PERSPECTIVES on Science and Christian Faith

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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

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Is Anyone Reading This Journal?

Evangelicals have devoted much energy discussing a recent indictment* of their lack of scholarship. One missing element in this debate has emerged from my discussions with editors of other 'learned' journals — the deep suspicion that our offerings are *underread.* We know that teachers seeking lecture materials, students preparing papers, authors tracking down citations, and a few of the faithful looking for something new on a favorite topic will search through these pages, but who else?

The evidence is anecdotal but pervasive, the sheepish admission that an issue is buried in the pile on the desk, the assertion that the articles are boring, too difficult or 'not in my field,' or the limited response from a large subscription list to even the most controversial proposals. Lack of time to read any but the shortest items is a typical complaint. It seems that we offer an excellent scholarly resource to the few who wish to view a topic in depth but are unable to consistently capture the thoughtful attention of our general readers. Some argue that they are barely able to keep up with their professional literature, that *PSCF* must wait it's turn — one that may never come.

Many of us have joined the ASA out of a desire to support the church and demonstrate to our professional colleagues that science *is* compatible with Christian faith. Surely we recognize that sorting out God, man, and nature is complex as well as a moving target — one that requires regular attention. Our authors address a wide variety of issues which bear on these relationships. Is it too much to ask our readers to set aside the time to grapple with the thinking of these scholars?

It has been suggested that our pages are oversaturated with Origins topics. I agree. Yet prospective authors persist in writing on this topic. A glance at the December 1996 triennial index will reveal the diversity of topics in the last twelve issues and suggest themes that need further development. Writing *and* reading are critical elements of enlightened scholarship.

With this collection of articles and several along similar lines slated to appear in upcoming issues, we are announcing a *moratorium* on articles related to interpretation of early Genesis. It is time to digest what has been published. Letters and short communications controverting or elaborating particular points are welcome.

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*Mark Noll, *The Scandal of the Evangelical Mind* (1994)

In This Issue

In our first paper, Meredith G. Kline offers a restatement of his non-literal chronological framework for the Genesis creation account. He adds a novel two-register cosmological approach that integrates his treatment of both space and time in the cosmology of Genesis.

J. Raymond Zimmer uses the time available in some non-chronological models to examine parallels between the creation story and the current picture of hominid evolution in his "The Creation of Man and the Evolutionary Record." In seeking to present a picture that takes both the Bible and science seriously, he begins with the question: "What if the creation story resembled evolutionary history?"

Our next paper deals with chronology related to the doctrine of the Fall. Randy Isaac considers five possible time scales in the light of differing views on the relationship of moral and natural evil. He finds that each interpretation of the Fall faces some difficulty when examined in the light of scripture or scientific data. Isaac suggests a complementarian approach predicated on the inability to logically relate the spiritual and the physical. He concludes that many different perspectives are needed to emphasize the truths that Scripture presents because none fully expresses the truth.

Famed Oxford University medievalist, novelist, and Christian apologist C. S. Lewis (1898-1963) has had an enduring influence on Evangelicals. In this paper Gary B. Ferngren and Ronald L. Numbers demonstrate Lewis's changing views on evolution through a series of his unpublished letters to Naval Captain Berard Acworth (1885-1963). Acworth was convinced of the incompatibility of Christianity and evolution and sought to influence his friend.

William Tanner's Communication "Real World Stratigraphy and the Noachian Flood" shows how modern geological field studies convincingly demonstrate that the features of the earth's surface require operational conditions and time not available to a flood.

Space and Time in the Genesis Cosmogony

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To rebut the literalist interpretation of the Genesis creation "week" propounded by the young-earth theorists is a central concern of this article. At the same time, the exegetical evidence adduced also refutes the harmonistic day-age view. The conclusion is that as far as the time frame is concerned, with respect to both the duration and sequence of events, the scientist is left free of biblical constraints in hypothesizing about cosmic origins.

The opening section gives a biblico-theological sketch of the two-register nature of cosmology as presented in Scripture. The second major section shows how two-register cosmology informs and shapes the treatment of both the space and time dimensions in the Genesis prologue. It is found that a metaphorical relationship exists between the two levels; the heavenly level (upper register) is described in figures drawn from the earthly level (lower register). As for the seven-day scheme, it belongs to the upper register and is, therefore, to be understood figuratively, not literally. The point of the concluding section is that Genesis 1, on any view that identifies the narrative order with the temporal sequence, would contradict the teaching of Gen. 2:5 concerning the natural mode of providence during the creation process.

