA and the rest of the cell have been configured for a particular task. To reform DNA in a cell already shaped to one task over to a different task is physically wrenching. Some labs have held out hope

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that someday we will be able to change such a cell to function normally in a new way, but in the meantime, and it may be a very long time, millions of people are struggling and many are dying who might be helped sooner by embryo-type stem cells which have the information but have not yet committed to a particular form. Should we obtain potentially life-giving stem cells from the death of embryos?

There is no problem with sacrificing human tissue to save human beings, but is the embryo more than just human tissue? If the embryo is a fellow human being, we should not kill one person to save another. Human beings are simply not available to cut into parts, no matter how useful. But is an embryo the smallest of human beings, a person, a soul? ANT and other developing technologies offer intervention at almost every stage of embryonic development. To know whether to use them requires precision in recognizing when a fellow human being is present to be welcomed and protected. It matters whether dissecting a human embryo is parsing human tissue or killing a human being. The ANT proposal seeks to create an entity which functions as an embryo, but is not one in the eyes of those who see embryos as human beings. Whether ANT can achieve its goal depends on why those who perceive the embryo as a fellow human being, do so. We need to describe carefully that reasoning.

Context

Until relatively recently, the first sign of pregnancy for most women was missing a period. If abortion was considered, it was after the first month when the woman knew a pregnancy had begun. The church leaders who wrote against abortion were addressing the ending of pregnancy that was at least that far along. Prohibition of abortion was not addressing the status of embryos.

When church leaders did write about early pregnancy, the common understanding was that a fellow soul was not present until there was enough of a body to ensoul. Through the early and medieval church, the longstanding consensus among theologians was that either God created a soul at the point when a body had formed in the womb, or in the perspective of traducianism, a soul inherited from one's parents develops with the body and is at last completely present when a body has fully formed. Both soul creation and traducianism reasoned that one needed a body to have a soul, whether the soul is assigned or emergent. In short, there is not a fully ensouled body until there is enough of a body to ensoul.

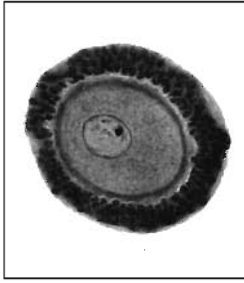
Before a body was present, the life developing in the womb was described as "unformed." This distinction between unformed and formed was used specifically, for example, by Tertullian, Lactantius, Jerome, Augustine (in the *Enchiridion*), Cyril of Alexandria, Theodoret, and the most influential shaper of Roman Catholic doctrine—

Thomas Aquinas.³ That tradition continues to the present with Roman Catholics and others, such as Margaret Farley who cites herself, Lisa Cahill, Thomas Shannon, and James J. Walter as examples of widely read Catholic theologians who, as they seek to thoughtfully carry on this church tradition, see the first presence of a person at a point later than conception.⁴

Both soul creation and traducianism reasoned that one needed a body to have a soul, whether the soul is assigned or emergent.

Church tradition saw allusions to the distinction between unformed and formed in three scriptural texts. One reference was clearest in the language chosen by the Septuagint. The Septuagint was the widely used Greek translation of the Hebrew Bible that was the primary Bible for the early Christian church. Its translation of Exod. 21:22–23 makes this distinction. There is a monetary penalty for ending *unformed* life, but if *formed* life is killed, the death penalty is required, life for life. Second, in the Hebrew language Scripture, human beings are often called "*nephesh*," an animated body. Can one be an animated body, without a body to animate? Granted one still has a body after a leg amputation or the removal of a cancerous kidney, but having a substantial body of some sort was basic to being a human being in this world. Third, in Job 10:10–11, Job prays, "Did you not pour me out like milk and curdle me like cheese, then clothe me with skin and flesh and knit me together with bones and sinews?" This was read as a description of life beginning with an unformed state and then later developing to a formed one. By this distinction between unformed and formed, not yet having a body and having a body, miscarriage or abortion before formation was seen as loss of what was becoming a body. Miscarriage or abortion after formation was the tragic loss of a present body and person.

The Christian tradition did not focus on other Scriptures often cited today as proof texts, because those texts do not actually address early status of life in the womb. In contrast, for Islam the Qur'an states directly that a person is not present until some time after the presence of bones covered with flesh.⁵ More precisely, the *Book of Destiny* from ninth century Islam sets the time of ensoulment at precisely 120 days after fertilization.⁶ Orthodox Jews, convinced of the full authority of the Torah, what Christians call the Old Testament, see a fellow



Article

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human being at forty days post fertilization. Before then, the developing life in the womb has a status "like water."⁷ They read texts such as Ps. 139:13, "You knit me together in my mother's womb," as a description of God's close involvement in the psalmist's life from the beginning. However, the psalm does not say when that form in the womb became a human being. God is intimately involved in the formation of the body that will be the psalmist, but this verse does not tell us when the developing body is the psalmist. Trying indirectly to extrapolate the timing of human presence from this text is reading in affirmations that are not present. That God can "open or close a womb" for Rachel or Hannah is not a claim that every conception is God ordained,⁸ nor that even if each conception is God ordained, that God's plan is always to bring that conception on through pregnancy. We know that two-thirds or more of all conceptions do not even successfully implant in the womb, let alone reach birth.

Jeremiah 1:5 is often quoted: "Before you were in the womb I knew you, before you were born I set you apart." However, the text is not about human embryology or even about humanity at all. It is about the surety of what God plans. God has called Jeremiah to a particular vocation and has been planning this task even before Jeremiah was in the womb to call to it. There is nothing in the text that designates when Jeremiah became a living human being. If the point of the text was instruction about the start of Jeremiah's existence, it would indicate that he was alive in some realm before being in the womb. Again the verse reads: "Before you were in the womb, I knew you." Human pre-existence is not the point anymore than for Eph. 1:4 which states that "God chose us in him before the creation of the world." The texts are marveling at God's foreknowledge and choice, not human existence before time. God knows what is in even the secret place of the womb (Job 31:15). Embryos are in God's presence as is all the rest of life. We are responsible for how we treat embryos, but when precisely they become persons is not taught in these texts.

A third text that is often cited is one already referenced above. Exodus 21:22–23 differs markedly from one translation to another. In the New International Version

(NIV), it reads: "If men who are fighting hit a pregnant woman and she gives birth prematurely but there is no serious injury, the offender must be fined whatever the woman's husband demands and the court allows. But if there is serious injury, you are to take life for life." After the phrase "gives birth prematurely" an asterisk refers one to the alternate reading "she has a miscarriage." The NIV text translation is that the fight has caused labor, but the delivered baby is healthy, hence minimal penalty is appropriate for putting the baby at risk.⁹ The NIV alternative reading is that a miscarriage has been triggered, a serious offense, but not at the level of taking a human life. If a human life had been lost, the death penalty would have been required, eye for an eye, tooth for a tooth, not a fine. Translation uncertainty is at precisely the point where the passage might have shed some light on the question before us. As stated above, Orthodox Jews, listening to this text and other Scripture with deep respect, have developed a consensus that human life should be protected beginning forty days after conception. Before that point there is human life, as in any human tissue, but not yet a fellow person.

A fourth text sometimes cited has drawn vast attention over the years. Genesis 1:27 says that human beings, male and female, are created in God's image.¹⁰ In context, "image" refers to certain human capabilities such as to be able to communicate with God, the mandate of representing God on God's earth, and reflecting God's character from living in close relationship with God.¹¹ This can be seen both in the mandate that immediately follows the creation of human beings in chapter one, and then in the more detailed story of Adam and Eve in the next chapter. What none of these three attributes of bearing God's image do, is make a case for the image of God being present from conception. An embryo has the capability to know God, represent God, or to interact with God only in future possibility. The image of God is not present simply because God is aware of the embryo, as has sometimes been argued. God is aware of every tree, but that does not make them all bearers of the image of God. There is no claim from this text that the image of God is already present at conception. At most, one could hope for the status of bearing God's image from the

potential to bear God's image in the future, but that is a conviction about the importance of potential brought to this text, not drawn from it.

In light of Scripture and basic Christian convictions of love and welcome, churches for centuries have called for a nurturing welcome of the ensouled fetus. This ruled out abortion as they knew it, but now we face a challenge that is new.

The only text sometimes cited from the New Testament is that when Elizabeth met with Mary she called the pregnant Mary "the mother of my Lord" (Luke 1:43). The argument is that Jesus must therefore have already been fully present at that time. The text does not tell how far along Mary was in her pregnancy, and even if the address was quite early, biblical people and texts often refer to God's promises for the future as being as assured as already present. For example, because of God's promise, Abram was called Abraham (father of the multitudes) years before he had even a second child (Gen. 17:5).

Harold O. J. Brown, who vigorously advocates the presence of each person beginning with conception, is scrupulously honest in his careful exegesis. He states that Scripture does not directly describe the human person as being present at the time of conception.¹² Pope John Paul II, who was a fierce opponent of abortion, writes: "The texts of Sacred Scripture never address the question of deliberate abortion and so do not directly and specifically condemn it."¹³ Gilbert Meilaender, the Lutheran theologian most often quoted by pro-life groups, unfailingly advocates nurture for the unborn but also states: "We cannot, I think, claim that the Bible itself establishes the point at which an individual life begins, although it surely directs our attention to the value of fetal life."¹⁴

What Christian Scripture does say is that God is aware of everything and cares about human beings long before they are adults. While Jesus' disciples were anxious to send away children who wanted to meet Jesus, Jesus welcomed them. Luke uses the same word to describe the children brought to Jesus for blessing, the newborn Jesus, and a child in the womb that could noticeably kick.¹⁵ There is concern for all, including the most vulnerable. Followers

of Jesus Christ should love their neighbors. Jesus describes this in Luke 10 as a concern and action for others that reaches out to whomever one can help. Responsibility, nurture, service, are at the fore, yet the question before us remains. Granted we should love our neighbor and that we know our neighbors who are dying from disease, but when is there a neighbor in the womb to love?

George Annas appeals to a common moral intuition of love and help with the following illustration:

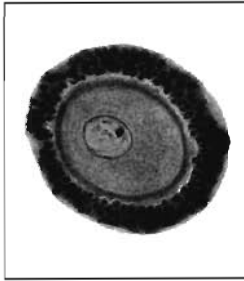
If a fire broke out in a fertility lab and there was only time to save a two-month-old baby there in a basinet or a rack with seven embryos, most people would save the baby without hesitation. Yet carrying out the petri dish rack instead, could have saved seven people, if indeed each embryo was a person.¹⁶

Thankfully that is not the usual choice that we face. But if Annas is correct about what we would do, what is guiding our choice? Could it be that we perceive a clear distinction between an embryo as potentially a person and, at a later point in development, as a person actually present? The response in the above story expresses love for our neighbors, but that attitude of seeking the best for the other does not of itself resolve the question of whether the embryo in the petri dish is yet a neighbor. Scripture directs us to extend our love to all our neighbors, but does not specifically tell us when in the womb there is a neighbor present to love. We should exercise hospitality, but does that extend to every sperm or egg? To every conceptus? To every embryo?

In light of Scripture and basic Christian convictions of love and welcome, churches for centuries have called for a nurturing welcome of the ensouled fetus. This ruled out abortion as they knew it, but now we face a challenge that is new.

The New Challenge

Applying the traditional definition of formation as the presence of a basic human body might lead one to about twenty-eight days post fertilization. By about that point, the fetus has a heartbeat; brain activity will soon follow. All of the major organ systems exist with future growth coming in size and refinement. There are now technical interventions from PGD to IUDs that can stop development at almost any point during the first month before formation. Is there a point before the formation of a basic human body when what is developing warrants full human protection as a fellow human being? Proposed transitions from human tissue to human person, before formation, have included possibility, conception, implantation, and individuation. How these are reasoned determines whether ANT is morally helpful. I will describe first the current arguments for personhood from conception on the basis of continuity, genes, and potential.



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at implantation
(beginning
6–9 days),
individuation
(by 14 days),
or formation
(arguably
28 days) ...*

Article

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It is often claimed that human development is such a continuum that no point along it can be marked as to when a human being has begun, hence a human being must be present from conception. There are two problems with this argument. One is that the argument against having a transition point from nonperson to person is being used to support a transition point, conception. If human beings and nonhuman beings are indeed distinct, there will be describable differences. A living entity that has the characteristics of a human being would be a human being; an entity that did not have those distinctives would not be a human being. In the course of development, there will be a threshold crossed from nonhuman being to human being. One can declare that transition as quite early in development, say conception, but it is still a transition point at which a person first becomes present. Second, if one persists that life is such a continuum that there cannot be a specific threshold from nonperson to person, the argument does not of itself lead to conception as a threshold. It could be claimed by a gradualist perspective that as life in the womb develops, so does its standing. This has been argued, for example, by Robert Boomsma in the pages of this journal.¹⁷

For those who argue that conception is the key threshold from nonperson to person, this is usually tied to the gathering of a complete set of genes in one place. For the first time, at conception, there is now an organism that has all the needed genetic instructions for a human body. The genes were already present in the living human egg and sperm, even just millimeters apart, but then merge into a single microscopic fertilized cell. That cell is alive, human (since from humans), and genetically individual, hence a human being. However, it can be noted that these three attributes apply to countless cells such as skin cells that we regularly slough off in daily life without regret.

Usually the argument shifts here to one of independence. There is a threshold point where a person is present. It is when a unique organism has all the genes present and the self-organizing ability to develop into an adult human being. The fertilized egg can grow on its own. Of course, that is not completely true. Whether it is in a fallo-

pian tube or a petri dish, a fertilized egg needs a woman to welcome and physically nurture it in her womb or it will not survive. It can develop only with extensive support. If some day all nucleated cells could be implanted in a dish or womb and develop into individual human beings, would each of them also warrant treatment as a person because of their potential? Every human being has roughly three billion of such nucleated cells.

Another variation on this argument says that the embryo is a human being because we have all been that size early in our development. A microscopic ball of identical cells is what all human beings look like at that age. Note that standing alone this statement is not so much an argument as a conclusion. All acknowledge that in the development of human life there is such a stage. The question forced by embryonic intervention such as ANT is when in human development is a fellow human being-person-soul present? There are billions of cells that bear one's unique and complete genetic code, are human, and alive, yet we do not consider them to be persons. The implicit appeal is that potential to develop into someone we would all recognize as a human being is the same as being a human being. But potential means not yet, if ever, not that what has potential has already become or is guaranteed to become what it has the potential to be. An acorn has the potential to become an oak tree, but may or may not actually become an oak tree.

Now there is an involved metaphysical argument that a human being is fully present as an embryo and only unfolds that presence over time, but this ignores the required and formative role of the environment in the womb and beyond. Genes do not determine all the physical characteristics of an individual, let alone who the person will be as a person. A set of genes does not a person make. Think of identical twins with identical genes who yet become and remain unique persons. Further, even if a genetic start guaranteed a later outcome, which it does not, that does not mean what is present should be treated as what it will be. All readers of this article are likely someday to be corpses, but that does not mean that we should be treated as corpses now.

If developing human life becomes a particular human being some time after fertilization, when might that be? Some writers and governments have seen the threshold at implantation which begins about 6–9 days after fertilization. The main reason for turning to this point is the establishment of a direct relationship with a fellow human being, the mother. If human beings are defined by relationship, this is where such relationship begins. Others argue for this threshold because the embryo's chance of birth increases from not likely (roughly 1 in 3) to likely. The exact proportion of embryo loss is contested, but it is clear that more than half of what is conceived never implants. It can be said that infant mortality has been that high in times and places of human history, and that infants are no less persons as a result. But if a person is present from conception, God's design for human beings is that a majority will never experience life on earth. Of course, God could choose to do this, but it seems contrary to what has been revealed as God's plan for human beings, to first meet God here.

There are now technical interventions from PGD to IUDs that can stop development at almost any point during the first month before formation.

Ronald Green raises the further note that if we are convinced that half of humanity is being lost in the days before implantation (a loss of human life beyond the scale of the medieval black plague), should not the greatest share of federal research money and all other available resources be devoted to saving them?¹⁸ If half of all the people who have ever been, are lost in those first days, that is a far greater loss of life than to cancer, AIDS, or other diseases that currently attract our greatest efforts.

Others have argued that fourteen days after fertilization is the transition to the presence of a fellow human being because that is when it finally becomes clear whether the embryo actually is an individual or several people. Identical twins or triplets can spring from one embryo up to that point. Also two embryos can merge to develop into one person. For those who think a soul is assigned at conception, the biological reality of twinning would mean that either some embryos that will not survive are soulless from the beginning or some embryos carry two souls until they split. There could not be a simple one-soul-to-one-embryo correspondence from fertilization. What is highlighted in this concern is not whether

there is life present. The number of lives beginning in one embryo would make no difference in that regard. It is rather taking seriously the argument that a person begins when one particular human continuum has begun. That is often associated with conception, but is actually not settled until fourteen days after fertilization. Norman Ford puts it this way:

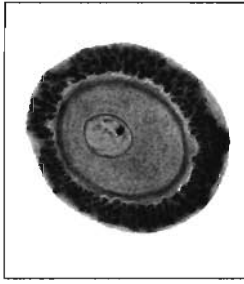
Instead of viewing development in the first two weeks after fertilization as development of the human individual ... the process ought to be seen as one of development into a human individual.¹⁹

It should be noted that recognizing a person at implantation (beginning 6–9 days), individuation (by 14 days), or formation (arguably 28 days) is not suggesting that human beings can be more or less human according to their mastery of certain capabilities, as if being a human being was a degreed property. That would leave people with various disabilities vulnerable to being declared non-human. The lines described above are each proposed as thresholds. Once the threshold is crossed, a human being is present whether attaining an ideal or not. It has also been suggested in a related concern that one should not even think in terms of transition from human life to human being, because such a focus excludes people who should be included. However, to point out that a description of a human being sees some instances of human life as not being human beings, is not an objection to such a description. It is characteristic of all definitions of human being. I am not aware of anyone who argues that a fully nucleated cell from a mouth swab that is alive and human, is a human being. To reject a description of what is needed to be a human being, one would need to show that someone who is a human being has been excluded, not simply that the description of a human being does not include everything that comes from humans and is alive.

Burden of Proof

The justification that everyone seems to claim is burden of proof. One side argues that we should not take a chance on ending a human embryo's life because a person *might* be present.²⁰ If there is any chance that a person may be present, that possibility should receive every protection.²¹

Proponents of using embryos appeal to the burden of proof as well. They say that we know there are undeniably people dying of diabetes, Parkinson's, Alzheimer's, congestive heart failure, and other diseases who could be helped by replacing lost tissue. Painful and chronic diseases such as arthritis and spinal cord injury paralysis might be helped by replacement therapy as well. While stem cell therapy is not proven at the time of this article's printing, lives may one day be saved by embryonic stem cells. How can we let a patient who is unmistakably a person, die to protect an embryo that even if implanted may or may not turn out someday to become a person?



Each side sees the burden of proof argument as favoring its conclusion. ... One advocates possible help for identified persons. The other calls for identified help for possible persons. ... For both perspectives, lives are at stake. Which burden seems greater depends on one's perception of the status of the embryo and the likelihood of embryo-type stem cells being uniquely helpful.

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We should not kill people to benefit others, but we should also not let people die to protect human tissue such as sperm or ova, even though such gametes do have great potential. Has the connection of one sperm and one egg together now made present a human being, who as a human being should of course not be sacrificed?

Notice each side sees the burden of proof argument as favoring its conclusion. Both are concerned about loving our neighbors, particularly those in great need. One advocates possible help for identified persons. The other calls for identified help for possible persons. One sees a culture of death in ending the lives of embryos. The other sees a culture of death in letting people die who could have lived with the help of embryonic stem cells. For both perspectives, lives are at stake. Which burden seems greater depends on one's perception of the status of the embryo and the likelihood of embryo-type stem cells being uniquely helpful.

How to weigh likelihood, doubt, risk, and burden of proof is not unique to this question. When a parent drives a child to school that parent is risking the child's life. Thankfully it is a small risk, but an accident along the way is a real possibility. If one had an obligation never to risk harm, one would have to stay home. However home is where most accidents happen. There are no risk-free choices. A standard of do nothing, unless one has complete surety that no one will be harmed, is unlivable. We do not claim it anywhere else. Why insist on it in this case?

For millennia the definition of death has been the cessation of heartbeat. With the not infrequent success of technical interventions that can sustain a heartbeat long after the person has permanently left, the definition of death has shifted to brain death. This is not to excuse killing people. Brain death is a responsible refinement of our understanding of death in a context changed because of our active technical intervention. Recognizing brain death as death has also made possible the donation of organs that save countless lives each year. We could use the burden of proof argument as absolute as cited above to say that if there is even the slightest chance that human beings might not really be dead when their brain is dead

(how can we know for sure, say in some sense the soul might live on in the body?), then we should never transplant organs until the heart is utterly still and it would be safer if we wait for the body to be cold and rigid, indeed safest if we wait for the body to begin to decompose. Such a conclusion would preclude many organ donations, sacrificing tens of thousands of lives every year. Pushing for an unqualified maximum protection in one area of concern can cause travesty in others.

For that matter, the maximum burden of proof protection is not at conception; it is at the possibility of conception. This is the key to the argument of the current Roman Catholic magisterium to forbid contraceptives. Intentionally hampering the procreation natural to conjugal intimacy is anti-life interference. Contraception blocks the existence of human beings who would have otherwise lived. If the argument is correct that maximum support for possible human life is always required, forbidding any interference in procreation is more consistent than allowing contraception to interrupt a God designed continuum of marital intimacy to birth. As a sole standard, maximum protection leads to complete openness to procreation, not starting to protect only at the point of conception.

A variation of the burden of proof argument is that if any developing human life is not nurtured, we will slide down a slippery slope into the horrific slaughter perpetrated by the Nazis. This concern refers both to a conceptual slippery slope that once it is acceptable to kill one human life there is no longer a clear prohibition to refrain from killing many, and a social slippery slope that even if there is a good reason to allow the end of embryos, the societal momentum of that acceptance will be such that we will not stop even late term abortion. Abortion is now allowed in North America up to the time of birth and there are prominent ethicists who currently argue for infanticide. The slippery slope argument concludes that human beings need protection from conception or they will eventually not be protected at all. On the contrary side, the experience in the USA and Canada to date has been that political insistence on all protection or none has largely resulted in none.

Slippery slope concerns are well worth considering. They are compelling to the degree that there is a slippery slope and the end to which it leads is abhorred. In response, middle positions have been proposed where the clear line to be drawn does not have to be at fertilization and even if the embryo is not a person yet, the embryo could still warrant more respect and care as a human embryo than mere tissue. Such status might still offer good reason to protect embryos, just not at the near absolute level that they would warrant as people.

So Does the ANT Proposal Help?

The ANT proposal is trying to build a workable coalition. It will not be possible to satisfy everyone, but can it accommodate the discussed ethical concerns? Each of the above arguments for the status of the human embryo as a human person can now be addressed, asking if ANT would be acceptable to that perspective. ANT probably does not address the maximum protection perspective that calls for all procreative acts to be open to new lives. That view rejects contraception and any other intervention “unnaturally” limiting human procreation. ANT could argue that what it is proposing would not be procreation if the entity is created in glass with no potential from the start, but gametes would still be obtained and modified outside their intended place within marital intimacy.

For those who find the genes-in-one-place argument compelling, ANT forces a question of refinement for that reasoning. Are all the genes except the ones needed for implantation, enough genes to trigger this definition of a human being? It is the old problem of defining, for example, a car. Is it still a car if it is missing one wheel? Is it a car if it lacks brakes? An engine? As parts are subtracted at what point is it not a car? ANT forces those who advocate the genes-in-one-place argument, to refine how complete the set of genes must be to constitute a fellow human being. For this view, it may be difficult to have an entity genetically complete enough to produce viable embryo-type stem cells but not complete enough genetically to be considered an embryo-person.

For those who see the key transition to human being status in potential, ANT offers a way to obtain embryo-type stem cells from an entity which is like an embryo in every respect except that it is unable to implant, hence it does not immediately have the potential to develop into a baby with womb support. Note, unlike earlier proposals to restrict an embryo’s potential,²² it is important to Hurlbut that he is suggesting altering an egg, not an embryo. The intervention is before conception. The restriction of potential is achieved before the genes come together to form an embryo-like entity which would have been an embryo if not for the intervention. Because the entity lacks one crucial capability to develop, Hurlbut proposes that it is not a human being since the reason

an embryo is a human being is because of its potential to develop with adequate support.

This argument depends on carefully qualifying the idea of potential. The altered nuclear embryo would still have the capacity to develop if the alteration were reversed. Does lacking a potential that could be provided, qualify as lacking potential? It would not be convincing to say a person lacks the capacity to see, if we have the ability to surgically remove her opaque lens and transplant a healthy one in so she can see. With help her sight could be restored. Is the potential actually absent if with intervention the potential could be achieved? Would an ANT entity be a human being by the definition of having potential, if the deletion could be reversed? If not, why not? An embryo needs constant and pervasive support to survive and develop. Why would needing a correction not be part of warranted support?

For those who see the first presence of a person at implantation, individuation, or formation, ANT could be acceptable, but a distraction of research effort from what would probably be more helpful.

For those who see the first presence of a person at implantation, individuation, or formation, ANT could be acceptable, but a distraction of research effort from what would probably be more helpful. Granted there could still be sufficient motivation to pursue ANT, if it created a source of embryo-type stem cells that would relieve both the moral distress of substantial portions of the population and people feeling obligated to opt-out of derived treatments. Whether it could achieve these goals would depend on how many who affirm that an embryo is a fellow human being would think that an entity which is like an embryo except that it cannot implant, is therefore not an embryo, hence not a human being.

Alternatives

Rudolf Jaenisch offers a parallel source of stem cells that may be more directly effective. He has argued that because somatic cell nuclear transfer (SCNT) bypasses the normal processes of gametogenesis and fertilization, the clone’s genome is not programmed to effectively develop a new organism. It appears that “serious biologic barriers (rather than mere technical problems) hinder faithful reprogramming after nuclear transfer and thus preclude the use of

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nuclear programming as a safe reproductive procedure."²³ If this is the case, somatic cell nuclear transfer to grow tissue matching the one in need of it would not sacrifice an embryo with potential for independent life.

Paul McHugh suggests that an embryo-like entity that can form tissue but not organize a fetus warrants a different name. He proposes "clonote" rather than zygote or embryo.²⁴ A clonote would have the same range of potential as an altered nuclear transfer, but without investing the extensive research necessary to found a new technique. To those who find ANT a possible resolution, SCNT may meet the same moral concerns with fewer technical challenges. However, the stresses which render the clonote unable to develop a functioning body, may also compromise the quality of derived stem cell lines. This route, too, would require careful testing and development.

One anonymous reviewer of this manuscript suggested that another alternative would be to remove one cell from an embryo in such a way that the embryo was not harmed, and then use that removed cell to start stem cell lines. For those who are convinced that the presence of all the necessary genes in an entity that is alive and human is, in fact, already a fellow human being, the removed cell is an identical twin, not a disposable cell. ANT is trying to address that group in a way that the reviewer's proposal would not.

What has brought this discussion to the forefront is the apparent advantage of using embryo-type stem cells for research and eventually for possible therapy. However, even if adult cells can someday be transformed into stem cells to bypass embryos as a source of stem cells, the status of human embryos will still make a difference for the ethics of cancer research, somatic cell nuclear transfer, pre-implantation genetic diagnosis, and a myriad of other present and coming techniques. For instance, embryos are now created and destroyed regularly as couples pursue IVF. If we forego research and potential treatment in order to protect embryos, why allow their destruction for the sake of infertile couples? Working through the status of the first month of developing human life in ever greater precision has ramifications far beyond ANT and so will continue to demand our attention. **

Notes

- ¹William B. Hurlbut, "Altered Nuclear Transfer as a Morally Acceptable Means for the Procurement of Human Embryo-Type Stem Cells," President's Council on Bioethics, December 2004.
- ²*God and the Embryo* (Georgetown University Press, 2003), ed. Brent Waters and Ronald Cole-Turner, is a thoughtful collection of essays on the moral status of embryos. My own chapter in the book includes a number of arguments also addressed in this article.
- ³John Connery, *Abortion: The Development of the Roman Catholic Perspective* (Chicago, IL: Loyola University Press, 1977), 40, 50–2, 56.
- ⁴Margaret A. Farley, "Roman Catholic Views on hES Cell Research," in *The Human Embryo-type Stem Cell Debate*, ed. Suzanne Holland, Karen Lebacqz, and Laurie Zoloth (Cambridge, MA: The MIT Press, 2001), 115–7.

⁵Qur'an 24:12–14.

⁶Abdulaziz Sachedina, "Islamic Perspectives on Research with Human Embryo-Type Stem Cells," *Ethical Issues in Human Stem Cell Research, Volume III: Religious Perspectives* (Rockville, MD: National Bioethics Advisory Commission, 2000): G-4.

⁷Laurie Zoloth, "The Ethics of the Eighth Day: Jewish Bioethics and Genetic Medicine," *Ethical Issues in Human Stem Cell Research, Volume III*, J-13, 15.

⁸Gen. 30:2, 1 Sam. 1:5. Cahleen and Paul Shrier propose extrapolating these and other texts to this end in "Human Embryo-Type Stem Cell Research and Christian Community Ethics: An Old Testament Investigation," *Perspectives on Science and Christian Faith* 58, no. 1 (March 2006): 37–46.

⁹John Jefferson Davis succinctly lays out and evaluates three possible readings in *Abortion and the Christian: What Every Believer Should Know* (Phillipsburg, NJ: Presbyterian & Reformed, 1984), 49–52.

¹⁰Roman J. Miller, "Viewing Bioethics Through Anabaptist Eyes," *Viewing New Creations with Anabaptist Eyes: The Ethics of Biotechnology* (Telford, PA: Cascadia/Herald Press, 2005), 89 is an example of a recent application of this text to status at conception.

¹¹For a more complete discussion, see James C. Peterson, *Genetic Turning Points: The Ethics of Human Genetic Intervention* (Grand Rapids, MI: Eerdmans, 2001), 68–9, 127–30, 345–6.

¹²Harold O. J. Brown as quoted by John Jefferson Davis, *Evangelical Ethics: Issues Facing the Church Today* (Phillipsburg, NJ: Presbyterian and Reformed, 1985), 148.

¹³Pope John Paul II, *Evangelium Vitae (The Gospel of Life)* (New York: Random House, 1995), 108.

¹⁴Gilbert Meilaender, *Bioethics: A Primer for the Christians* (Carlisle, UK: Paternoster, 1996), 29.

¹⁵Luke 18:15, 1:41, 44, 2:12, 16.

¹⁶As quoted by Bonnie Steinbock in *Life Before Birth: The Moral and Legal Status of Embryos and Fetuses* (New York: Oxford University Press, 1992), 215.

¹⁷Robert A. Boomsma, "Embryo-type Stem Cells and a Reformed Christian World View," *Perspectives on Science and Christian Faith* 56, no. 1 (March 2004): 43.

¹⁸Ronald M. Green, "Determining Moral Status," *The American Journal of Bioethics* 2, no. 1 (Winter 2002): 26.

¹⁹Norman M. Ford, *When Did I Begin?* (Cambridge: Cambridge University Press, 1988), 181. D. Gareth Jones notes that while Ford does not see an individual present from fertilization, Ford still calls for protection beginning with the zygote. Jones, "Responses to the Human Embryo and Embryo-type stem Cells: Scientific and Theological Assessments," *Science and Christian Belief* 17, no. 2 (October 2005): 213.

²⁰Kristyn A. Mannoia, "An Evaluation of Three Religious Perspectives on Stem Cell Research," *Perspectives on Science and Christian Faith* 56, no. 3 (September 2004): 222.

²¹Robert Song, "To Be Willing to Kill What for All One Knows Is a Person Is to Be Willing to Kill a Person," in *God and the Embryo*, ed. Brent Waters and Ronald Cole-Turner (Washington, DC: Georgetown University Press, 2003), 98–107.

²²Stephen S. Hall, "Stem Cells: A Status Report," *Hastings Center Report* (January–February 2006): 20.

²³Rudolf Jaenisch, "Human Cloning: The Science and Ethics of Nuclear Transplantation," *New England Journal of Medicine* 351, no. 27 (December 30, 2004): 2787.

²⁴Paul R. McHugh, "Zygote and 'Clonote': The Ethical Use of Embryo-Type Stem Cells," *New England Journal of Medicine* 351, no. 3 (July 15, 2004): 209–11.

keynote speaker

Alister McGrath

CiS/ASA Conference
University of Edinburgh
August 2–5, 2007





The American Scientific Affiliation Booklet Controversy

Jerry Bergman

Many critics of "scientific creationism" advocate theistic evolution, the view that God guided evolution. This communication reviews the responses to a booklet published by the American Scientific Affiliation (ASA) on this topic. Probably most ASA members are theistic evolutionists of some sort. All are active, committed Christians. Some ASA members are supportive of the Intelligent Design (ID) movement; others are critical of ID. Although the statement of faith signed by its members identifies them as evangelical Christians, the ASA resembles a scientific society more than it does a religious group.¹ The ASA as an organization endeavors to investigate matters of science and faith, but it does not feel obliged to settle them by fiat, or to make official pronouncements about them. From its founding in 1941, ASA has remained open to various interpretations of the biblical doctrine of creation and has never advocated "flood geology" or what came to be known as "scientific creationism" or simply "creationism."²



Jerry Bergman

By the early 1980s, advocates of a literal interpretation of the Bible were using legal and political means to influence the teaching of evolution in public schools. Laws passed in Arkansas and Louisiana and a remark by presidential candidate Ronald Reagan convinced leaders of the scientific community that science education was "under attack."³ It had become obvious that a religiously motivated segment of the population was hostile to Darwinian evolution or at least suspicious of it. To prevent such antagonism from getting worse, individual American Scientific Affiliation (ASA) members began taking action, sometimes in the name of ASA.⁴ For example, in February 1982, when the decision in *McLean v. Arkansas Board of Education* was announced during the national meeting of the American Association for the Advancement of Science (AAAS), ASA members attending the meeting issued a press release in the name of the ASA, stating that "Creationists Can Be Evolutionists, Too," resulting in some favorable publicity for the ASA.

In 1984, three ASA members in California formed a Committee for Integrity in Science Education, with authorization from the ASA Executive Council to seek financial support for a publishing project. They were David

Price, John L. Wiester, and Walter R. Hearn. Price was named chairman on the basis of his doctorate in science education and experience teaching biology at both high school and college levels. Wiester, after serving as a teaching assistant in geology at Stanford, had served as financial officer for several high-tech businesses. After becoming a Christian, he published his synthesis of biblical faith and "old-earth" geology in a popular-level book, *The Genesis Connection*.⁵ Hearn has twenty years experience as a researcher and professor of biochemistry at Iowa State University. His Ph.D. from the University of Illinois is in biochemistry. He has been active in the ASA for much of his career and was the editor of the ASA newsletter for two decades. One of the founders of New College Berkeley, he now serves as professor of

It had become obvious that a religiously motivated segment of the population was hostile to Darwinian evolution or at least suspicious of it.

Jerry Bergman, a fellow of ASA, has been an active ASA member for over 25 years and has found his involvement in ASA a very rewarding part of his career. He has taught biology, genetics, chemistry, biochemistry, and anthropology for over 35 years. His nine degrees, including from Medical University of Ohio, Wayne State University in Detroit, University of Toledo, and Bowling Green State University, are all in the sciences. Many of his over 700 publications in twelve languages and twenty books and monographs deal with the creation/evolution controversy. He has taught at the Medical University of Ohio where he was a research associate in the department of experimental pathology, and at the University of Toledo and Bowling Green State University. He is now an adjunct professor at the Medical University of Ohio.



Communication

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In 1984, three ASA members in California formed a Committee for Integrity in Science Education, with authorization from the ASA Executive Council to seek financial support for a publishing project. ... Concluding ... that those in most immediate need of help were high school teachers ..., the committee set to work to clarify issues that might come up in a classroom.

science and Christianity there. He has contributed chapters to over six edited volumes, from Mixer's *Evolution and Christian Thought Today*⁶ to Templeton's *Evidence of Purpose: Scientists Discover the Creator*.⁷

The committee first toyed with the idea of writing for the conservative Christian public, with whom they were well acquainted, to try to persuade it to broaden its "young-earth" view of the biblical creation narrative. Concluding, however, that those in most immediate need of help were high school teachers "caught in the crossfire," the committee set to work to clarify issues that might come up in a classroom. With foundation grant support, the three authors met several times at Wiester's cattle ranch near Santa Barbara and, by mid-1986, had produced a 48-page booklet titled *Teaching Science in a Climate of Controversy* (see Figure 1).

The ASA booklet was modeled after, and was essentially a response to, the 1984 publication of National Academy Press titled *Science and Creationism: A View from the National Academy of Sciences* (NAS). The Preface to the ASA booklet was provided by a member of both the ASA and the National Academy, Professor John E. Halver of the School of Fisheries of the University of Washington. Halver expressed appreciation for the NAS booklet's summary of the evidence but noted that "to some readers the NAS booklet seemed to overstate its case—particularly with regard to human evolution." He commended ASA's *Teaching Science in a Climate of Controversy* for "its careful treatment of scientific matters and for its practical approach to questions that go beyond science."

The NAS had mailed a free copy of *Science and Creationism* to each of more than 40,000 high school biology teachers and science supervisors in the United States. ASA's Committee for Integrity in Science Education used the same mailing list from the National Science Teachers Association but had enough money to print and distribute only half that many copies of its booklet, targeting the western and southern states in 1986. The following year additional funds became available for a second printing (with slight revisions) that were mailed to teachers in the rest of the country. The ASA booklet was reprinted again in 1989 (with more revisions). In 1993, additions to the 1989 text made the fourth printing of *Teaching Science*

almost a new edition, bringing the total circulation to over 100,000 copies.

The authors of *Teaching Science* occupied what they called in their booklet the "broad middle ground in which creation and evolution are not seen as antagonists." They expected criticism from the narrowest segment of creationists, to whom even the word "evolution" was anathema, but they were unprepared for the virulent criticism hurled at their irenic effort by some scientists and educators. Having emphasized that teachers should focus on the quantity and quality of scientific evidence, why should it matter, they assumed, whether the case for evolutionary science was being made by a theist, an atheist, an agnostic, or someone who gave no thought to religion at all?

Evidently it mattered a great deal to California science writer William Bennetta, who called the ASA

a fundamentalist political movement with political aspirations that are broad, bold, and almost universally underestimated by the public and the press.⁸

He asserted that ASA members were all creationists who

want to bring all science education and all science under religious control. [Bennetta claimed that ASA's activities would] cripple science education in public schools [and would result in schools teaching] pseudoscience that distorts ... physics, chemistry, astronomy, geology, paleontology, and biology.⁹

Bennetta lashed out at the ASA as a

religious group [whose members must affirm that] the Bible is the inspired, unerring Word of God. [Ultimately, he argued, ASA's goal was to] replace science with a system of pseudoscience devoted to confirming biblical narratives.¹⁰

Bennetta seemed to mischaracterize the ASA and *Teaching Science* so thoroughly that the authors wondered if he had actually read the booklet. He called the ASA booklet

an ordinary exercise in creationist pseudoscience. It deserves special attention, however, because it has been distributed widely and because it may seem respectable to lay people.¹¹

Bennetta seemed to be absolutely certain that all ASA members were “scientific-creationists.” Considering science teachers to be the guardians of the “future health” and success of science, he wrote that when “science education comes under attack, teachers can expect their colleagues to help in defending it.” Bennetta cast himself in the role—fending off an “attack against science” by the ASA booklet, which actually was written to help teachers analyze some claims and counterclaims about evolution.

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The director for research for the National Science Teachers Association (NSTA) Russell Aiuto called the ASA booklet “clever and subtle” and those who advocated its position “neo-creationists.”¹² He concluded that the booklet was “very clever nonsense” that achieved

a very high level argument, one that would be so seductive, seemingly innocent, and ostensibly rational, that—at long last—the creationists would save our children from godless Darwinism and finally insinuate creationism into the curriculum.¹³

Aiuto objected to a classroom exercise added to the 1993 edition because of its reference to fossils providing *inference* for evolution (rather than *evidence*). Asking students to distinguish between *evidence* and *inference* was “deceptive” to Aiuto, who called both the book and its sponsoring organization “insidious” and “offensive.” He claimed that the “inspiring quote from a noted author or scientist”—with which each chapter was introduced—had been taken out of context.¹⁴

In response, Wiester called Aiuto’s review “a sad example of the tactics Darwinists use to defend their ideology; *ad hominem* rhetoric, dishonest statements and innuendo, and distortions of science.”¹⁵ Wiester accused Aiuto of assuming that whatever “evolutionists believe” is fact, noting that

beliefs are not what count in science. In science, it is evidence that counts. That evidence must be presented without manipulation by ideological infer-

ence. We hope that NSTA will join us in our efforts to have evolution taught as science.¹⁶

Kent State University Geology Professor Neil Wells wrote that the booklet was not only biased, but that it “belittles science,”¹⁷ and that the authors “lack knowledge” and are “confused.”¹⁸ Wells then revealed his real objection to the Christian position of the authors by repeating common “buzz-word” condemnations against Christianity, such as the Inquisition, the Crusades, etc.

Science writer Robert Shadewald complained that the booklet was “riddled with misconceptions and lacunae” but gave only one putative example.¹⁹ Texas Council for Science Education President Steven Schafersman went farther, calling the booklet “dangerous” because the view it presented, theistic evolution, was “plausible but false.”²⁰ He accused the ASA writers of not knowing how science operates, and *Teaching Science* of containing numerous errors of fact. He was especially concerned because he felt that the booklet gave “theism and religion ... legitimacy.”²¹

San Jose State University Anthropologist Robert Jurmain dismissed the booklet with the judgment that the motives of the authors were “religious,” implying that, therefore, their conclusions were wrong.²² State University of New York Biology Professor Douglass Futuyma²³ called the booklet a “Creationist tract that uses as its principal tactics innuendo and selective omission.” National Cancer Institute Scientist Biologist Maxine Singer criticized the booklet for not covering material that she regarded as important and by ignoring that material she concluded “the writers of the ASA booklet have made a mockery of their claims of objectivity.”²⁴ (Of course, any booklet designed to be read

Teaching Science in a Climate of Controversy

A View from the American Scientific Affiliation



Figure 1. The cover of *Teaching Science in a Climate of Controversy*. Note the subtitle, “A View from the American Scientific Affiliation.”



Communication

The American Scientific Affiliation Booklet Controversy

Wiester responded to charges of incompleteness by noting that the purpose of the ASA booklet was to complement existing high school textbooks, on which teachers rely to present the evidence on which Darwinists' claims are based.

in an hour or so could hardly cover every aspect of a controversy that has raged for over 150 years.) Wiester responded to charges of incompleteness by noting that the purpose of the ASA booklet was to complement existing high school textbooks, on which teachers rely to present the evidence on which Darwinists' claims are based.²⁵

Research scientist Michael Ghiselin called the ASA "pamphleteers" who "attempt to disparage unwelcome scientific findings."²⁶ Arguing that "chance" accounts for "organic form or variation" of life, not "divine design," Ghiselin concluded that the ASA was telling "lies to naive and trusting young persons."²⁷

American Museum of Natural History Invertebrate Paleontologist Niles Eldredge accused the ASA booklet of retreating to the "central canon of all creationism—that major groups of organisms may have been separately created."²⁸ Boston University Microbiologist Lynn Margulis called the ASA booklet "insidious ... treacherous ... nefarious propaganda."²⁹ Juliana Texley, editor of *The Science Teacher*, conceded that *Teaching Science* "contains few if any easily recognizable errors in the first half of the text. Yet, buried in it are insidious scientific misrepresentations."³⁰ She insisted that these "implications are far worse than the text."³¹

University of California, Berkeley, Biochemistry Professor Vincent Sarich considered it fruitless to point out the poor evidence for evolution in the fossil record because "the fossil record is not, and never has been, our major source of information about evolutionary relationships."³² (Actually, many high school textbooks do claim that the fossil record is a major evidence for evolution.)

The mild skepticism of the ASA booklet toward some claims of Darwinian evolution was not appreciated by skeptic organizations. Another Berkeley professor, Biochemist Thomas Jukes, wrote a blistering attack in the *Bay Area Skeptic Newsletter*. He charged that Hearn, despite his career in biochemical research, did not comprehend molecular evolution. Jukes bemoaned the fact that *Teaching Science in a Climate of Controversy* had been distributed to tens of thousands of schools "when one of its co-authors, Hearn, has such confused ways of thinking and

writing that are reflected in its text."³³ Jukes did not detail the nature of Hearn's "confusion," but was certain that the ASA was a "creationist pseudoscience" organization that pushed classic "creationist quackery."³⁴

Hearn responded to Jukes' charges by flatly stating, "Well, he is wrong. We are not" a classic creationist organization.³⁵ By "classic" Hearn meant young age, flood geology, biblical literalist creationists. Dennis Wagner, director of Access Research Network, has noted that the spate of negative reviews the booklet received indicate "an orchestrated campaign to discredit the ASA publication." He adds that, to date, all but one of the publishers of the reviews of the ASA booklet "have refused to publish replies from the ASA authors."³⁶ Hearn wrote a detailed response to the *California Science Teachers Journal's* attempt to lambaste *Teaching Science*, which the journal refused to publish. ASA member and science historian Richard Aulie summarized the attack on the ASA by the *Creation/Evolution Newsletter* as a transmutation from a review of the booklet "into a denunciation of the ASA and all its works" that has "gone into the hands of science leaders everywhere."³⁷

Although the ASA booklet was widely attacked, few critics pointed to specific scientific errors, and the authors corrected minor errors that were noted in subsequent printings. The criticism seemed to consist primarily of name-calling.³⁸ In a response to the criticism, ASA fellow Wilbur L. Bullock, professor emeritus of parasitology at the University of New Hampshire (1988), wrote that, as a whole, the attacks were "emotional," "unscientific," and actually an attack on an "imaginary position" that is *not* found in the ASA publication, as noted also by Wiester.³⁹ Several ASA members tried to respond to the attacks by publishing various articles and letters to the editor, most of which were reasoned discussions of the purpose and arguments in the booklet.⁴⁰

Those active in organizations such as the Creation Research Society expressed mixed reactions to the ASA booklet. Many felt it compromised a strict creationist position and ignored many of what they consider the major problems with theistic evolution. We are not aware of any mainline creationist organization that openly supported the booklet.

Before drawing conclusions from this study of the reception of *Teaching Science in a Climate of Controversy*, we should also comment on its reception by those to whom it was addressed. It is possible to do this because the booklet contained a card asking readers to rate the booklet with a grade (A+ to F) and to offer any comments on its contents. Of those returning the score card supplied with the booklet, almost 80% rated the booklet very favorably (A or B), yet almost every review of the booklet published in science journals was very negative.

Of those returning the score card supplied with the booklet, almost 80% rated the booklet very favorably (A or B), yet almost every review of the booklet published in science journals was very negative.

Wagner concludes that most of the negative criticism was not aimed at the data presented, but rather was an emotional reaction to the ASA's attempt to "remove the 'ism' from the scientism and evolutionism that was so boldly presented in the 1984 NAS booklet."⁴¹ Responses on the returned cards thus reflect the conclusions of science teachers, not professors of evolution: 27.2% gave it an A+; 42% gave it an A; 6.7% a B; 5.3% a C; 4.6% a D; and 14.1% an F (a few adding a minus to indicate their complete dissatisfaction). Unfortunately, no information is available about those not returning the cards and the data was not analyzed beyond the above percents.

Although the ASA booklet was roundly condemned in scientific journals for being a "creationist tract," not all teachers read it that way. Most of the teachers seemed to consider the booklet a fair analysis of the major claims and counterclaims about evolution. Even those who gave it a C or D tended to give insightful comments. One concluded that it had "too much of an evolution bias."

Several reviewers condemned it and/or gave it an F because they concluded that the booklet promoted evolution. One teacher commented: "Macroevolution has failed every test devised. Why waste time and resources on advertising a poor theory?" Several comments were along the following lines: "Sounds like you support theistic evolution. I'd rather that you took the Bible as the literal word of God" and "As a Christian I definitely would

never guess that the authors of this edition believe in the infallible Word of God as being accurate as to the Genesis account of Creation."

Teachers who read the booklet as an attack on evolution and gave it an F or F- proved to be as eloquent at name-calling as the scientists who panned it. One called the writers "ignoramuses," adding "you guys never quit, do you?" Another said, "Propaganda, if I ever saw it. Trash." Another commented: "You are all mindless. Sober up and kick the religious habit." Others called the booklet "garbage," "silly," and "a thinly veiled attempt to promote a discredited view point." One respondent fumed, "You should rename your group the K.K.K." At least one complained that theistic evolution was even "more insidious than 'scientific creationism.'"

Conclusions

In writing about evolution's impact on Christianity, University of California Anthropologist Donald Symons stated that many

evolutionary biologists and historians of science have argued persuasively that Judeo-Christian theology is profoundly at odds with Darwin's theory of evolution. As Steven Jay Gould has pointed out, Darwin's 20-year delay in publishing his theory did not result from his fear of advocating evolution—evolutionary ideas had been commonplace since the late eighteenth century—but rather from his fear of advocating a *materialist evolutionary ... mechanism*. Other evolutionists of Darwin's day spoke of "vital forces," "directed history," "organic striving," and so forth—vague, mystical notions that were easily reconciled with a Christian God who acts through evolution rather than through special creation. ... Nonfundamentalist Christians are able to accept Darwinian evolution so easily because they do not fully understand its implications.⁴²

It is clear that many critics of ASA's *Teaching Science in a Climate of Controversy* saw the booklet's authors as fostering "vague, mystical notions" out of an unwillingness to "face the facts"—although those authors were trained in scientific disciplines and their booklet presented scientific discoveries in a positive light. As "nonfundamentalist Christians," the booklet's authors were undoubtedly aware of tensions in their own lives between a Christian point of view and a scientific point of view. Critic Alan M. Portis misunderstood the authors' perspective, concluding:

It is inappropriate for a science teacher to offer what the ASA publication implies—a synthesis of science and religion. Just as science develops by internal controversy, so a tension between scientific and religious views may promote the personal development of our students. If we seek to avoid this tension by synthesizing both points of view, we may compro-



*Judging by
the cards
returned and
other feedback,
the booklet
had positive
results ...
the booklet's
approach
appears to be
a viable
response
to this difficult
question, but
more research
and dialogue
is required
to reduce the
antagonism
from the
general
scientific
community ...*

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mise science and deny our students an opportunity for growth.⁴³

The question is whether such "personal development" requires resolution of the tension by essentially rejecting a religious view, specifically that of theism. Critic Schafersman expressed concern that the authors of the booklet wanted students' personal development to take place in science classrooms:

These "classroom guidelines," if conscientiously followed, would do more to harm science education in this country than not teaching science at all. The science classroom is not the proper place to discuss Gods and Creators. Doing so confuses students in precisely the wrong direction for development of a good appreciation of science, because they will associate such discussion with rational acceptance of deities on the part of the science teacher, an authority figure, and thus mistakenly assume that somehow science and deities are connected in some legitimate fashion. There is no common middle ground between supernatural religion and science; to suggest there is is deceptive.⁴⁴

Although some people, such as the ASA booklet's authors, feel they have found common ground, Schafersman believes "they are simply holding contradictory views simultaneously." Regardless of the validity of this claim, Schafersman concludes:

The public school classroom is no place to encourage students to think this way. As for taking sides, it is absolutely essential for the science teacher to tell students that "Science does not recognize or require a Creator." Postulation of a creator is a faith position that has nothing to do with science. Neglecting to say this confuses the student about the true nature of science and promotes religious thinking in science, certainly something to be avoided.⁴⁵

Critics like Symons and Schafersman do not seem to realize that the fact is students commonly bring religious questions with them into the science classroom, just as their teachers often do—as shown in the responses by teachers to *Teaching Science in*

a Climate of Controversy. For that matter, many practicing theists take up science as a profession—as shown in the membership of the ASA. Furthermore, many theists are citizens who will never enter a laboratory, but who vote for the congressional representatives who supply the funds that support scientific research.

The harshest criticisms of the ASA booklet seemed to come from individuals with an atheistic or materialistic perspective but, to be fair, a few reviewers did defend the ASA. Richard Aulie, an ASA member, wrote a favorable comprehensive review of the booklet.⁴⁶ So did Karl Fezer, editor of the *Creation/Evolution Newsletter*, an agnostic willing to acknowledge theism as a legitimate perspective.⁴⁷

Lessons from This Experience

Although many ASA members feel that far more important issues exist that should be focused on, such as the environment and the depletion of natural resources, the creation/evolution controversy is now a more contentious issue than when the ASA booklet was published twenty years ago. The publication of ASA Fellow Francis Collins's book, *The Language of God: A Scientist Presents Evidence for Belief* (as of this writing number 12 in sales on Amazon.com, and already reviewed in *Nature* [July 13, 2006]: 110, 114–5) has again raised the issue (and has also created much controversy). In view of this fact, the ASA has no choice but to continue to address this issue in order to cover issues that are on the minds of many Christians in science.

Judging by the cards returned and other feedback, the booklet had positive results, especially from teachers who must deal with the extremes from both sides of this still very contentious issue. No easy answer exists for how best to address the question of secularism in public education today; not only in science, but also in history, social science, and in other areas. Whereas fully 67% of the teachers favored the approach that the booklet took, the booklet's approach appears to be a viable response to this difficult question, but more research and dialogue is required to reduce the antagonism from the general scientific community as reviewed in this communication. **

Acknowledgment

I wish to acknowledge the major contribution of Walt Hearn to this manuscript. His careful fact checking and the work he did on several major revisions significantly improved the original manuscript. He also provided several documents and guided the manuscript's development.

Notes

- ¹A number of other Christian academic societies are similar to the ASA in this aspect.
- ²Ronald L. Numbers, *The Creationists* (New York: Alfred A. Knopf, 1992), chapter 9.
- ³*Ibid.*, chapter 19.
- ⁴Some ASA members felt that this activity was a deviation from the traditional ASA stance.
- ⁵John Wiester, *The Genesis Connection* (Nashville, TN: Thomas Nelson Publishers, 1983).
- ⁶Russell Mixter, *Evolution and Christian Thought Today* (Grand Rapids, MI: Eerdmans, 1959).
- ⁷John Templeton, *Evidence of Purpose: Scientists Discover the Creator* (Continuum, 1994).
- ⁸William J. Bennetta, "Scientists Decry a Slick New Packaging of Creationism," *The Science Teacher* 54 (1987): 36.
- ⁹*Ibid.*, 36.
- ¹⁰*Ibid.*
- ¹¹*Ibid.*, 37.
- ¹²Russell Aiuto, "Book Claims Fairness, Tries to Dismantle Evolution," *NSTA Reports* (October–November 1993): 3.
- ¹³*Ibid.*
- ¹⁴*Ibid.*
- ¹⁵John Wiester, "Distorting for Darwinism: NTSTA Attacks the ASA," *Committee for Integrity in Science Education, American Scientific Affiliation* (1994): 1.
- ¹⁶*Ibid.*, 5.
- ¹⁷Neil Wells, "Review of *Teaching Science in a Climate of Controversy*," *Creation/Evolution Newsletter* 7 (1987): 4.
- ¹⁸*Ibid.*, 5.
- ¹⁹Robert J. Shadewald, "Comments about *Teaching Science in a Climate of Controversy* by D. Price, J. L. Wiester, and W. R. Hearn," *Creation/Evolution Newsletter*, 6 (1986): 4.
- ²⁰Steven Schafersman, "Review of ASA Booklet," *Creation/Evolution Newsletter* 7 (1987): 5.
- ²¹*Ibid.*

- ²²Robert Jurmain, "Review of *Teaching Science in a Climate of Controversy*," *Science Teacher* 54 (1987): 42.
- ²³Douglass Futuyma, "Review of *Teaching Science in a Climate of Controversy*," *The Science Teacher* 54 (1997): 37.
- ²⁴Maxine Singer, "The Science Teacher," *Creation/Evolution Newsletter* 7 (1987): 38.
- ²⁵John Wiester, "Response to Reviews of *Teaching Science in a Climate of Controversy*: 'Did the Universe Have a Beginning?' and 'Where Did the First Animals Come From?'" *Perspectives on Science and Christian Faith* 40 (1988): 162.
- ²⁶Michael T. Ghiselin, "Review of *Teaching Science in a Climate of Controversy*," *The Science Teacher* 54 (1987): 38–9.
- ²⁷*Ibid.*, 39.
- ²⁸Niles Eldredge, "Review of *Teaching Science in a Climate of Controversy*," *Science Teacher* (1987), 39.
- ²⁹Lynn Margulis, "Review of *Teaching Science in a Climate of Controversy*," *Science Teacher* (1987), 40.
- ³⁰J. Textley, "Editor's Corner," *The Science Teacher* 54 (1987): 8.
- ³¹*Ibid.*
- ³²Vincent Sarich, "Review of *Teaching Science in a Climate of Controversy*," *Science Teacher* 54 (1987): 41.
- ³³Thomas Jukes, Letter to the editor in a reply to Hearn, *Bay Area Skeptic Newsletter* 9 (1990): 11.
- ³⁴*Ibid.*, 13.
- ³⁵Walt Hearn, "Bennetta v. ASA: Misguided Zeal?" *Bay Area Skeptics Newsletter* 9 (1990): 5.
- ³⁶Dennis Wagner, "Review of *Teaching Science in a Climate of Controversy*," www.leaderu.com/orgs/arn/orpages/or101/101views.htm (2005), 3.
- ³⁷Richard P. Aulie, "Response to Bennetta's Review of the ASA Booklet," *Creation/Evolution Newsletter* (1987): 9.
- ³⁸*Ibid.*
- ³⁹Wilbur L. Bullock, "Scientists Decry a Slick New Packaging of Creationism," *Perspectives on Science and Christian Faith* 40, no. 3 (1988): 165–7.
- ⁴⁰Wagner, "Review of *Teaching Science in a Climate of Controversy*."
- ⁴¹*Ibid.*, 3.
- ⁴²Donald Symons, "Evolution and Christianity," *The Skeptical Inquirer* (1985): 90, emphasis in original.
- ⁴³Alan M. Portis, "Review of *Teaching Science in a Climate of Controversy*," *Science Teacher* 54 (1987): 43.
- ⁴⁴Schafersman, "Review of ASA Booklet," 6.
- ⁴⁵*Ibid.*
- ⁴⁶Aulie, "Response to Bennetta's Review of the ASA Booklet," 9–11.
- ⁴⁷Karl D. Fezer, "Reflections on the ASA Booklet, and on The Goals and Means of Science Education," *Creation/Evolution Newsletter* 6 (1986): 9.



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Communication

In the Image of God: Exploring Links with Cognitive Psychology



Harold W. Faw

In the Image of God: Exploring Links with Cognitive Psychology

Harold W. Faw

Cognitive psychology, with its focus on "higher mental processes," appropriately explores complex cognitive capacities ... However, the picture it presents needs to be placed in proper context.

In his intriguing analysis of Psalm 8 entitled *The Majesty of Man*, Ronald Allen directs our gaze to the lofty picture of humans this passage paints.¹ A portion of the Psalm reads as follows:

O Lord, our Lord,
How majestic is your name in all the earth!
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.
You made him ruler over the works of your hands;
You put everything under his feet.
O Lord, our Lord,
How majestic is your name in all the earth!¹²

This passage echoes the Genesis account in which humans, while firmly rooted in the created order, also stand apart from the rest of God's creation, uniquely fashioned in his image. Phrases such as "crowned with glory and honor" and "ruler over the works of your hands" affirm humankind's distinctive status as responsible overseers of creation. Yet the frame around this picture is of crucial importance: it is the majesty of HIS name. Cognitive psychology, with its focus on "higher mental processes," appropriately

explores complex cognitive capacities such as memory, problem solving, and decision making. However, the picture it presents needs to be placed in proper context. Otherwise, our perspective on humankind can all too readily become distorted.

Cognitive Psychology and Scripture

Ulric Neisser, arguably the founder of the cognitive psychology movement, grounded this approach in the metaphor of humans as processors of information.³ For him, cognitive psychology deals with the information we take in from our surroundings and the ways in which we engage with it and act upon it. Many of its models are drawn from computer analogies, and the entire movement is characterized by a commitment to rigorous experimental investigation.

The "creation mandate" is articulated in Gen. 2:15: "The Lord God took the man and put him in the Garden of Eden to work it and take care of it." This directive is echoed in Psalm 8. Both passages presuppose the presence of sufficiently advanced cognitive capacities to make fulfillment of the assigned tasks of management and care feasible. To expect accountable stewardship of creation's resources without the provision of the necessary intellectual resources would certainly seem incongruous.

Furthermore, the biblical text contains numerous allusions to our mental capabilities.⁴ Relatively unexplored, however, is the fundamental compatibility between cogni-

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tive psychology's basic approach and a biblical view of persons as bearers of the divine image. Commenting on discussions at the interface between Christian faith and psychology, Bonnidell Clouse notes, "The most recognized cognitive psychologists are absent from the integration literature."⁵ How does the vision of persons implicit in the cognitive psychology perspective mesh with the biblical concept of the *imago Dei*?

Created in the Divine Image

There are surprisingly few biblical references to the image of God in humans.⁶ Nevertheless, in his ambitious *Man: The Image of God*, G. C. Berkouwer devotes more than 350 pages to the topic. He links this concept with both our role of having dominion over creation and our inter-relatedness—being made male and female. However, he stops short of identifying either feature with the *imago Dei*. He also resists equating the divine image with any of the various dimensions of the human person, whether self-consciousness, capacity for understanding, or spiritual sensitivity. He rather insists that it reflects the whole person. For Berkouwer, the clearest sense of its meaning resides in our inescapable relatedness to God.⁷

In her recent reflections, Noreen Herzfeld explores three quite different (though potentially overlapping) views offered by scholars through the centuries.⁸ The first and oldest view—*reason*—affirms that the image consists of a trait or group of traits unique to humans within creation, yet shared with God. Despite the support lent by several church fathers, Herzfeld finds this position inadequate, partly because of its strong individualistic emphasis. To the second view—a more functional one—Herzfeld attaches the label *regency*. According to this view, the image of God is less an attribute we possess and more a title of esteem with which we have been honored. It speaks to our role as stewards, entrusted with the task of exercising unselfish rule on God's behalf. As Herzfeld succinctly affirms, "Human beings image God when they function in God's stead."⁹ As a third and final way of characterizing the divine image, Herzfeld offers a perspective focused on *relationship*. This view is grounded both in the doctrine of the triune God who reaches out to us, and in the biblical description of humans created male and female. It thus emphasizes both vertical and horizontal relationships as essential to the *imago Dei*.

To summarize, in attempting to unpack the phrase "made in the image of God," we find consensus that this expression points to humanity's unique status within creation. Gregory Peterson notes that human distinctiveness has long been assumed, and that cognitive features have typically been included and frequently highlighted.¹⁰ Thus, our rationality has been consistently understood as part of the way we humans image our Creator, though not necessarily the only, or even the most important way.

The Image of God and Cognitive Psychology: Sounds of Discord

Having reflected on theological insights related to our nature as image bearers, we now consider two of the ways in which those who pursue a cognitive approach in psychology may encounter tensions with the vision implicit in the *imago Dei* concept. The seriousness of these discordant sounds is open to debate.

Note one: Reductionism. In her exploration of the "cognitive revival," Mary Van Leeuwen warns of a pair of lurking dangers. She identifies the first as reductionism—the assertion that nothing of substance remains of human experience beyond the fundamental neurological mechanisms guiding our thoughts, emotions, and activities.¹¹

The computational model of the mind—viewing humans as information processors—provides a useful working analogy for cognitive psychologists. After all, access to stored information is essential for the execution of any and all cognitive tasks. Despite the complexity of such models, however, their mechanical, deterministic flavor persists.¹² Thus, the danger of reductionism is real.

Malcomb Jeeves has consistently maintained that biblical and scientific accounts of human experience are complementary, not conflicting. A neurobiologist more than a cognitive psychologist, Jeeves understands the biblical account of humans as emphasizing our wholeness rather than our divisibility into distinct components such as mind, body, and spirit. For Jeeves, this unity is fully compatible with cognitive and brain research which he interprets as confirming the ever-tightening links between mind and brain. The two are intimately related, yet mind is never reducible to purely physical processes. While endorsing cognitive perspectives, Jeeves explicitly rejects a reductionist stance.¹³ Cognitive researchers need to do likewise by freely acknowledging that the explanations they can provide are always incomplete.

Note two: Self-deification. Van Leeuwen points to a second and opposite error that may be latent in this approach—the tendency toward self-deification.¹⁴ As she colorfully warns, "We are constantly in danger of being seduced by our own metaphors,"¹⁵ even those that provide valuable insights. In other words, the cognitive approach may create tensions for Christians specifically because it prompts us to "think more highly of ourselves than we ought to think."¹⁶

One might argue that it is in the applications of cognitive research to the creation of nonhuman intelligent systems that we face the greatest dangers in this regard. Herzfeld points out that in this endeavor, humans attempt to create machines in their own image.¹⁷ In their exploration of the challenges arising from the development of artificially intelligent systems, Alan Emerson and Cheryl



Reasons for cooperation [between cognitive psychology and theology] include the significant ways in which our cognitive capacities reflect those of our Creator, the rational nature of the theological enterprise, and the corrective reminders biblical theology provides concerning our creaturely status in God's world.

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In the Image of God: Exploring Links with Cognitive Psychology

Forbes contend that the greatest danger lies in the fact that this enterprise may change the way we view ourselves.¹⁸ Such changes could include the inclination to ignore our creaturely limitations—to lose sight of the frame around the picture.¹⁹

Van Leeuwen also makes the case that what we typically tout as intellectual brilliance overlaps only marginally with biblical wisdom. In western society, we have a fixation with formal operational thought—the type easily mimicked by computers, yet one of only limited importance in some cultures. By contrast, biblical wisdom is marked by two main features: the fear of God and the willing acknowledgment of our limitations.²⁰ Whenever we forget that we are dust, the danger of self-deification is at hand.

The Image of God and Cognitive Psychology: Toward Harmonious Music

Cognitive psychologists devote their attention to capacities through which we mirror the divine image. Thus we should expect that insights derived from theological and cognitive viewpoints will be compatible and even mutually illuminating. We now turn to these considerations.

Chord one: The gift of reason. In light of biblical teachings, there can be no disputing that humans are unique, and that the *imago Dei* is bound up in this distinctiveness. Human qualities constituting our uniqueness are often identified as cognitive ones—capacities that hinge on our expansive powers of reason and understanding. It has further been suggested that these aspects have been consistently claimed because of their moral and ethical implications: if humans possess superior mental capacities, they also merit preferential ethical consideration.²¹ While reason does not comprise the whole package, it clearly represents a crucial piece of the *imago Dei*.

In psychology, only the cognitive approach regards our capacity to deal rationally with the information we encounter as central in its exploration of humans. And central it must be. God, who created us to reflect his nature and to exercise a stewardship role in managing what he has made, has equipped us with the capacity to under-

stand his creation and to respond to him.²² While our abilities are but pale reflections of his, they are nonetheless worth exploring. Indeed, the remarkable achievements manifest by artificially intelligent systems which showcase our God-given mental powers should inspire worship of the Creator who graciously bestows these capacities on us.

Chord two: Active agents. That humans are active participants in their interactions with the surrounding world is another clear emphasis of the cognitive perspective. Unlike views emphasizing strong biological, social, unconscious, or environmental determinism, a cognitive approach presupposes that we engage with our environment as we take in, store, organize, and act on the information it supplies. Neisser's notion of a perceptual schema nicely captures the interactive nature of sensory processing.²³ We thus come face to face with the vital human characteristic of agency.

Are we agents who freely choose our paths, or pawns caught in a web of causal influences? Are we objects or agents? In his critique of a cognitive perspective, Clarence Joldersma expresses concerns at this point. He sees no satisfactory way to transition from a computational view in which the governing function is based on algorithms to an approach that can realistically incorporate agency.²⁴

Peterson also recognizes this tension with basic physiological drives. However, he notes that "our very nature as cognitive, thinking beings makes us subtle, complex and free in a way that other organisms are not."²⁵ Thus he sees room for agency in the midst of powerful biological influences, partly because of the immense complexity of the human mind. For Peterson, cognitive psychology does reserve a legitimate place for agency.

Stan Jones has observed that at least some cognitive psychologists assume humans are agents capable of originating action. He argues that while human choice and agency is real, it is also bounded and constrained.²⁶ In his view, causative influence and human agency are both real—a perspective whose validity is confirmed by the uncomfortable fact that social scientists are much better at predicting group behaviors than individual responses.²⁷

Chord three: Relationships grounded in cognition.

Several thinkers have emphasized our capacity for relationships with our Creator and with one another as an essential component of the *imago Dei*. In her discussions, Anne Foerst strongly supports such an interpretation, suggesting that this characteristic is rooted in God's intention to build relationships with us.²⁸ Likewise, Jay Brand argues that human minds exist not simply to facilitate survival, but also to enable communication with God.²⁹ There can be little doubt that relationships are intrinsic and essential to our humanness. But what exactly is the link between cognitive capacities and interpersonal relatedness?

Warren Brown traces this link, highlighting the potential for a mutually beneficial interaction between insights from cognitive psychology and the *imago Dei* concept. Brown's essential argument is this: the fact that we are "souls" implies a capacity for interrelationships—which in turn rests on the presence of numerous cognitive abilities.³⁰ Two of these are of particular salience here—a theory of mind and episodic memory.

Peterson points to the connection between the concepts of self-consciousness and *theory of mind*, noting that both of them presuppose our awareness of self and others. More specifically, he defines theory of mind as the ability to infer the mental states and intentions of other organisms.³¹ Peterson suggests that while rudimentary forms of this ability are present in some primates, full-orbed manifestations are unique to humans.³²

Of particular interest for this discussion is the fact that human capacities such as empathy are dependent on the presence of a theory of mind. For Brown, these are part of our meta-cognitive capabilities—those abilities which enable us to reflect on our own mental states. He points out that as children mature, part of what enriches their social interactions is a growing capacity to appreciate what others are experiencing.³³ Brown further suggests that the severe communicative and interpersonal limitations characteristic of childhood autism may be attributable to deficits in this capacity. If so, we have compelling evidence of just how significant such cognitive capacities are for the nurturing of meaningful relationships.³⁴

A second capacity essential for interpersonal relationships is *episodic* or *autobiographical memory*. This aspect of memory functioning is activated when we recollect time- and space-specific events from our past. Clearly, interpersonal relationships are enriched through memories of shared experience. It is also noteworthy that as distinct from semantic (general knowledge) and procedural (motor skill) memory, episodic memories are typically most damaged in the event of brain injury and are usually impacted first in the normal aging process. In both these situations, relationships become increasingly constrained.³⁵

It can be argued, then, that without several well-developed cognitive abilities, the forging and maintaining of meaningful, satisfying relationships is seriously curtailed, perhaps even precluded. While this fact may be clearest when relationships with other people are at issue, similar patterns apply in our relationships with ourselves and with God. God is a person; our capacity to remember past encounters with him and to rehearse his faithful deeds serves to enrich and deepen our relationships with him.³⁶ With respect to our own sense of self, as Brown notes, episodic memory likewise figures prominently in our enduring sense of identity.³⁷

As some have argued, the core meaning of the *imago Dei* resides not in our intellectual abilities but in our capacity for relationships. Granting that, it is clear that such relationships are possible only when supported by complex cognitive capacities. Thus, a fuller understanding of these human abilities can help to deepen our appreciation for the biblical teaching on the *imago Dei*.

Concluding Reflections: Of Wonder and Worship

Constructive, ongoing conversations between cognitive psychologists and theologians are both possible and valuable. Indeed, these two fields need each other as they pursue a balanced understanding of the most complex portion of God's creation—ourselves. Reasons for cooperation include the significant ways in which our cognitive capacities reflect those of our Creator, the rational nature of the theological enterprise, and the corrective reminders biblical theology provides concerning our creaturely status in God's world.

May we be drawn into worship of the Creator as we pursue a growing understanding of humans, his image-bearers. In the words of the Psalmist, "O Lord, our Lord, how majestic is your name in all the earth!"³⁸ **

Notes

¹Ronald B. Allen, *The Majesty of Man* (Portland, OR: Multnomah Press, 1984).

²Psalm 8:1, 4–6, 9 (New International Version).

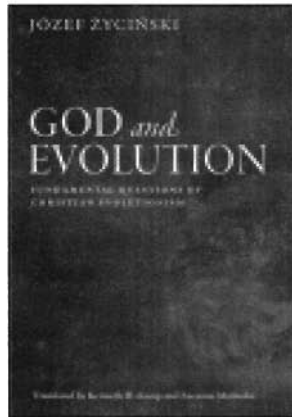
³Ulric Neisser, *Cognitive Psychology* (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1967). In this classic volume, Neisser gathered together existing research and sketched his vision for the new movement.

⁴There are literally dozens of such references in scripture, a few of which include the following: Acts 17:2; Acts 18:19; Isa. 1:18; Ps. 119:97; Ps. 1:2; Luke 22:60, 61; 1 Cor. 1:18, 19; James 3:15–18.

⁵Bonnidell Clouse, "Can Two Walk Together Except They Be Agreed? Psychology and Theology—A Journey Together or Paths Apart?" *Journal of Psychology and Theology* 25, no. 1 (1997): 44. There is a lengthy history of dialogue between theologians and psychologists, though very little of it deals with a cognitive perspective.

⁶There are only nine passages incorporating this phrase or one very similar to it. Six of them are generic, while the last three refer explicitly to Christ (Gen. 1:26, 27; Gen. 5:1; Gen. 9:6; 1 Cor. 11:7; Eph. 4:24; Col. 3:10; 2 Cor. 4:4; Col. 1:15; Heb. 1:3).

Essential Reading



GOD and EVOLUTION

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⁷G. C. Berkouwer, *Man: The Image of God* (Grand Rapids, MI: William B. Eerdmans Publishing Co., 1962). This volume is considered by many to be the classic theological treatment of the *imago Dei*.

⁸Noreen Herzfeld, *In Our Image: Artificial Intelligence and the Human Spirit* (Minneapolis, MN: Fortress Press, 2002), 7.

⁹*Ibid.*, 21.

¹⁰Gregory Peterson, *Minding God: Theology and the Cognitive Sciences* (Minneapolis, MN: Fortress Press, 2003), 147–8.

¹¹Mary Van Leeuwen, *The Person in Psychology: A Contemporary Christian Appraisal* (Grand Rapids, MI: William B. Eerdmans Publishing Company, 1985), 143.

¹²Clarence Joldersma, "The Missing Subject of Mind: Toward an Inner Reformation of Cognitive Science," in S. W. Vanderstoep, ed., *Science and the Soul: Christian Faith and Psychological Research* (Lanham, MD: University Press of America, 2003), 117–43.

¹³Malcomb Jeeves, *Human Nature at the Millennium* (Grand Rapids, MI: Baker Book House, 1997), 55–8.

¹⁴Van Leeuwen, *The Person in Psychology*, 143.

¹⁵*Ibid.*, 139.

¹⁶Romans 12:3 (New International Version).

¹⁷Herzfeld, *In Our Image*, 5.

¹⁸Alan Emerson and Cheryl Forbes, *The Invasion of the Computer Culture* (Downers Grove, IL: Intervarsity Press, 1989), 152–64. Herzfeld also echoes a similar concern.

¹⁹In Psalm 8 cited earlier, the opening and closing verses are identical—"O Lord, our Lord, how majestic is your name in all the earth"—forming a frame around the lofty picture of humankind painted in the intervening verses.

²⁰Van Leeuwen, *The Person in Psychology*, 174.

²¹Peterson, *Minding God*, 147, 148.

²²See, for example, Isa. 1:18 and Josh. 24:15.

²³Ulric Neisser, *Cognition and Reality: Principles and Implications of Cognitive Psychology* (San Francisco, CA: W. H. Freeman and Company, 1976), 20–4.

²⁴Joldersma, *Science and the Soul*, 135–8.

²⁵Peterson, *Minding God*, 175.

²⁶Stan Jones, "The Meaning of Agency and Responsibility in Light of Social Science Research," in R. C. Roberts and M. R. Talbot, eds., *Limning the Psyche: Explorations in Christian Psychology* (Grand Rapids, MI: William B. Eerdmans Publishing Company, 1997), 186–205.

²⁷Though we can forecast typical or average responses with reasonable accuracy, predicting what a specific individual will do in advance—as, for example, what a dangerous criminal's next move will be—is rarely possible.

²⁸Anne Foerst, "Cog, a Humanoid Robot, and the Question of the Image of God," *Zygon* 33, no.1 (1998): 106.

²⁹Jay Brand, "Challenges for a Christian Psychology from Cognitive Science," *Journal of Psychology and Christianity* 16, no.3 (1997): 234.

³⁰Warren Brown, "Cognitive Contributions to the Soul," in W. S. Brown, N. Murphy and H. N. Malony, eds., *Whatever Happened to the Soul? Scientific and Theological Portraits of Human Nature* (Minneapolis, MN: Fortress Press, 1998), 99–125.

³¹As a simple illustration of this concept, when I pause to think that my wife will be delighted if I take the afternoon off and go shopping with her, I give evidence of a functioning theory of mind.

³²Peterson, *Minding God*, 135–6.

³³Brown, *Whatever Happened to the Soul?* 109.

³⁴I do not wish to imply that either autistic children or other persons with reduced cognitive capacities cannot participate in interpersonal relationships. It does appear, however, that when such relationships exist and thrive, it is because the other party contributes more than normal to the building of these relationships.

³⁵Among several groups of persons—young children, those suffering with many forms of autism, those with severe brain damage, and elderly persons with dementia—there runs an intriguing parallel between their limited cognitive capacities and their shrunken interpersonal relationships.

³⁶Two of many examples are found in Ps. 105:5 and Ps. 103:2, 3.

³⁷Brown, *Whatever Happened to the Soul?* 112.

³⁸Psalm 8:1, 9.



Paradox Confronted: Exploring the Nature of Christ's Teaching in the Debate on Embryonic Stem Cell Research

Bryant Webber and Cynthia Fitch



Bryant Webber



Cynthia Fitch

Few societal topics are as monumental, as decisive, as much debated—or as little understood—as embryonic stem cell research (ESCR). It has pitted science against faith, states against nation, and patient against provider. This intersection between science and faith has been broached from several angles. In this study, we aim to penetrate Christ's parables and analyze his allegories to the good of ethical research and the glory of God. By delving into the *ipsissima verba* (the very words themselves) of God in flesh, Jesus Christ, we explore the paradoxical, perplexing wisdom of God Incarnate. Our goal is to seek some biblical light on the subject for pensive Christians who are passionate about the future of science and medicine.

Stem cells are not as arcane or mysterious as some Christians would like to think. They are not the harbingers of a brave new world or the fabrications of fiction. They are, on the contrary, simply undifferentiated cells by which the body regenerates itself. Human beings are teeming with them—they are tucked away in the retina and bone marrow and the recesses of most organ systems. These cells, coupled with those found in the neonatal byproducts (placenta and umbilical cord), comprise the collection of somatic stem cells. As mostly multipotent and progenitor stem cells, they can develop into a limited number of functional somatic cells. While reflecting a partial malleability, these *adult* stem cells have been successfully manipulated and incorporated into scores of clinical procedures.¹

Researchers, however, covet the touted pluripotency of *embryonic* stem cells. They,

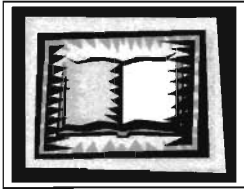
according to ESCR proponents, proffer the context and continuity of life—the auspicious faculty to regenerate moribund tissues *in vivo* just as they would have naturally generated them *in utero*.² This is, after all, what embryonic stem cells do. For every human being on the planet today—every complex human body with its 600 muscles and 60,000 miles of blood vessels—was once a tiny ball of cells. This ball, known as the blastocyst, smaller than a comma and mostly hollow, careened down the fallopian tube toward the uterus. Comprising the inner mass, these stem cells were brimming with the molecular knowledge required to fashion kidneys and eyeballs and completely novel fingerprints. All these they produced, with incredible precision, in a matter of weeks. Their encrypted instruction and endowed potency were unleashed in differentiation, amplified in gestation, and showcased, finally, in birth.

The Paradox

Despite their seemingly unlimited medicinal potential, embryonic stem cells remain contested in the arenas of science, politics, and religion. Christians are often conflicted. On the one hand, they desire to bring disease under their dominion, using their God-given intellects to sustain life. On the other hand, they seek to protect nascent human life by analyzing the means that lead even to the

Embryonic stem cells remain contested in the arenas of science, politics, and religion. Christians are often conflicted.

Bryant Webber, a recent graduate of Seattle Pacific University (Seattle, WA), is now a first-year medical student. **Cynthia Fitch** is an associate professor of biology at Seattle Pacific University. She received a Ph.D. in molecular biology from Iowa State University. Cynthia has been highly attuned to the embryonic stem cell controversy for some time and, after noticing the discrepancy among Christian thinkers, asked Bryant to collaborate on this project.



We approach the gospel accounts with three questions in mind: (1) Is there something paradoxical in the nature of Christ's teachings from which we might glean some wisdom, insight, or guidance concerning the ESCR controversy? (2) How can we or should we incorporate a call to community in our conversation on embryonic stem cell usage? and (3) What are the ESCR implications for Christians today?

Communication

Paradox Confronted: Exploring the Nature of Christ's Teaching in the Debate on Embryonic Stem Cell Research

noblest of ends. If quality of life is always contrasted with its quantity, then Christians struggle to find the right shade of grey. Though they confess the classical creed that the Scriptures, in their entirety, are the Word of God, they often find no revelation therein—no mention of stem cells or how they should entertain this dilemma. Even the ancient admonition to sanctify life can be bargained from either side of the debate.

In this communication, we take one step backwards. Instead of searching for answers, we search for questions. We revel in the revolutionary perspectives of Christ's life and ministry, concentrating not merely on *what* he said, but *how* he said it. Knowing that Jesus often taught through parable and paradox, turning conceptions into misconceptions and answering questions with questions, we delve into the complex sayings of our Savior. We approach the gospel accounts with three questions in mind: (1) Is there something paradoxical in the nature of Christ's teachings from which we might glean some wisdom, insight, or guidance concerning the ESCR controversy? (2) How can we or should we incorporate a call to community in our conversation on embryonic stem cell usage? and (3) What are the ESCR implications for Christians today?

Christ's Words Considered Turning Our Misconceptions Upside-Down (Matt. 18:1-5; Luke 9:46-48)³

Here we encounter a discomfiting reminder that our penchant to cherish the wealthy, the beautiful, the intelligent, the powerful, the suave—our disposition to call these attributes great—is a carnal tendency that needs to be taken captive by the Word of Truth. Fittingly, with the example of a child, Christ says that "he who is least among you all will be great." Whether consciously or not, we tend to think of embryos as lesser human beings (if human at all)—less important than fetuses, or newborns, or certainly our favorite celebrities. But embryos literally represent the very least of us and therefore reflect the same *imago Dei*. They are often tossed about in bioethical debate as little more than poker chips. Maybe it is time for us to take more seriously

the Savior's admonition to value the least, to cherish the lowly, and to defend the most vulnerable. Will the Son of Man say to us: "inasmuch as you did it to one of the least of these My brethren, you did it to Me" (Matt. 25:40)?

Tradition Does Not Make Truth (Matt. 12:1-8; Luke 6:1-5)

When condemned by the Pharisees for healing on the Sabbath, the Lord of the Sabbath points out that David ate the consecrated showbread when he was hungry, even though it was considered by tradition unlawful. Indeed, illegality and sinfulness do not always intersect. David and Jesus did the proper and righteous thing. Likewise, maybe contemporary Christians ought to thoughtfully and prayerfully consider what is most useful in the present. Could employing embryonic stem cells to treat terminal conditions parallel eating consecrated bread to ward off starvation? Were the answer *yes*, the practice must not slip into wanton utilitarianism. Rather, it should maintain the friction of wise pragmatism, which would actively preclude acceleration toward therapeutic cloning (or euphemistically, "nuclear transplantation to produce human pluripotent stem cell lines"). Like the showbread of old, embryos too are consecrated (cf. Ps. 139), but are their stem cells as vital as bread? Should stem cells of consecrated embryos trump sacred tradition in favor of life?

God Venerates Life (Luke 12:4-7, 22-34)

Jesus reveals to the multitude that not one sparrow is forgotten by God—that he loves life so much that the "very hairs of your head are numbered" (v 7). Christ's analogy would probably be different in today's high-tech culture. He might say that our very cells are numbered, or our genes known. If God loves a bird, how much more a baby, even at its earliest stages? With this in mind, to what extent are we prepared to pilfer and sacrifice nascent life for the sake of medicine and its sometimes questionable experimentation? "The Son of Man did not come to destroy men's lives but to save them," said Christ (Luke 9:56). Assuredly, he could save the one without destroying the other. We cannot. Consequently we ask: does one facilitate the other?

All in God's Time

(Matt. 4:1–11; Luke 4:1–13)

At the beginning of his salvific ministry, Jesus, the Holy One, is approached by Satan, the evil one. In exchange for a simple bow, the deceiver proffers all the kingdoms of this world and their glory. Essentially, Satan offers Jesus instant gratification and pleasure, before that ordained time when he would sit at God's right hand as the King of kings. Likewise, perhaps embryonic stem cell vitality seductively served up by science is simply not the *sine qua non* for our healthcare and enjoyment right now. Regardless of their potency—be it *multi*, *pluri*, or *toti*—stem cells will never provide an “earthly” eternal life. Rather, having been regenerated spiritually from above, we must patiently await physical regeneration here below and the renewed vitality of our new bodies, just as Christ delayed his kingly reign above for the sake of righteousness below. With the Word of God written, Jesus resisted a very enticing temptation. Should not we do the same?

Knowledge is a Talent

(Matt. 25:14–30; Luke 19:11–27)

In the Parable of the Talents, Jesus shares the story of a master with three servants. Before departing on a long journey, he entrusts his talents (*viz.*, his money) to his servants. Two invest their talents, and the third hides his. Upon the master's return, he blesses the investors and curses the hoarder. The Master of the universe has endowed us with all sorts of talents and gifts, not the least of which is scientific acumen and competence. If we become content and complacent with the progress we have made (e.g., in disease prevention, outer and inner space exploration, computer capabilities, etc.), we essentially disobey the command to invest our talents. But, as Gilbert Meilaender reminds us, “However greatly we value the betterment of life made possible by medical research, we have no overriding obligation to seek such betterment.”⁴ The question remains: does stagnancy in the field of embryonic stem cell research parallel the indolence of the unprofitable servant? Might we too be judged as unprofitable?

The Paradox of Life both Present and Future (Matt. 10:39; 16:25; Mark 8:35; Luke 9:24; 17:33)

“Whoever seeks to save his life will lose it, and whoever loses his life will preserve it,” dictates Christ (Luke 17:33). He is reminding us to forget ourselves—to forget our lives, to forget our circumstances, to forget those things our flesh encourages us to cherish. These things are utterly worthless in the long run. It is meaningless to elevate this life above the next. Yet Jesus valued temporal life. He restored sight, eradicated leprosy, and even resurrected the dead (Matt. 11:4; Luke 7:22). In medicine, too, we apply the arsenal of technology and chemistry to keep and sustain life. Christ's statement must not be accepted superficially,

nor should it be interpreted literally. It belies something within us—some unredeemed attitude to relish our own lives—and Christ exposes it painfully through a cutting paradox. It reinforces his statement that one's life “does not consist in the abundance of things he possesses” (Luke 12:15). Whereas these possessions will perish, those of the next life will prevail. By tapping into the reservoirs of embryonic stem cells, then, are we vainly trying to save our lives, storing up treasures on earth at the expense of treasures in heaven? Or are we honoring Christ by imitating his paradigm of restoring physical health and preserving temporal life?

Is the Slippery Slope Argument Biblical? (Luke 16:1–15)

The “slippery slope” is one of today's most hackneyed arguments in bioethics. Its ubiquity has undermined its effectiveness and credibility in academic circles. Surely, deriving stem cell lines from cryogenically frozen embryos would not necessitate a “slip” into embryo harvesting. If the international milieu is any indication, however, we must be wary of the temptation. As we have seen in Hwang Woo-Suk's work, the field of regenerative medicine not only offers hope to millions of infirmed, but seductive benefits to researchers.⁵ Christ warns his disciples to be different. “For the sons of this world are more shrewd in their generation than the sons of light” (v 8), and if the former are “unjust in what is least, [they will be] unjust also in much” (v 10). If we fail to ascribe dignity to human life in the least of our research, we will do the same in the most significant. The Pharisees were infuriated by the Parable of the Unjust Steward, and Jesus was swift to censure them: “God knows your hearts. For what is highly esteemed among men is an abomination in the sight of God” (v 15). We ask: Where are our hearts? Do we risk being judged accordingly?

Mustard Seeds—the Stem Cells of the Kingdom (Matt. 13:31–32; Mark 4:30–32; Luke 13:18–19)

Three gospel writers record Christ's analogy of the mustard seed as representing the infancy of God's kingdom. In biblical times, the mustard seed was a prototypical example of something small that became large, of something seemingly trivial that became significant—of something that developed form and function because it was allowed to reach its God-given potential. Embryonic stem cells are eerily similar to mustard seeds. They are small. They appear trivial on their own. But they have such vast potential. They can develop intricate form and elaborate functions in the womb and in the world. As all great mustard trees were once seeds, so too all great men and women were once embryos. That we would now consider disassembling and parting them out for sale—to grind the seeds into mustard on the specious basis that they are otherwise useless—is really unthinkable. Has



The noblest intentions of medicine must ... be examined in the light of Scripture. As technology evolves and improves, and we behold the vast and pending potential of embryonic stem cells, we must be the guardians of life—in terms of quality and quantity. By God's grace we must remain vigilant ...

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God not said that what he has joined together, let not man put asunder (Matt. 19:6)? Would this not apply to the progeny as well?

Conclusion

In light of feigned research⁶ and statehood opposition to federal funding limits,⁷ Christians need to ready themselves with an intelligent, pragmatic, yet biblically-founded opinion on the issue. Though all cloning procedures are currently illegal in our nation, Christians cannot blithely hide behind legislation. We continue to learn that appeals to emotion and moral posture are inadequate when the controversial topic bears monumental implications on law, medicine, economy, and religion. Rather than surrender to political maneuvering, we must stand fast upon our biblical foundation.

The academic leaders have done a superb job lobbying for the preponderant place of regenerative medicine in our healthcare system. Unfortunately, the initial disgust of the American public—that “wisdom of repugnance”⁸—is diminishing. It is softening under the pressure of celebrity endorsement, international intrigue, and the hubris to beat our worldwide competitors to the prize. But more than anything, it is crumbling under the American ideal to cherish individuality over and above community.

Just a month prior to 9/11, President Bush made his first nationally televised address, announcing his decision to limit federally funded ESCR to existing lines.⁹ This stance was decried throughout the nation. California universities, in particular, were outraged. Three years later—on the same day that the President was reelected—these institutions celebrated a monumental victory. The citizens of California passed Proposition 71, allocating some \$3 billion to fund ESCR at the state's premier research institutions. It did not legalize therapeutic cloning, but it opened up the cryogenic freezers for experimentation on unwanted embryos, mostly “leftovers” from *in vitro* fertilization (IVF).¹⁰

Some feared that Proposition 71 would also open Pandora's Box. Most researchers have been reticent about their intentions and the prospects for therapeutic cloning within our borders. Nevertheless, the “slippery

slope” argument is often dismissed as irrational and uninformed. Over a year has passed since the California law changed, and reputable institutions have yet to publicize attempts to derive new lines via nuclear transplantation.

This issue, however, is certainly not stagnant. The ethical quandary remains, and before it causes another crescendo, we, as Christians, should continue to explore the issue, exegete the Scriptures, and, like our Savior, extend God's healing hand of mercy to all peoples. Jesus' very words changed lives, fulfilled prophecies, and shook the foundations of the world. Like his disciples, we wrestle with his parables and their paradoxes. We weigh our instincts and our desires against Christ's preface in Matthew 5: “You have heard that it was said ... but I say to you ...” He redefined the Mosaic Law concerning murder and adultery. He stripped the exterior to reveal the thoughts and attitudes that motivate our actions. The noblest intentions of medicine must likewise be examined in the light of Scripture. As technology evolves and improves, and we behold the vast and pending potential of embryonic stem cells, we must be the guardians of life—in terms of quality *and* quantity. By God's grace we must remain vigilant, lest Christ say of us what he said of the Roman soldiers: “Father, forgive them, for they do not know what they do” (Luke 23:34). **

Acknowledgment

The authors would like to thank Drs. Rick Steele and Tom Trzyna for their insights regarding this manuscript.

Notes

¹Rick Weiss, “The Power to Divide,” *National Geographic* 208, no. 1 (July 2005): 3–27.

²Christine Soares, “Repair Workers Within,” *Scientific American Online* (June 27, 2005).

³All Scripture quoted from the New King James Version.

⁴Gilbert Meilaender, *Bioethics: A Primer for Christians*, 2d ed. (Grand Rapids, MI: Wm. B. Eerdmans Publishing Co., 2004), 119.

⁵Michael Lemonick, “The Rise and Fall of the Cloning King,” *Time* 167, no. 2 (January 9, 2006): 40–3.

⁶*Ibid.*

⁷Weiss, “The Power to Divide.”

⁸Leon Kass, “The Wisdom of Repugnance,” *The New Republic* 216, no. 22 (June 2, 1997): 17–26.

⁹“The Stem Cell Compromise ...,” *The Wall Street Journal*, August 14, 2001.

¹⁰Weiss, “The Power to Divide.”



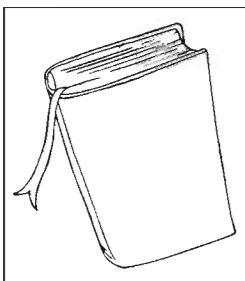
Our Father, on the Rise of Science

Walter Hearn



et them begin, as I began, with light:
Celestial iotas of alphabet unknown,
Deciphered by equations they soon would write
For Force attracting planet, star, and stone.
Alembic fires illumined many a night
To smelt the ores, distill the putrid bone,
In search of formulaic clues, not quite
Correct until a Table stood full-blown.
Eons I took to get conditions right
For Scientists to flourish on their own;
Yet in four centuries they reached the height
Of pseudo-gods, pretenders to My throne.
My children have done well at co-creation;
I wonder how they'll try to bring salvation.

ASA Fellow **Walter R. Hearn** is professor of Christianity and science at New College Berkeley in California and author of *Being a Christian in Science* (Downers Grove, IL: IVP, 1997). After a career in biochemistry (Ph.D., 1948), in 1972 he became a free-lance editor with his wife Virginia. From 1969 to 1993, he edited the Newsletter of the ASA and CSCA.

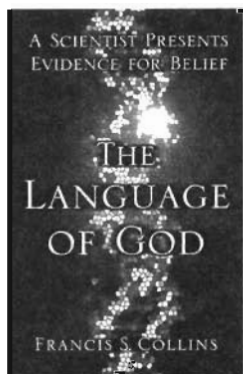


Essay Review

Francis S. Collins: A Spokesman for Today

Francis S. Collins: A Spokesman for Today

J. W. Haas, Jr.



His
intellectual
search
[for God]
turned
personal as
[Collins]
recognized
that his
ultimate choice
would be based
on faith
rather than
proof.

The Language of God: A Scientist Presents Evidence for Belief by Francis S. Collins. New York: Free Press, 2006. 304 pages, notes, index, appendix. Hardcover; \$26.00. ISBN: 0743286391. Audio CD (read by Collins), Unabridged; \$29.95. eBook; \$16.99.

Evangelical Christianity has long needed an infusion of those with highly regarded scientific credentials and a living faith who can speak to the issues of science and Christianity at the national level. With *The Language of God*, his leadership as Director of the National Human Genome Research Institute, as well as an engaging personality, Francis S. Collins ably fills such a role.

In the months before publication, Collins entered the public eye via interviews by the national press and in August 2006, with fellow ASA member and Harvard Astronomer Owen Gingerich, was the subject of a searching interview by National Public Radio's *Talk of the Nation*.¹ Collins emerges from the halls of science and the political stage of the Human Genome Project capable of reaching a broad audience in detailing his path to Christianity and the challenges to one who seeks to bridge the worldviews of science and faith. From the vantage point of an insider, he comments on the values and pitfalls emerging as a result of the rapid progress in understanding the human genome and improving human health.

Asked by a reporter why he was going public, Collins cited his experience with students at the William Belden Noble lectures he had given on three weeknights at Harvard's Memorial Church in 2003.

It was clear to me from that experience that there is a hunger for a dialogue about whether these two ways of seek-

ing the truth [science and religion] are compatible or whether they're at war. Right now, it appears to many that there's a war going on.²

An Educational and Spiritual Odyssey

The Introduction of *The Language of God* describes a capstone moment—the June day in 2000 when Collins stood in the East Room of the White House with President Clinton and government officials—linked by satellite to Prime Minister Tony Blair and other participants in the project—to announce that the script for the human genome was available to all. He recalls his role with the president's speech writer in the inclusion of the words:

Today, we are learning the language in which God created life. We are gaining ever more awe for the complexity, the beauty, and the wonder of God's most divine and sacred gift.³

Collins would build on this comment in his own remarks at this occasion by noting that "the experience of sequencing the human genome ... was both a stunning scientific achievement and an occasion of worship."⁴

The chapter "From Atheism to Belief" describes his early years. The youngest of four brothers, he was raised on a dirt farm in the Shenandoah Valley and home-schooled by highly educated parents in an environment indifferent to religion. A move to town, public school, and a "charismatic" chemistry teacher turned him on to chemistry—biology was "too messy." He entered

Jack Haas, Gordon College emeritus professor of chemistry, whiles away his days working on the ASA web site, practicing the trumpet to maintain his chair in the church brass group, and splitting wood to keep the household comfortable in the New England winter.

Yale at age 16, gained a B.S. in chemistry at 20 and a Ph.D. in physical chemistry at 24. Along the way, if he thought about religion at all, he wavered between agnosticism and atheism—a pattern of “willful blindness” that he would later identify in C. S. Lewis. Half-way through a dissertation on quantum mechanics, he began to have doubts about a future as a teacher and researcher. During the same period, he enrolled in a course in biochemistry which he described:

The course was nothing short of astounding. The principles of DNA, RNA, and protein, never previously apparent to me, were laid out in all of their satisfying digital glory ... With the advent of new methods for splicing different DNA fragments together at will ... the possibility of applying all of this knowledge for human benefit seemed quite real. Biology has mathematical elegance after all. Life makes sense.⁵

Collins then abruptly shifted direction to enroll in medical school at the University of North Carolina. A short course in medical genetics opened his eyes to the possibilities of genetic medicine and started him on the path to lead the Human Genome Project. Becoming involved in bedside care, he began to appreciate the relationships that naturally develop when one becomes closely involved with patients and the strong role that Christian faith played in the lives of those close to death. One patient challenged him to reconsider the God question and he visited a Methodist minister who pointed him to C. S. Lewis’s *Mere Christianity*.

Collins was particularly attracted by Lewis’s Moral Law argument. As he reflected on the implications of a holy and righteous God he came to “the threshold of accepting the possibility of a spiritual worldview, including the existence of God.” Science provided no help. His intellectual search turned personal as he recognized that his ultimate choice would be based on faith rather than proof. He had found a God who cared about humans.

In his chapter “The War of the Worldviews,” Collins spells out four sources of doubt that plagued his new faith. As with other “doubters,” over the years C. S. Lewis’s writings would be a fruitful resource. Was God just a sentimental conclusion to a universal longing—a kind of wish fulfillment? Was he the end of childhood wishes described by Sigmund Freud? Collins would find that this *sacred longing* would lead in a different direction to the God of the Bible who fills a “God-shaped vacuum” in our hearts.⁶ Another question concerned the record of evil done in the name of Christianity. Collins notes Voltaire’s famous comment at the start of the French Revolution, “Is it any wonder that there are atheists in the world, when the church behaves so abominably?”⁷ The hypocrisy of the laity and church leaders alike is endemic. In the end, the way out of this concern is to look at the good that has

resulted from Christians—to look beyond the rust and corruption to the pure.

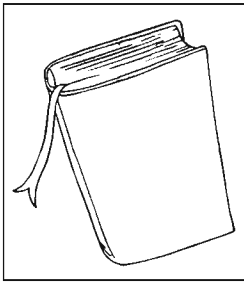
How can a loving God allow suffering? Collins suggests several helpful responses. Our God-given freedom to make choices may lead to bad outcomes. Free will and the existence of evil will lead to terrible suffering. The order of nature can lead to pain and human anguish. With Collins we recognize that rational answers do not sweep away the effects. In the end we need to entrust pain and suffering to the loving care of God. Adversity, indeed, forces one to a spiritual worldview.

The last of the objections, considered by Collins, deals with the belief in miracles. A scientific worldview has no place for miracles. He turned to Lewis’s book, *Miracles*, where a Christian worldview does embrace the role of miracles in historic Christianity, especially the resurrection of Jesus Christ from the dead. While dubious about many claims of the miraculous in current culture, Collins is willing to assume that God will intervene in everyday situations. Many things appear miraculous to the uneducated. Collins is sympathetic to John Polkinghorne’s point that “to be credible, miracles must convey a deeper understanding than could be obtained without them.”⁸ Faith may be buttressed by strong arguments but nonetheless is faith!

The Great Questions of Human Existence

Collins then turns to the origin of the universe and the origin of life by asking whether there can be a harmony between science and faith in this contentious arena. He begins with a conventional statement of how science works, pointing out its dynamic nature which leads to refinement (and occasionally radical change) in our understanding of the structure of the universe and the nature of matter as a result of new tools and methods of attacking questions. While verbal descriptions of current concepts are increasingly opaque to nonspecialists, Collins physical chemist side finds that “their mathematical representation invariably turns out to be elegant, unexpectedly simple and even beautiful.”⁹ He asks whether mathematics is a language of God.

The Big Bang—*something* out of *nothing*—demands a supernatural Creator. Scripture and science describe the event in the same general fashion. Collins discusses the process leading to the formation of our sun about six billion years ago and the cooling of our earth to be potentially livable for life about four billion years ago. Remarkably, planet Earth was teaming with life 150 million years later. Collins feels that this story is well founded. While open to the finding of life on other planets, he is dubious about our near-term ability to answer the question.



Essay Review

Francis S. Collins: A Spokesman for Today

*Collins [claims]
that science is
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creator God
who answers
both the
question of
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before the
Big Bang and
the fine-tuned
universe
suggested by
the anthropic
principle.*

Collins finds the anthropic principle to be *interesting* but not *decisive* as a proof for the existence of God. In another well-honed section, he considers quantum mechanics and the uncertainty principle but finds little for the theist. Complementarity, a favorite approach for apologists of the last generation, is not mentioned.

Collins then returns to his earlier point that science is incomplete—that there is need for a creator God who answers both the question of what came before the Big Bang and the fine-tuned universe suggested by the anthropic principle. He draws together these threads with his earlier “God hypothesis” in a tentative synthesis of science and faith. He treads carefully on matters of scriptural interpretation, recognizing the wide range of views and the tenacity with which they are held.

Chapters four and five consider earthly life and the human genome—the author’s strengths. He begins by noting the loss of traditional “pillars of belief” through scientific accounts of the earth’s origin and evidence that the earth was not the center of the universe. A third pillar—the complexity of life—has more recently come under scientific scrutiny. Collins suggests that the simple observations of an earlier time have been enhanced by our new understanding of the elegance behind the surface complexity. He offers a detailed analysis of Paley’s well-known watchmaker design analogy by identifying its limitations as an argument for God. He is concerned with those who fear the scientist’s search for understanding and reminds the reader that science cannot answer the basic questions of existence.

Collins surveys efforts to develop mechanisms for the origin of life from the periodic environment of the early earth. The few scenarios that have been offered have little substance and there is nothing in the wings that promises anything more fruitful. Collins warns against any tendency on the part of Christians to invoke divine intervention at points where science appears clueless. The past is full of mysteries linked with theology that left their advocates with egg on their faces when uncovered.

Recent fossils discoveries have provided evidence for extinct species and the time scale for a host of organisms as methods of

dating have been refined and funding more available. New findings related to modern *Homo sapiens* and other hominids appear almost daily and one should be wary about hanging theology on any part of such a fast-moving field. The discovery of transitional forms from reptiles to birds and reptiles to mammals should dispel some of the cries for this information.

A short introduction to Charles Darwin’s work and influence includes comment on his religious views and his contributions to the current understanding of the complexity and diversity of life. An account of the post-Darwinian work on the physical basis of evolution brings a fascinating story to the present. High school biology has become less messy but more complex! When Collins is faced with those who charge that science displaces divine mystery, he responds:

For me there is not a shred of disappointment or disillusion in these discoveries about the nature of life—quite the contrary! How marvelous and intricate life turns out to be! How deeply satisfying is the digital elegance of DNA! How aesthetically appealing and artistically sublime are the components of living things, from the ribosome that translates RNA into protein, to the metamorphosis of the caterpillar into the butterfly, to the fabulous plumage of the peacock attracting his mate!¹⁰

In the chapter, “Deciphering God’s Instruction Book,” Collins describes what an arduous task it was in the early 1980s to determine even small amounts of the human DNA code. It took eighteen months to find the single altered letter of the human DNA code that triggers the fetal hemoglobin production. Once that was identified then one could learn how to turn this on in adults with sickle cell disease. Shortly after Collins learned of an ongoing discussion concerning the DNA sequence of the entire human genome—something he did not expect in his lifetime. He joined the debate on the side of those who wanted to go forward, and consequently developed a research group of graduate students and post-docs for the purpose of identifying the genetic basis of certain diseases that had hitherto resisted discovery. Cystic fibrosis, a common potentially fatal genetic disorder of northern

Europeans, became the object of his group's attention. The story that follows should be read by any young person interested in science.

At that time, finding genes was a matter of identifying chromosomal markers that were inherited with the disease, and then "walking" from one piece of DNA to the next in the hope of stumbling on the gene of interest. The process was painfully slow. Collins developed a more rapid method that made it possible to "jump" along larger stretches of DNA; later, he coined the term "positional cloning" to describe this process of finding a disease gene by its map position. In contrast to previous methods for finding genes, positional cloning enabled scientists to identify disease genes without knowing in advance what the functional abnormality underlying the disease might be.

[O]ne rainy night in May 1989, the answer finally came. There spilling out of the fax machine Lap-Chee and I had set up in the Yale dormitory where we were both attending a meeting, was the data from that days work in the lab—showing unequivocally that a deletion of just three letters from the DNA code in the protein-coding part of a previously unknown gene was the cause of cystic fibrosis in the majority of patients.¹¹



"The Language of Speed"

While the final chapter of the cystic fibrosis story is yet to be written, this "easiest" challenge had taken more than ten years, two dozen research groups worldwide, and more than \$50 million to identify one gene for one disease. Extending the research to other rarer diseases and to those where multiple genes are involved seemed to require knowledge of the entire human genome.

Collins describes the intense debate of the late 1980s: the start of the U.S. Human Genome Project led by James Watson, Watson's sudden departure after two years over an argument with the director of the NIH over patenting parts of the DNA and Francis Collins' appointment as Director in late 1992. For Collins this appointment was a spiritual as well as career challenge. As the years wore on to the April 2003 announcement of the completion of the goals of the Human Genome Project, Collins led a very public project that demanded good judgment, political savvy with Congress, cooperating research teams and competing challenger Craig Venter as well as scientific acumen and Christian ethics.

Space does not permit consideration of Collins' thinking on DNA and evolution, his reading of Genesis, atheism and agnosticism, creationism, intelligent design, or his own view, *BioLogos: Science and Faith in Harmony*. They are best considered by reading the book. The closing chapter "Truth Seekers" spells out a faith grounded in obedience to the call of Jesus Christ who died in his place.

Collins writes clearly about complex things. His book is a wide-ranging account laced with humor, humility, a love for science, and a desire to witness to God—an inspiring account for the faithful and a challenge to the casual reader to follow his path to belief. *

Notes

¹Francis Collins and Owen Gingerich, "Must We Have a Separation of Church and Science?" *Talk of the Nation*, National Public Radio, WGBH, Boston, August 4, 2006. <www.npr.org/templates/story/story.php?storyId=5617850>. Edited transcript of Collins remarks: <www.pbs.org/wgbh/questionofgod/voices/collins.html>

²Francis S. Collins, "Is There Common Ground Between Science and God?" interview by Gina Shaw, Washington DC: The Association of American Medical Colleges, August 11, 2006. www.aamc.org/newsroom/reporter/aug06/quanda.htm

³*Language of God*, 2.

⁴*Ibid.*, 3.

⁵*Ibid.*, 17.

⁶*Ibid.*, 38.

⁷*Ibid.*, 40–1.

⁸Quoted in *The Language of God*, 53.

⁹*Ibid.*, 61

¹⁰*Ibid.*, 106–7.

¹¹*Ibid.*, 115.



Book Reviews



ANTHROPOLOGY & ARCHEOLOGY

THE CRADLE OF HUMANITY: Prehistoric Art and Culture by Georges Bataille and Stuart Kendall, eds. Translated by Michelle Kendall and Stuart Kendall. New York: Zone Books, 2005. 210 pages. Hardcover; \$28.95. ISBN: 1890951552.

Stuart Kendall presents here a collection of essays, reviews, letters and other manuscripts by Georges Bataille (151 pages), together with an introduction (23 pages) and notes (25 pages). He does so to reassert the place of prehistory in Bataille's thought, even though he notes—thus weakening the argument in favor of the book—that the indifferent silence accorded Bataille's work has been “perhaps not entirely inappropriate.” While other matters are touched, Kendall's introduction (as does Bataille's work itself) points out the importance of the discovery of prehistoric cave art at Lascaux on shaping Bataille's thought: the period when that art was produced stands for all of prehistory for Bataille, who does not offer final answers but instead “writes to satisfy our longing for the marvelous.”

Bataille reads Lascaux and other art as portraying prehistoric humans as having a reverence and love for animals, feeling remorse for having to kill them, and thus anticipating our modern experience of being slaves to work we must pursue at any price. In general, he claims that “our present world disparages man's longing for the marvelous.” Prehistoric art shows that as a race we have not been defeated in the past by a lack of understanding, but have continued to strive for it, and we can do the same in the modern world. We do not understand art, poetry or religion, but in all of these we strive for understanding. In particular, “the world of understanding is to religion as the clarity of the day is to the horror of the night.” Paradoxically, in the moment when we are refusing to reduce religious experience to something easily defined and delineated, we are being religious.

My second pass through this book, looking back after some reflection at the notes I had made while reading it in detail, made me more sympathetic to the stimulus that Bataille's work could be for those who think about the relationship between prehistory and modern experience, and between art and the human religious imagination.

Reviewed by David T. Barnard, Regina, SK Canada.



FAITH & SCIENCE

GOD, HUMANITY, AND THE COSMOS: A Companion to the Science-Religion Debate by Christopher Southgate, et al. 2d ed.; New York: T & T Clark International, 2005. 443 pages, index. Paperback; \$49.95. ISBN 0567030164.

The first edition (1999) of this book, then with the subtitle, *A Textbook in Science and Religion*, received enthusiastic

reviews in the June and September 2000 issues of *PSCF*. The book has been substantially revised and has two new chapters and some other new material, though a change to smaller type and finer paper has kept the number of pages about the same and reduced the thickness of the book. It is written by a team of British authors, most of whom hold academic qualifications in both science and theology/religion, led by Christopher Southgate. The other members are John Hedley Brooke, Celia Dean-Drummond, Paul D. Murray, Michael Robert Negus, Lawrence Osborn, Michael Poole, Andrew Robinson, Jacqui Stewart, Frazer Watts and David Wilkinson.

Among the topics covered in the fifteen chapters are: the debate between science and religion; truth and reason; modern cosmology; biological evolution; divine action today; Islam and science; biotechnology; and what the future holds. The new chapters are Chapter 2, on creation, by Murray and Wilkinson and Chapter 3, learning from the past, by Brooke. These further extend the usefulness of this book.

Intelligent Design Theory is dealt with in one paragraph. The arguments of Behe and Dembski are briefly stated and books by Ruse, Shanks, Peters and Hewlett, and Dembski and Ruse are cited. It is noteworthy that Phillip Johnson is not mentioned. We are told that

Intelligent Design theorists tend to say that their ideas are scientific rather than theological, but one is left in little doubt that their ultimate motivation is to suggest the existence of (a Paley-esque) God. We would regard their position as flawed on scientific grounds—plausible evolutionary explanations for the relevant processes are possible, and also questionable theologically.

Young earth views are also treated very briefly. We are told that

some Christians view the Genesis text as a disclosure of *how* exactly creation came into existence and not simply *why*. Such approaches are collectively referred to as “Creationism” ... there is a diversity of such creationist approaches ... Some believe in creation that is only thousands of years old. Some view just the earth as being only thousands of years old but think of the universe in its totality as being much older. Others believe that the universe *appears* to be billions of years old but is in fact only thousands of years old ... In these views contemporary science is seen to be misleading compared with the evidence of Scripture. Such views are dependent on seeing the Genesis text as a scientific picture of God's creative acts. However, the current scientific picture of the universe which is billions of years old cannot be dismissed lightly. The theories of modern science have gathered a very considerable consensus around them with a very considerable body of supporting evidence in their favor. Moreover, many of the scientists who explore the history of the universe in this way are devout Christians and Jews. Nor is this simply a scientific problem but also a theological one, for if God is the creator of all then creation should surely disclose something of God? God as creator, it might be reasoned, has authored “the book of nature” as well as “the book of scripture.” It is odd, therefore, on theological grounds to think of the book of nature

and the book of scripture as standing in fundamental conflict with each other.

For people who are willing to look deeply beyond young-earth creationism and intelligent design, this book has a wealth of informative and challenging material, from both classical and modern sources—far too much for me to list here. The book deserves to be widely read by students and others.

Reviewed by Donald Nield, Associate Professor of Engineering Science, University of Auckland, Auckland, New Zealand.



GENERAL SCIENCES

GOD IN THE MACHINE: What Robots Teach Us About Humanity and God by Anne Foerst. New York: Plume/Penguin, 2005. 212 pages. Hardcover; \$15.00. ISBN: 0452286956.

This book afforded me one of the most enjoyable reading experiences I have had for some time. Foerst has studied both computer science and theology (as I have myself) and written a thesis on the possibilities of a nonjudgmental dialogue between Christian anthropology and artificial intelligence (AI). One of the orientations of AI is to think of intelligence as an abstract that can be realized in various concrete forms, such as machine intelligences and the “meat machine” that is the human brain. On the other hand, there is a noticeable continuity of the rest of the animal world and humanity, because most of what we know about humans can be found elsewhere in creation; but as Christians we know humans as special in that we are “God’s partner.”

The book has as a central narrative the interaction of the author and some colleagues and visitors at MIT with two robots, Cog and Kismet. This narrative describes how humans bond with these machines in fascinating ways, sometimes despite initial skepticism about that possibility. Foerst’s reflections explore what robots can teach us about ourselves, our emotions, and our ways of thinking and acting. This leads to challenging thoughts about what it means to be human and what it means to be partners of God.

The author sees humans as essentially storytellers, with the shared narratives of our experience—including our experiences with God—providing the core of our self-understanding. The Bible, of course, presents us as estranged from God, in a condition it refers to as sin. AI generally takes a different view, seeing humans as defined by their intelligence. However, though estranged, we are certainly communal beings and embodied beings, so if we want to replicate the human experience in robots, they too must be communal and embodied.

Personhood means accepting the other as the other, though humans are not always very good at this, sometimes only acknowledging relatively small numbers of others as really human in one way or another. But God accepts us for who and what we are, and allows us to be imperfect. “Personhood, then, can be understood as participating in the narrative processes of mutual storytelling about who each of us is.” If we want to include all humans

in these shared narratives, the author expects that we will not be able to draw boundaries that exclude all of the intelligences that we are capable of creating, so some of them will also be persons in this sense. Ultimately, we are called to commit ourselves to creating narratives of universal acceptance so that peaceful coexistence of all humans “and our robotic children” becomes possible.

This book is easy to read and should be accessible without a detailed background in computer science or AI or theology. It is thoughtful and thought-provoking. I highly recommend it.

Reviewed by David T. Barnard, Regina, SK Canada.

THE E-BOMB: How America’s New Directed Energy Weapons Will Change the Way Future Wars Will Be Fought by Doug Beason. Cambridge, MA: Da Capo Press, 2005. 256 pages, index. Hardcover; \$26.00. ISBN: 0306814021.

Beason is the associate director of threat reduction at Los Alamos National Laboratory. He has been a key architect in directed-energy weapons for the past twenty-six years and has worked as the president’s science advisor in both the Clinton and Bush administrations.

This book has three major divisions. First, Beason makes the attempt to explain in an accessible, yet unclassified way, what Directed Energy weapons are (chaps. 1–4), the technology that is involved with them (chaps. 5–13), and what the future may hold for this class of weaponry (chaps. 14–16).

Directed Energy (DE) is best defined perhaps by what it is not. Many of those not involved in the defense industry visualize a weapon to execute war as some projectile (bullet, bomb, missile, etc.) putting its kinetic energy onto a target (i.e., striking the objective). DE weapons by contrast seek to divert part of the electromagnetic spectrum as a weapon. DE weapons have a variety of applications in the prosecution of war. They may be high-powered microwaves directed at a target to damage its electrical infrastructure, or a laser attempting to “heat up” an incoming ballistic missile to destroy it, or a millimeter wave used to deter access to incoming assailants.

Beason makes some arguments as to why DE weapons are superior to conventional kinetic weaponry. His arguments are three-fold: (1) DE weapons allow for more precision and thus can minimize collateral damage; permitting the U.S. Armed Forces to become even more of a precision-strike force, isolating the specific threat and neutralizing it; (2) DE weapons are “unlimited,” in that they do not require bullets so therefore can be used for a very long time. Harnessing the power of the sun, while not truly infinite, is many times more sustainable from a logistic sense than kinetic weapons; and (3) because of the precision-strike capability and the “unlimited” supply, a boost is achieved in the affordability of defense weaponry. An argument from economics can be made that the objective must be achieved in a much cheaper way.

Beason then goes on to tout more of the specific advantages of DE weapons in a variety of scenarios. From ballistic missile defense to crowd control, he goes as far as

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saying that DE weaponry is a "revolution in military affairs" (p. 4). He makes a rather strong case and his scenarios are both realistic and timely.

Beason is also a realist most of the time. He knows of the many detractors of this type of weaponry and does his best to acknowledge them. At times, he dismisses them as bureaucratic and obstructionists without merit. At other times, he acknowledges that their questions pose some value. He also admits, though not overtly, that the current state of technology does not quite yet permit his rather overly-optimistic view. Since I am familiar with the industry, in my opinion, it is only a matter of time until DE weapons are a reality.

In his descriptions of DE weaponry, Beason displays great faith in technology. This engenders the reader to ask some pressing moral questions concerning these weapons. For example, is it a troubling development that the consequences of war are becoming further and further separated from the ones that are prosecuting the war? Are these weapons too powerful? How do we separate the question of "Can this be done?" from "Should this be done?" Is this another example of the growth of technology outpacing our moral capacity to deal with it? This book can catapult readers to a whole series of vital and relevant questions concerning the developments of this technology.

This book does give a tremendously helpful overview of the inevitable state of modern and soon-to-be weapons of defense in the USA. Those who appreciate the many accomplishments of technology will enjoy this book. It is a relatively light read because much of the technical detail is glossed over. However, this should not detract from its value as an informed appraisal of the defense armaments in our time.

Reviewed by Kyle Hilton, South Hamilton, MA 01982.



HISTORY OF SCIENCE

A CHAOS OF DELIGHT: Science, Religion and Myth and the Shaping of Western Thought by Geoffrey P. Dobson. London: Equinox, 2005. 478 pages. Paperback; \$27.95. ISBN: 1845530195.

Dobson's comprehensive volume (the title reflects a quotation from Darwin) includes a review of the Sumerians (chap. 2), ancient Egyptians (chap. 3), Presocratics (chap. 4), classical philosophy (chap. 5), early and medieval Christianity (chaps. 6 and 7), and science (chaps. 8–11). The first and last chapters (1 and 12) outline Dobson's convictions and assumptions, such as "Every religion contains some form of myth" (p. 9), and "Natural science provides a very different way of making sense of the world" (p. 11), one that is ordered and explainable. Modern science includes knowledge seeking, with questions and answers that have no absolutes (a self-correction process). A "scientific truth" is "that relation derived by careful observation and some form of verifiable experimentation, usually involving measurement" (p. 18). Dobson states clearly his own views:

I do not believe in a personal god, heaven or hell, the afterlife or the notion that human beings are spe-

cial creations of God ... The idea of a personal god, heaven or hell, the afterlife or the act of special creation are "truths of the past" and, along with the concepts of spirit and soul, belong to the history of ideas (p. 374).

There are many helpful figures and tables, including "Summary of Greek prehistory and civilization" (p. 95), "Twelve major Olympian gods and divine functions" (p. 100), "Chronology of the major Greek Presocratic philosophers" (p. 103), "Definition of Greek terms" (p. 105), "Summary of the major contributions of the Greek Presocratics" (pp. 134–5), and a "Diagram showing the broad mindset of most Presocratic philosophers" (p. 138).

Chapter 6 covers the rise of Judeo-Christianity in the Greco-Roman world, noting briefly Abraham, Moses and the prophets, then Jesus, who "taught that suffering indicated an unhappy and disoriented soul ready to receive divine grace with the right guidance" (p. 193). Dobson next comments on Paul before turning to early "Christian" philosophers such as Philo Judaeus, Justin the Martyr, Clement of Alexandria, Origen and Tertullian, as well as Latin church fathers, such as Ambrose, Jerome and Augustine of Hippo.

Chapter 7, Medieval Christendom, discusses neoplatonism (Boethius, Charlemagne and Eriugena of Ireland), "The Arabic Corpus" (pp. 228–37), and scholasticism and the universities (Anselm, Thomas Aquinas). Dobson includes challenges to church authority, such as Roger Bacon, and provides background on the foundations of natural science at that time (pp. 255–6).

Chapter 8 treats the rise of Western science and its methodologies, with achievements by Leonardo da Vinci (anatomy and mechanics), Copernicus (heliocentric theory), Vesalius (human anatomy), Brahe (astronomy), Galileo (telescopic astronomy), Gilbert (magnetism), Kepler (planetary motion), Harvey (blood circulation), Descartes (theory of coordinates), Pascal (probabilities), Torricelli (barometric pressure), Guericke (air pump), Malpighi (capillaries), Boyle (gas laws), Huygen (wave theory), van Leeuwenhoek (microscopic research), Newton (universal gravity), Leibniz (monads) and Harrison (portable maritime clock).

In Chapter 9, Dobson outlines how he believes the universe arose (the Big Bang theory) and how it is changing, leading to chapter 10, with theories on the origins of life discussed (spontaneous generation, divine creation, life from outer space and, of course, natural selection). Dobson believes the formation of the earth was at 4.6 billion years ago, when prebiotic and biological evolution began. On the origin of life "scientists have to be content with developing plausible 'scenarios' that mimic primordial conditions and assume there is a continuity between extant organisms and life forms" (p. 331).

Chapter 11 discusses the evolutionary origins of the mind in the light of Darwin's theory, which allowed a scheme of hominid evolution. Dobson concludes that humans evolved from a hunter-gatherer existence to builders of "a succession of grand civilizations with the most elaborate language and cultural systems," all within the past 12,000 years (p. 362).

Chapter 12 is a short polemic on "seeking unity in diversity" (pp. 370–4) because "Everyone's truths, to some degree, have been shaped by ideas of the past" (p. 371). Dobson's agnostic views do not "suggest doing away with religion" (p. 374) because it has contributed to the history of ideas.

Dobson's book on the history of ideas is a veritable *tour de force* that includes over 1,100 bibliography entries and over 3,000 endnotes. It falls short, however, of noting contributions on the idea of intelligent design.

Dobson displays an extensive knowledge of science and summarizes how people have built upon each other's ideas throughout the centuries. He may not believe in God, but readers are asked to believe in Dobson.

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

THE RELIGIOUS FOUNDATIONS OF FRANCIS BACON'S THOUGHT by Stephen A. McKnight. Columbia, MO: University of Missouri Press, 2006. 193 pages, index. Hardcover; \$37.50. ISBN: 086216099.

Francis Bacon's writings are traditionally seen as harbingers of the Enlightenment when religion is reduced to a sideshow and human reason and human capabilities usher in a new era of prosperity, tolerance, and progress brought about by the steady advancement of science and technology. The many references to religious motifs throughout Bacon's works are seen either as attempts to deceive less enlightened readers as to his true intent to destroy the power of religion over humankind or as window dressing that does not reflect his true beliefs about religion in general, and Judeo-Christian beliefs in particular.

Reading Bacon in such a future-oriented mode, argues Stephen McKnight, fails to do justice to understanding Bacon on his own terms and removes him from a social and cultural context that facilitates obtaining a full grasp of his central philosophy and its import. McKnight, professor emeritus of European intellectual and cultural history at the University of Florida, seeks to redress this imbalance by dissecting the texts of eight of Bacon's works, including his three major works *New Atlantis* (1626) and *Instauratio Magna* (*The Great Instauration*) and *Novum Organum* (*The New Organon*) both published in 1620, and five earlier important works: *The Advancement of Learning*, *De sapientia veterum* (*Wisdom of the Ancients*), *Temporis Partus Masculus* (*The Masculine Birth of Time*), *Redargutio Philosophiarum* (*The Refutation of Philosophies*), and *Cogitata et Visa* (*Thoughts and Conclusions*).

Consistent with the work of other revisionist historians and historians of science (e.g., Perez Zagorin, John C. Briggs, and the introductions to the new critical edition of Bacon's writings) who have reconsidered Bacon's works in the past decade or so, McKnight finds that Bacon's thought is constructed on a religious foundation that includes classic Christian thought as well as substantial themes and imagery drawn from the *prisca theologia*, a collection of Neoplatonic, Hermetic, alchemic, magic, and Jewish esoteric traditions that was quite influential at the time. Bacon was especially focused on the imagery and

importance of the Edenic Fall and believed that science and technology would become a means of ameliorating its effects on humanity.

New Atlantis, for example, contains a series: the Exodus-Sinai episode, the Davidic-Solomonic kingdom, the wisdom of Solomon, the concept of the chosen people, and the messianic and millenarian restoration of nature and humanity. Bacon also draws upon the *prisca theologia* and employs both the myth of Atlantis and ancient wisdom traditions. The function of the Temple priests as preservers of the Ark and esoteric knowledge passed down from Moses leads Bacon to make a case that in the demise of the Hebrew nation much ancient knowledge was lost. Science and technology from his time forward is the means for reacquisition of what was lost (*instauration* or re-edification), restoring order to a disordered world.

McKnight finds four major religious motifs in Bacon's writings. *Instauration* is Bacon's motif for the restoration of humanity to its prelapsarian condition, i.e., before the Fall. *Providential intervention* figures largely in Bacon's view of how this instauration will be realized. Vocation for Bacon is the God-ordained task of himself and others to advance harmony and prosperity through reason and the advancement of science and technology. The final motif is that of Christian charity which replaces selfishness and pride and prevents materialism from rearing its ugly head.

This detailed study of Bacon, a major thinker in the history of science and technology, shows clearly that he proceeded from a religious orientation. McKnight's case helps one reconsider the foundations of modernity (i.e., it is not what your professors likely told you), and encourages the rereading of Bacon with more discernment and understanding.

Reviewed by Dennis W. Cheek, Vice President of Education, Ewing Marion Kauffman Foundation, 4801 Rockhill Road, Kansas City, MO 64110.

HOLLOW EARTH: The Long and Curious History of Imagining Strange Lands, Fantastic Creatures, Advanced Civilizations, and Marvelous Machines beneath the Earth's Surface by David Standish. Cambridge, MA: Da Capo Press, 2006. 289 pages, bibliography. Paperback; \$24.95. ISBN: 0306813734.

This is a history of speculations about advanced civilizations existing underground in a largely inaccessible hollow earth. No matter that such views are challenged and exceed established scientific knowledge, the myth, like many such myths (UFOs, for example), is durable.

David Standish, a teacher in Northwestern University's Medill School of Journalism, is a frequent writer for the *Smithsonian*. His book takes us on a journey which entertains as well as informs. He describes how varied, extensive and everlasting are the fables which some people believe. Yes, the idea of a hollow earth is still alive and well in the twenty-first century. Search the Internet for evidence!

The idea of a hollow earth dates back as far as the Sumurians (2600 BC–2100 BC), but it was Edmund Halley (of comet fame) who made it famous in modern times

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when he developed the first scientific theory. He claimed it accounted for observed variations in the earth's magnetic poles. In 1691 his ideas were presented three times to the Royal Society, where they were taken very seriously for awhile. Since Halley, the hollow earth has been subjected to hundreds of permutations, both fictional and "charmingly delusional" (author's description). The works of authors Verne, Poe and Burroughs are analyzed, as well as the strange stories of Richard Shaver, taken seriously by some in the middle of the last century. The book is well illustrated, which adds to its appeal.

ASA members interested in the fringe histories of science will want to read this book; all ASA members will enjoy it.

Reviewed by John W. Burgeson, Rico Community Church, Rico, CO 81332.

SCIENCE AND RELIGION: 400 B.C. to A.D. 1550 from Aristotle to Copernicus by Edward Grant. Baltimore, MD: The Johns Hopkins University Press, 2006. 307 pages. Paperback; \$22.00. ISBN: 0801884012.

Science and Religion is an outstanding chronicle of the emergence of science intertwined with theology. Grant provides a detailed commentary of the development of the relationships of science and religion.

Grant, a distinguished professor emeritus of history and philosophy of science at Indiana University, Bloomington, has published numerous books in science and religion, specializing in the Middle Ages. This book is a revision of a prior publication (2004) in a series by Greenwood Press and forms a pair with *Science and Religion: 1450-1900 From Copernicus to Darwin* written by Richard Olson.

Reason and revelation: two concepts whose development has affected virtually all of Europe's history. After an Introduction to these themes, the next two chapters cover the works of Aristotle and other scientists to show that "Greek learning acquired by the natural light of human reason ... stands in contrast to revelation" (p. 13). This dichotomy was maintained in the Roman Empire which inherited and preserved the rich legacy of Greek science in two major literary genres: the handbook and the commentary. "The most important commentaries for the interrelations between science and religion were those on the works of Plato and Aristotle" (p. 93) which later served as key sources for writers in the Middle Ages. Grant argues that a New Europe emerged after the Barbarian Invasions. The Middle Ages was an innovative period despite the meager knowledge of science and natural philosophy. As partial evidence, Grant cites the development of Medieval Universities which featured prominently in developing natural philosophy and theology in the fourteenth and fifteenth centuries.

Grant has an extensive grasp of the field which he uses to provide insightful comparisons and draw out general themes. For example,

From all that has been said about the interrelations between natural philosophy and theology, it is obvious that theology had a relatively small impact on natural philosophy, whereas natural philosophy, logic, and mathematics had so great an influence on theology that they reshaped the discipline, trans-

forming its subject matter more nearly into natural philosophy than theology or religion (p. 220).

Science and Religion should be required reading for all those teaching and researching in this area. The topics are well indexed and the bibliography contains an impressive list of original works in translation. The style is remarkably engaging for a densely packed book that is an excellent resource and could be used as an upper class textbook.

Reviewed by Fraser F. Fleming, Associate Professor of Chemistry, Duquesne University, Pittsburgh, PA 15282.



NATURAL SCIENCES

SMITHSONIAN TITLES by Seymour Simon. New York: HarperCollins, 2006. 12 volumes. Hardcover; \$6.99 each.

This may be the first book intended for children ages 5-9 ever reviewed in *PSCF*. Actually, it is not one book, but twelve beautifully produced volumes: *The Brain; Destination: Space; Earthquakes; The Heart; Lightning; Oceans; Sharks; Stars; The Universe; Volcanos; and Whales*.

Each book contains beautifully photographed scenes in color. The accompanying text is brief, double-spaced, and in large type. This should make them appealing to young readers. Adults also will find them stunning.

Seymour Simon, labeled "the dean of science writers for the grammar school set" (Kirkus Reviews), writes about things that interest children including animals, vehicles, anatomy and astronomy. He has published more than two hundred books on many topics for which he has gotten many awards.

These books are offered by the Smithsonian Institution in conjunction with HarperCollins. They are updated editions of Simon's most popular books, and they include the most recent scientific research. Their modest price makes them accessible to families as well as libraries.

If you like to look at exquisite pictures of nature with brief commentary, and seek to instruct your children in the marvels of nature and creation, these books fit the bill.

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

HARD SCIENCE, HARD CHOICES by Sandra J. Ackerman. New York/Washington, DC: Dana Press, 2006. 142 pages, index. Paperback; \$12.95. ISBN:1932594027.

This book is a journalist's report (a good one in my opinion) on a conference held in May 2005 at the Library of Congress on "neuroethics," a term coined at a seminal conference three years earlier in San Francisco with the support of universities and the Dana Foundation (now chaired by William Safire). Organizers of the 2005 conference, Ruth and Gerald Fishbach, both from the faculty at Columbia University, named the conference per the title of this book with the subtitle: "Facts, Ethics and Policies Guiding Brain Science Today."

The book begins with an overview which reports on a discussion among panelists Safire, law professor Hank

Greely (Stanford) and neuroscientist Michael Gazzaniga (Dartmouth), touching on highlights such as chimeras, drug enhancement, neuroimaging and general legal and ethical aspects of neuroscience. Three parts follow on neuroimaging, drugs in the brain and neurotechnology (e.g., deep brain stimulation and the brain-computer interface). The book closes with another discussion of legal and ethical issues by panelists Safire, Greely and Gazzaniga, with audience participation. At the end there is a list of twenty-three references to the most prominent and controversial issues in this field.

The first part on neuroimaging discusses how functional MRI (fMRI), supported by human participation exercises and techniques like skin conductance response, points to areas of the brain (brain circuits) involved in decision-making including those related to morality and ethics. On the issue of "false memory" the results are equivocal—"hard to prove or disprove." Considerable discussion focuses on the difficulty distinguishing PVS (permanent vegetative state) from MCS (minimally conscious state) patients—with reference to the Terry Schiavo case. Memorable quotes are "scientists have not found anything in the brain that looks like a truth detecting region," and "according to data from neuroimaging the brain has no moral center."

In the part on drugs, key issues are "pharmacological Calvinism" (the notion that prescribing drugs robs patients of the opportunity to exercise self-reliance skills) and the debate on when drugs give therapy (e.g., helping old people remember) vs. performance enhancement (e.g., for athletes). Along the way the question is posed on whether a relative loves the "person" before drug therapy or the "person" after drug therapy.

Under neurotechnology, there is a focus on DBS (deep brain stimulation) that relieves symptoms of various disorders and neurosurgery aided by DBS—PET scans guided by patient's feelings. Noted is the scary indication that ten percent of patients feel no benefit from treatment, and it carries a high risk of suicide.

In the final panel discussion attention is given to the debate on choosing to know about results of the test for the Huntington gene. A dichotomy is reflected in the views of Greely (law) and Gazzaniga (neuroscience). "Even if a neuroscientist could prove that there is no such thing as free will, we would ignore him in the critical setting. We would continue to treat people as if they are responsible" (Greely). "Neuroscience is driving towards a mechanistic understanding of us. But that doesn't lessen the social contract of personal responsibility" (Gazzaniga).

The idea of complete mechanistic understanding seems to me antithetical to the Christian view where hope and faith are welcome. Fortunately, I believe the defense of the Christian view is supported by the fact that neuroscience is not a "hard" science and far from the definitive prognosis of Gazzaniga. I note that on page 21, Ackerman, makes the following statement, presumably based on talks at the symposium, about neuroscience studies: "Very few of them are reproducible and even fewer would be published a second time in a major professional journal."

Reviewed by John M. Osepchuk, Full Spectrum Consulting, 248 Deacon Haynes Road, Concord, MA 01742.



ORIGINS & COSMOLOGY

THE MUSIC OF CREATION: Theology and the Sciences by Arthur Peacocke and Ann Pederson. Minneapolis, MN: Augsburg Fortress Press, 2006. 106 pages. Paperback; \$20.00 ISBN: 0800637569.

This book comes with a CD and is divided into parts by musical terminology: prelude, first movement, second movement, bridge passage, third movement, coda, and postlude. Included are a glossary, endnotes, index, and CD track list of twenty-two musical compositions by past greats including Haydn, Wagner, Beethoven, Mozart, and Bach. Music from modern musicians like Duke Ellington and Charlie Parker are also found on the CD. Comments on the CD music is woven into the text.

The prelude commences with a quote attributed to Victor Hugo: "Music is that which cannot be said but upon which it is impossible to be silent." The postlude concludes that "Music and theology have been brought together here in a composition about God's creation" (p. 81).

Arthur Peacocke, a biologist, is ordained by the Church of England, a recipient of the Templeton Prize in Religion, and author of *Theology for a Scientific Age*. Ann Pederson, a professor of religion at Augustana College in Sioux Falls, SD, is the author of *God, Creation and All That Jazz*. While the authors come from different cultural backgrounds, they share a common theology. Peacocke seeks to emphasize music as a reservoir of models and metaphors for examining God's continuous creative activity and presence. Pederson sees music, jazz especially, as reflecting and enriching the creative Christian community. In this book, the authors "hope to shed light on God and creation through the rich creativity we see in music" (p. xii). The authors agree with Luther that "God's grace is experienced through the music of creation, as the grace notes in our lives" (p. 82).

The Music of Creation stresses the importance of music in enriching the human spirit, shedding light on God and his creation, and showing that, in a civilized society, music should not be supplanted by pragmatics, utilitarianism, and efficiency.

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



PHILOSOPHY & THEOLOGY

FROM HUMAN TO POSTHUMAN by Brent Waters. Aldershot: Ashgate, 2006. 166 pages. Paperback; \$29.95. ISBN: 0754639150.

We are at the dawn of an age when technology enables humans to ascend to a posthuman stage—so state many authors who argue in favor of the need and necessity of the change. Waters is interested in the unspoken assumptions, particularly of a theological type, that are made in such arguments.

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As discussed in chapter 1, at the threshold of the postmodern age, there is a shift from the providential view of reality to progress and rational ethics so that moral progress can be put in line with the progress of science. However, "there is no progressive trajectory to discern; only a non-directional process marking the passage of time" (p. 18). According to chapter 2, the end of the modern age is marked by Nietzschean philosophy and the emergence of two classes of people: last men and nihilists. Three postmodern attributes are discussed: subjectivity, malleability, and mastery.

Technology becomes the major tool to create posthumans, claims the author in chapter 3. Previously, the human mandate was to have a dominion over the earth. Posthumans, on the other hand, should also have dominion over themselves. In particular, they want to achieve immortality by, for example, treating the mind as software that can be copied at will. Chapter 4 points to the need of a theological perspective in discussions promoting the posthuman stage: "to assert that humans should become posthuman requires the invocation of a higher or transcendent good that trumps the anthropocentric standard" (p. 78). If such a perspective is offered, theological aspects are often downplayed and diluted, as illustrated with the views of Hefner and Peacocke.

In chapter 5, a case is made for the view that "the principal weakness in postmodern theology ... is the absence of any compelling Christology" (p. 95) as illustrated in the views of Kaufman, Teilhard de Chardin, and again, Hefner and Peacocke. Waters, using O'Donovan's work, delineates a framework that avoids this deficiency. One important result of giving a predominant position to the Incarnation is the statement that "we are called to prepare creation for its perfection by Christ, and not to perfect it for Christ's sake" with the available technology (p. 121). The last chapter accentuates eschatology as a proper perspective for analysis of what dominion over the earth signifies. However, according to the author himself, no easy solutions can be automatically derived from his deliberations concerning specific moral problems such as embryonic stem cell research.

This is an important and valuable book because the author stresses the significance of theology in thinking about technological progress and places emphasis on the person of Christ in pondering the consequences of this progress upon the fate of humankind.

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



RELIGION & BIBLICAL STUDIES

ALL THINGS IN THE BIBLE: An Encyclopedia of the Biblical World by Nancy M. Tischler. Westport, CT: Greenwood Press, 2006. 2 volumes. Hardcover; \$149.95. ISBN: 0313330824.

This attractive two-volume set is printed in large type on pages with lots of white space. The author intends it for lay readers who are less interested in scholarly debate, detail, and discussion and more interested in the facts leading to a better understanding of Scripture.

Organized alphabetically, the book's cross-referencing and sixteen-page index help locate topics. Most of the books' two hundred topics have Bible references, etymology, commentary, archaeological findings, and intellectual, artistic, and religious history. A bibliography covers four pages in the second volume. The topics are sometimes illuminated by illustrator Ellen Johnston McHenry.

The author's hope is that these two volumes will help readers "gain a richer understanding of vineyards and funerals, weddings and hospitality, Pharisees and Sadducees, kings and shepherds ..." I think they will.

Nancy M. Tischler, professor emerita at the Pennsylvania State University, has also written *Men and Women of the Bible* and *Student Companion to Tennessee Williams*.

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

THE MAGIC NEVER ENDS: The Life and Work of C. S. Lewis by John Ryan Duncan. Minneapolis, MN: Augsburg Books, 2006. 194 pages. Paperback; \$14.99. ISBN: 0806652802.

The magic which never ends refers to the public's continuing fascination with the life and works of C. S. Lewis. Forty-three years after his death, the life of C. S. Lewis still provides fodder for biographies, pictorials, and analysis. That Lewis' writings, of which there are many, are perennial bestsellers testifies to their vast influence.

If you know nothing about C. S. Lewis, or perhaps are interested in a different perspective on what you already know, this book is for you. It has many attractive features, the primary one being its brevity. A reader who might be hesitant to indulge in reading a longer account of Lewis' life and writings would find this volume very appealing. Its brevity is aided by the white spaces and large print.

There are many photos of Lewis, his family and friends, and buildings associated with his life. In the past, some fundamentalists were deterred from reading or admiring Lewis because of his vices. This book does not seek to hide them. It includes photos of The Eagle and Child Pub, where the Inklings group met, and several photos of Lewis smoking a pipe and cigarettes. (By the way, Lewis thought some denominations majored on the minor, "the trivial at the cost of the essential," as Gresham put it, p. 97.)

Endnotes for the book's twelve chapters point to other writings on Lewis. Quoted throughout the book are people who personally knew Lewis and other scholars who have spent time studying Lewis' writings. These include Douglas Gresham, Lewis' step-son; Walter Hooper, Lewis' personal assistant; Dabney Hart, author of *Through the Open Door: A New Look at C. S. Lewis*; Lyle Dorsett, currently writing a spiritual biography on Lewis; Christopher Mitchell, director of Marion E. Wade Center at Wheaton College, which contains the C. S. Lewis archives (the world's largest collection of C. S. Lewis writings and memorabilia), and currently writing about Lewis and the Oxford Socratic Club; and Colin Manlove, author of *C. S. Lewis: His Literary Achievement*.

Chapter Twelve, "Observations," is unique and interesting. Much information the author collected did not fit

neatly into the main text. Therefore he has included it in this chapter in a question and answer format. It succinctly provides insights by answering such questions as "Was C. S. Lewis a misogynist?"

Some people consider Lewis to be the twentieth century's greatest Christian writer, leading apologist for the Christian faith, and a most important author of children's books. This is easy to understand because his books have collectively sold more than 200 million copies and all thirty-eight are still in print. Lewis was featured on the cover of *Time* magazine; had some of his life covered in the film *Shadowland*; had his famous tale, *The Lion, the Witch, and the Wardrobe*, translated into a movie; was the subject of a documentary film with the same title as this book and produced by the author of this present book; and is the focus of more than two hundred fan clubs around the world.

Lewis' conversion from atheism in 1931 changed his life dramatically. "Up to that time, he'd been a respected scholar, a respected teacher, a gifted student, a caretaker to Mrs. Moore, and a good friend to Oxford colleagues. But his writings, while interesting, were not yet notable. That seemed to change with his transformation to Christianity" (p. 67).

One of Lewis' most famous observations resulted from his reaction to people who say Jesus was only a great teacher. It is summarized by Lyle Dorsett: "How can he be a great man, a great teacher, and a wonderful prophet but not be who he says he is? He's either a liar, he's a lunatic, or he is who he says he is" (p. 95).

Three significant events occurred November 22, 1963: John F. Kennedy was murdered in Dallas; the Beatles released their second album in London; and C. S. Lewis died at age 64 in Oxford, England.

Lewis's concise statement of his faith best explains his popularity with evangelicals and the huge sales of his writings: "The central Christian belief is that Christ's death has somehow put us right with God and given us a fresh start" (p. 99). This belief resulted in exerting, by his life and writings, a great influence in the twentieth century. That influence continues unabated.

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

ON THE PASSION OF THE CHRIST: Exploring the Issues Raised by the Controversial Movie by Paula Fredriksen, ed. Berkeley, CA: University of California Press, 2006. 284 pages. Paperback, \$19.95. ISBN: 0520248538.

Mel Gibson's blockbuster *The Passion of the Christ*, released in 2004, has already faded into the distance for most observers of the film and religion scene—a culture-wars hot spot that flared in an especially intense American moment. However, the issues it raised about art, historiography, and, of course, Christian theology, remain largely unresolved for moviegoers and laypeople. As long as individual viewers and believers remain uncertain what values are at stake, or why this film represents a unique crisis point in the culture wars, they will be unable to move beyond their personal aesthetic reactions into an informed judgment on the larger issues.

For those reasons, Fredriksen's guidebook to the controversy will be timely for years to come. The collection (a reissue of the hardcover *Perspectives on The Passion of the Christ* (Miramax, 2005), with a new introduction) is a lively, personal, passionate, and accessible argument against the widespread misunderstandings and misreadings engendered by Gibson's disingenuous virtuosity. Its shortcomings are endemic to edited volumes of this sort. For example, there are repetitive introductions in multiple essays to Anne Catherine Emmerich, the nineteenth-century nun whose visions provided framework and content for *The Passion*, without a single definitive essay on her life, work, promotion, and the significance of Gibson's appropriation of her interpretation of the passion scenes. But the book's strengths illuminate both the film and its source material from multiple angles. Readers will leave the collection understanding the difficulties of using the gospels as unproblematic historical sources, of conflating or harmonizing their different accounts, and of approaching film as naive consumers, assuming that what one sees there is all there is to be seen. The emotional tone of the prose will convince readers that the fissures revealed by the film's reception are serious threats to religious co-existence and public understanding—issues for which all the writers exhibit passionate and credible concern.

Fredriksen, one of the premier popular writers on early Christian development, contributes an arresting introduction and an outstanding overview of the disparities in audience and approach among the four Gospel accounts of Jesus' death. The collection otherwise begins on a shaky note, with two essays by journalists. *Newsweek's* Jon Meacham provides an account of the film's origin and reception, but includes no notes or sourcing for his assertions, frustrating the reader who might like to find the original interviews and news reports. Similarly, Jay Tolson and Linda Kulman of *U.S. News and World Report* narrate the changing relationship between Judaism and Christianity over the last two millennia, and while they perform ably, it is difficult to know why these journalists, rather than historians of religion, are the right guides to these complex topics.

The meat of the volume, however, is choice prime. Members of the ad hoc scholars group that provided a much-discussed pre-release report on Gibson's script, including Phillip Cunningham of Boston College, Lawrence Frizzell and Eugene Korn of Seton Hall, Amy-Jill Levine of Vanderbilt, and John Pawlikowski of Catholic Theological Union, offer perspectives from Catholic and Jewish scholarship and piety. (The entire scholars' report is also included in the text.)

Fredriksen's most inspired touch, however, is her solicitation of essays from passionate evangelicals like Ben Witherington III of Asbury Theological Seminary, and Jim Wallis of *Sojourners* magazine. Complementing the scholarship of other practicing clerics from Orthodox Judaism, Catholicism, and Protestantism, these essays have the invigorating flavor of preaching that engages with cultural touchstones.

Where the collection is weakest is in genuinely cinematic approaches to the movie and its issues. Adele Reinhartz of Wilfred Laurier University comes closest to a legitimate writer on film, but the reader senses in some

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of the essays the bravado of the cultural dilettante, such as when Thistlewaite asks rhetorically whether there is "a person who lives in the United States who does not know that Mel Gibson starred in the *Lethal Weapon* series and in *Ransom*." (Until Thistlewaite reminds her readers of the existence of the minor genre picture *Ransom*, they probably would not have known it themselves.) Nevertheless, it is difficult to imagine a more exciting engagement with Gibson's *Passion* than this informative volume, still smoking from the heat of the moment.

Reviewed by Donna Bowman, Assistant Professor of Interdisciplinary Studies, Honors College, University of Central Arkansas, Conway, AR 72035.

MAPPING PARADISE: A History of Heaven on Earth by Alessandro Scafi. Chicago: University of Chicago Press, 2006. 400 pages. Hardcover; \$55.00. ISBN: 0226735591.

Where was the Garden of Eden located? How about Ethiopia, Sri Lanka, Missouri, or somewhere in the Middle East? Was the Garden a real earthly place or metaphorical one? If it were geographically terrestrial, was it destroyed by the flood? These are some of the questions raised by contemporary theorists and discussed in this book.

Mapping Paradise shows how paradise was presented during the past 2,000 years in cartographic form. It explores how creative people attempted to make a place of unknown location, yet imbedded in the Genesis creation story, become more accessible and real.

Scafi is a lecturer at the University of Bologna, the Victoria and Albert Museum, and the University of London.

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

GETTING THE GOSPEL RIGHT: Assessing the Reformation and New Perspectives on Paul by Cornelis P. Venema. Carlisle, PA: The Banner of Truth Trust, 2006. 100 pages. Paperback; \$6.00. ISBN: 085151927X.

EVANGELISTIC CALVINISM: Why the Doctrines of Grace Are Good News by John Benton. Carlisle, PA: The Banner of Truth Trust, 2006. 32 pages. Paperback; \$2.00. ISBN: 0851519296.

If you need to brush up on your Calvinism, or to be introduced to it for the first time, these two short books will help. The first one, *Getting the Gospel Right*, deals with the Reformation understanding of Paul, and then it explains and assesses the new perspective.

The Reformation perspective is given on Paul's view of justification, grace, and faith. The new perspective treats Second-Temple Judaism, works of the law, and justification. The conclusion to the matter is that only time will tell whether the new perspective has traction, because it has too many problems. Consequently, "it would be premature to declare the Reformation perspective outdated" (p. 90). Venema thinks the old view of the Reformation a more faithful representation of Scripture.

According to the new perspective, the Reformers (mainly Luther and Calvin) erred because they believed Paul thought the Judaizers taught salvation by works.

Not so! Paul opposed the Judaistic teaching that Gentiles were excluded from God's covenanted people unless they conformed to certain legalisms. According to this view, Paul was objecting to Jewish exclusivism, not to Jewish legalism. Paul's emphasis was on ecclesiology, not soteriology. However, as Venema points out, the new perspective appears to require some keeping of the law to reflect inclusion in the covenanted relationship which then becomes, at least partially, justification by works.

Evangelistic Calvinism defends the five points of Calvinism coming out of the Synod of Dort in Holland in 1618–1619. These five points resulted from what the Synod considered a departure from the faith in the teachings of Jacob Arminius. Benton thinks "The five points of Calvinism are a very useful hand-drawn theological sketch-map" (p. 4).

Benton thinks TULIP, the acronym for the five points, represents biblical truth "not only ignored and despised by the world but are often considered unfashionable within the church of Jesus Christ" (p. 5). Arminianism is a "distortion of the Bible's teaching on grace" (p. 5). After making the case for TULIP and how they relate to evangelism, Benton concludes that TULIP should be taught because they (1) are full of cogent and loving evangelistic arguments; (2) are full of pastoral encouragement and consolation; and (3) bring glory to God in Christ (pp. 30–1).

Because of their brevity, irenic style, and high regard for Scripture, these two books will be helpful in giving new exposure to the teaching of the Reformers. They also address the teachings of new and old theologies that they think are less faithful to Scripture.

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

INSPIRATION AND INCARNATION: Evangelicals and the Problem of the Old Testament by Peter Enns. Grand Rapids, MI: Baker Academic, 2005. 197 pages, glossary, index of scripture and other ancient writings, index of subjects. Paperback; \$17.99. ISBN: 0801027306.

For Enns, an associate professor of Old Testament at Westminster Theological Seminary, "the primary purpose of Scripture is for the church to eat and drink its contents in order to understand better who God is, what he has done and what it means to be his people, redeemed in the crucified and risen Son" (p. 168). His goal in writing *Inspiration and Incarnation* "is to bring an evangelical doctrine of Scripture into conversation with the implications generated by some important themes in modern biblical scholarship—particularly Old Testament scholarship—over the past 150 years" (p. 13). He seeks to reach those who accept the fact that "the Bible is God's word, but for whom reading the Bible has become a serious theological problem—even a crisis" (p. 15).

PSCF readers are familiar with the issues raised by discoveries in disciplines that shed light on the ancient history of the earth and its inhabitants in contrast with traditional treatments of scripture. Accompanying the new science has been more than one hundred fifty years of critical scholarship and study of ancient Near East culture,

including contemporary and pre-biblical documents. The author identifies three problem areas:

1. *The Old Testament and Ancient Near Eastern Literature.* The Bible often looks like the literature of the surrounding Gentiles. If the Bible is God's special revelation, should it not be unique?

2. *Theological diversity in the Old Testament.* Different authors seem to have different opinions on the same subject, at times even flatly contradicting each other. If God only has one opinion, should the Scriptures not always say the same thing?

3. *New Testament interpretation of the Old Testament.* The New Testament authors seem to quote the Old Testament out of context, making it say something the author never intended. If we have to use the grammatical-historical method, should they not?

An additional problem area ...

4. *The biblical and scientific accounts of origins do not agree.* Issues of age, pre-adamic humans, and death before the Fall plague efforts to make the "two books" concur.

Conservative Christians generally believe that the Bible must be error and contradiction free for it to be God's Word. The result has been a huge effort to smooth over the inconsistencies with yet another "harmony of the gospels" or "harmony of science and Scripture."

Enns suggests instead that one *begin* with the belief that *Scripture is inspired* then deal with the problems as they appear. Faith comes before proof and it is not based on fact or proof, or it would not be faith. If it is inspired, then the contradictions are there for a reason, and it does not make it any less inspired.

The author asks us to think of biblical inspiration in terms of the "incarnational analogy." "As Christ is both God and human, so is the Bible" (p. 17). While not a new concept, it is often ignored by evangelicals. The Bible is both a divine and human book. Both Christ and Scripture were situated in the context of their times. The Old Testament is more than a compendium of dictated timeless truths; it is revelation bound to the cultural trappings of its times—the languages, the customs, the events of the day, political structures, etc. There needs to be a balance between minimizing the human marks of Scripture and regarding it as just another ancient book.

In the chapters, *The Old Testament and Ancient Near Eastern Literature*, *The Old Testament and Theological Diversity*, and *The Old Testament and Its Interpretation in the New Testament*, Enns considers data from the ancient Near East that conservatives have downplayed. *PSCF* readers will have a special interest in his (all too short) discussion of the biblical accounts and ancient creation and flood stories and *Enuma Elish*, *Atrahasis*, and *Gilgamesh* epics. Enn's summary is instructive.

It is a fundamental misunderstanding of Genesis to expect it to answer questions generated by a modern worldview, such as whether the days were literal or figurative, or whether the days of creation can be lined up with modern science, or whether the flood was local or universal. The point I would like to emphasize, however, is that such a firm grounding in

ancient myth does not make Genesis less inspired; it is not a concession that we must put up with or an embarrassment to a sound doctrine of scripture ... This is surely what it means for God to reveal himself to people—he accommodates, condescends, meets them where they are (pp. 55–6).

Each chapter closes with an annotated bibliography and a lengthy glossary of terms. One index contains references from Scripture and other ancient literature; a second, topics and authors.

Inspiration and Incarnation has created heated discussion among biblical scholars. Some feel that Enns has not gone far enough, others find him headed down a slippery slope. Get it.

Reviewed by John W. Haas, Jr., Emeritus Professor of Chemistry, Gordon College, Wenham, MA 01984.

Letters

Author's Reply to Two Letters Regarding "Prospects for Theistic Science"¹

P.G. Nelson's letter² makes the point that complex groups can have properties not singly possessed by their components. That is undoubtedly correct, and the non-reductionist ontology I advocate agrees with his examples of this. But the point is doubly irrelevant. First: that fact has nothing to do with whether everything has at least some properties of each basic kind (quantitative, spatial, physical, biotic, sensory, logical, etc.). Nelson says he is in disagreement with this, but gives no reason for it. Second: the sort of reduction I was arguing against was not only the old whole-must-be-the-same-nature-its-parts claim. Instead it attacked a more basic sort of reduction, a sort that is ontically global, namely, the claim that anything in creation is purely X, where X is one or another of the basic kinds of properties and laws exhibited by things. Against that claim I gave a (knock-down) argument: no one can so much as frame the idea of any thing as purely X -or even any property as purely X. I urged my readers to try the thought experiment of thinking away the non-physical properties of a thing to see what they had left when they finished. So I ask again: what is left of the idea of a physical thing that is nowhere in time or space, is not mathematically calculable, and is not logically identical with itself, and cannot be referred to in language? The very idea of *physical* disappears before our minds as soon as we attempt to separate it from the non-physical kinds of properties-and-laws we experience such as temporal, spatial, quantitative, logical, and linguistic, etc.

The same comments apply to the letter³ of Moorad Alexanian. While ignoring the argument I just repeated, he simply asserts "The purely physical constitutes the subject matter of science" and "the content of all there is in Nature are elements that are either (1) purely physical, (2) purely non-physical, or (3) both ..." But if we cannot form any idea of anything as purely physical (or purely logical,

numerical, sensory, or whatever) the expression "purely physical" is on a par with talk about square circles. Moreover, Alexanian shifted the idea of ontological reduction from the one I found religiously objectionable and rebutted, to the claim that some sets are either "equated" with one another or are empty. But kinds of properties-and-laws are not sets; kinds do not have "members" and what is qualified by each kind is a matter of contingency. By contrast, sets do have members and each is necessarily a member of the set. Besides, I gave a fairly detailed circumscription of the senses of "reduction" I found objectionable so it is hard to understand why a completely different idea is treated in response.

Finally, my non-reductionist argument would equally defeat the notion that a proper ontology can be a "set theoretic analysis of the whole of reality." The idea of a set is derived by abstracting from the quantitative aspect of creation and thus can neither encompass nor explain its nonquantitative properties and laws.

Notes

¹Roy Clouser, "Prospects for Theistic Science," *PSCF* 58, no. 1 (2006): 2–15.

²P. G. Nelson, "Reduction in Science," *PSCF* 58, no. 3 (2006): 253–4.

³Moorad Alexanian, "Set Theoretic Analysis of the Whole of Reality," *PSCF* 58, no. 3 (2006): 254–5.

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Free Will and Incarnation

David Siemens¹ questions my attempt to understand free will and incarnation scientifically.² Concerning my explanation of free will, he asks: "What mechanism or process sets up the balanced state [in the brain], produces awareness of it in the decider, and then consciously switches it?" The best answer I can give to this is as follows.

As a child grows, its brain develops by cells multiplying and differentiating according to the child's genes, and by the whole structure interacting, through the nerves and sensory organs, with the rest of the body and the outside world. This leads eventually to activity among the neurons that the young person experiences as an awareness of having to think about and make a decision. So far this is a bottom-up process, determined by physics and chemistry.

My hypothesis is that, once this point has been reached, a top-down process becomes possible. This is when the young person's consideration of the options facing him or her gives rise to a physically balanced state (bifurcation point) in the brain. In this circumstance, I suggest, the young person's thoughts themselves can, by proceeding along one line rather than another, determine the direction the brain takes. This then constitutes a free choice.

David Siemens also asks, in relation to my treatment of the Incarnation: "if personality is a function of brain how does a nonphysical spiritual being have a personality?" My answer to this is that personality resides in *patterns* among neurons, not in the neurons themselves.³ A spiritual being can therefore have a personality if it has an organ with components that can take up similar patterns to those in the brain. In my treatment of the Incarnation,

I assumed that the preincarnate Son had such an organ with patterns in it (I speak humanly⁴). I further assumed that, when the Son "emptied himself" and became an embryo, the Father retained these patterns in his memory, and then, as Jesus grew up, ensured that they were reproduced in Jesus' brain.

Notes

¹David F. Siemens, Jr., "On Freedom and Incarnation in Nonreductionistic Materialism," *PSCF* 58, no. 2 (2006): 165.

²P. G. Nelson, "Neuroscience, Free Will, and the Incarnation," *PSCF* 58, no. 1 (2006): 86–7.

³Cf. P. G. Nelson, *Big Bang, Small Voice: Reconciling Genesis and Modern Science* (Latheronwheel, Caithness, Scotland: Whittles, 1999), 109–10.

⁴Romans 3:5.

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Creationism or Methodological Naturalism: A Response to Finlay, et al.

In "Creation versus Creationism," (*PSCF* 58, no. 3 [2006]: 236–9), Finlay, et al. criticize Christians who attack and debunk "evolution," yet their article is a classic example as to why thinking Christians should reject "evolution" as promoted by the scientific community. Thinking Christians accept naturalistic microevolution but understand that compelling evidence for the naturalistic evolution of humans from a common ancestor with the chimpanzee and for the naturalistic generation of new families of proteins does not exist.

Finlay, et al. provide data that compare similarities between the human and chimpanzee genomes. They conclude, "Chimps and humans are related genetically." Thinking Christians would concur, but genetic relatedness is not evidence for any agency that could cause genetic alterations.

Yes, "Humans differ from chimps by about 200 large duplicated or deleted segments." However, such segments of DNA could be identical whether they were generated, altered or deleted by naturalistic processes or by an intelligent agency. Since DNA does not reveal causative agency, neither do RNA, proteins, homologous structures or fossils.¹ In macroevolution, causative agency cannot be determined from scientific data, and it is not naturalistic by default.

Without any supporting data, Finlay, et al. state dogmatically, "The differences between chimp and human genetic sequences reflect natural genetic processes." Such unfounded statements concerning agency are a major reason for Christian opposition to "evolution." Rather, scientists should ask, "Is the naturalistic evolution of *Homo sapiens* from a common ancestor with the chimpanzee probable?" If one were to ask Charles Darwin, he would have responded by saying that there were endless variations,² innumerable progenitors,³ and an unlimited number of generations.⁴ His invocation of the infinite has fogged rational thinking.

What are the facts? *Homo sapiens* evolved from a common ancestor with the chimpanzee about 7 million years

ago and fewer than 1 billion ancestors were born per year. Therefore, less than 1 million generations and fewer than 10^{16} individual ancestors existed. With these constraints, is naturalistic causation remotely probable? Did genetic deletions and duplications occur in a specified order? Did random codon alterations require a specific codon change elsewhere within a gene to maintain enzymatic function or structural integrity? Thinking Christians want to know the answers before ascribing genetic alteration to naturalistic processes alone, and, until then, a naturalistic evolution remains hypothetical.

While duplications and deletions may be naturalistic, the generation of DNA coding for new families of proteins is not naturalistic. The enzyme, cytochrome-C, as found in at least sixty diverse species, has twenty-seven specific amino acids, each located at a specific site along the protein chain. The probability of naturalistically sequencing the appropriate codons for these twenty-seven specific amino acids is one chance in 10^{35} per try.

A reasonable assumption can be made that, over the last 1 billion years, fewer than 100 individual vertebrates were hatched or born each year for each square meter of Earth's surface. Fewer than 10^{26} individual vertebrates ever existed on Earth. Each individual vertebrate is equivalent to one try toward a naturalistic generation. The number of tries falls short by a factor greater than 1 billion.

The combined total of all individual fish, reptiles, amphibians, birds and mammals fails to have the necessary potential to naturalistically sequence a mere twenty-seven specific amino acids. A genetic flight program was assembled for pterosaurs, for birds, and for bats. Each required the appropriate sequencing of far more than twenty-seven specific amino acids. Naturalistic evolution does not have the potential to generate one flight program, much less three. The naturalistic generation of new families of proteins is a highly irrational scientific hypothesis.

What did Finlay, et al. mean by "natural genetic processes?" Are these processes restricted to methodological naturalism? If so, certainly the next previous step was consistent with methodological naturalism, as the one before that, all the way back to a chemical soup in a warm little pond. Under methodological naturalism, God's creative activity and sovereignty evaporate like a morning mist.

Yes, thinking Christians should debunk and attack "evolution" as currently promoted by the scientific community. Unfortunately, generations of children are being turned against science because of bad science.

Notes

¹Fredric Nelson, "Needed: A New Vocabulary for Understanding Evolution," *Perspectives on Science and Christian Faith* (March 2006): 30.

²Charles Darwin, *The Origin of Species* (New York: The Modern Library, 1993 Modern Library Edition), 25.

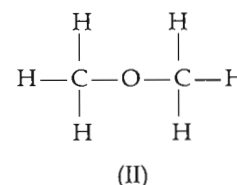
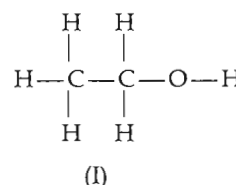
³Ibid., 165.

⁴Ibid., 34.

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Correction

Formula II below was typeset incorrectly in the September 2006 issue on p. 253. The correct formula is printed below.



United States Postal Service
Statement of Ownership, Management, and Circulation

1. Publication Title: *Perspectives on Science and Christian Faith*
2. Publication Number: 0892-2675
3. Filing Date: 9/27/06
4. Issue Frequency: Quarterly
5. Number of Issues Published Annually: 4
6. Annual Subscription Price: \$35
7. Complete Mailing Address of Known Office of Publication (Not printer) (Street, city, county, state, and ZIP+4):
PO Box 668, 55 Market St., Ste. 202
Ipswich, Essex County, MA 01938-0668
8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer):
American Scientific Affiliation, PO Box 668, Ipswich, MA 01938-0668
9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do not leave blank):
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14. Issue Date for Circulation Data Below: September 2006 (Volume 58, Number 3)

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i. Total (Sum of 1g and 1h)		2278	2357
j. Percent Paid and/or Requested Circulation (1b divided by 1i times 100)		84.2%	84.2%

16. Publication of Statement of Ownership:
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Vol. 1–15 (1949–1963), *JASA* 15 (1963): 126–32
Vol. 16–19 (1964–1967), *JASA* 19 (1967): 126–28
Vol. 20–22 (1968–1970), *JASA* 22 (1970): 157–60
Vol. 23–25 (1971–1973), *JASA* 25 (1973): 173–76
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Vol. 51–53 (1999–2001), *PSCF* 54 (2002): 71–78
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