An *apologia* is needed for addressing again the question of the chronological data in the Genesis creation account. Simply put — the editor made me do it. Over thirty years ago, I made an exegetical case for a non-literal interpretation of the chronological framework.[1] In the interval, that approach has found increasing acceptance. Its most distinctive argument, derived from Gen. 2:5, has occasionally been incorporated in studies with similar views of the chronological issue.[2] Advocacy of the literalist tradition, however, is as clamant as ever, and it was thought that a more accessible statement of my exegetical arguments could prove useful now.

In preparing the restatement another line of exegetical evidence has come to the fore in my thinking. It concerns a two-register cosmological concept that structures the whole biblical cosmogony. This idea developed into the main point and has become the umbrella under which the other, restated arguments are accorded an ancillary place here and there. My *apologia* concludes then with a claim of adding something somewhat fresh to the old debate.

Two-Register Cosmology

Central in biblical revelation is the relationship of God, whose dwelling place is heaven's glory (Ps. 115:16), to man on earth. A two-register cosmos is thus the scene of the biblical drama, which features constant interaction between the upper and lower registers.[3]

From the perspective of man (more precisely, of man in his pre-Consummation state), the heavenly

register is an invisible realm. However, heaven is not to be thought of as occupying a separate place off at a distance from the earth or even outside the cosmos. Heaven and earth relate to each other spatially more after the manner of speculated dark matter and visible matter. When earthlings experience a proleptic opening of their eyes, they see that the very spot where they are is the gate of heaven (Gen. 28:16, 17), filled with heavenly chariots of fire (2 Kgs. 6:17).

Reference to the invisible realm as "above" is simply a spatial figure based on a natural analogy between what is physically higher and what is more exalted in dignity and honor. This same analogy accounts for the designating of the invisible sphere by the name of the upper level within the visible world. Visible space is itself divided into heaven and earth (and, in tripartite formulations, the waters under the earth). The visible heaven consists of the star-studded canopy of the sky overhead, with the clouds, the waters that are above the earth. Taking its name from this above-section of visible space, supernal space (the above-section of the two-register cosmos) is then called "heaven."[4] Further, when the heavenly Glory is revealed in visible theophany, it is a manifestation in clouds and related phenomena. So close is the association of God's dwelling and actions with the visible heaven (cf., e.g., Ps. 104:2-4) that it may be difficult to determine in given cases whether "heaven" refers to the visible or invisible heaven, or both at once.[5]

The two-register character of biblical cosmology, relative as it is to man's preglorification status, is not permanent. It belongs only to the first stage of an eschatological movement that was integral to creation from the beginning and leads to a final stage of Consummation. As we trace this eschatological development, an important feature that emerges is the archetype-replica (original-likeness) relationship between the upper and lower registers.

From the beginning, God's presence was peculiarly and preeminently associated with the invisible heaven. That was where he dwelt, the site of his enthronement (cf., e.g., Deut. 26:15; 1 Kgs. 8:39, 43, 49; Pss. 11:4; 102:20 [19]; 103:19; Isa. 66:1; Matt. 5:45; 7:21). It was there that he manifested his Glory to the angels, the Glory that fills invisible space and makes it a temple, the Glory-epiphany that is itself God's temple. But though the invisible, upper register heaven was God's true sanctuary, the earth also was at the first the scene of a special visible divine presence.[6] Invisible space was the holy of holies; and visible space (visible heaven and earth) was a holy place. Creation was sanctified in all its spatial dimensions, with lower register space a replica of the upper register archetypal temple.

Eden was the sacred center of the earthly reproduction of the heavenly reality. Here in the garden of the Lord, the Spirit-Glory that fills the heavenly temple was visibly manifested on the mountain of God (cf. Isa. 51:3; Ezek. 28:13 ff.; 31:8f.), the vertical cosmic axis linking heaven and earth. The revealed presence of the King of Glory crowning this sacred mountain marked the earth as a holy theocratic domain. Reflecting the identity of Eden as a sanctuary was the priestly responsibility assigned to man to guard the garden from profanation (Gen. 3:15). The sequel underscores this. When man forfeited his priestly role, guardianship of the holy site was transferred to the cherubim (Gen. 3:24). They were guardians of the heavenly temple throne and the extension of that function to Eden accents the identity of this earthly spot as a visible reproduction of the temple above.[7]

Man's fall radically affected the way the replication of holy heaven on earth was to unfold. As a consequence of the breaking of the creation covenant, the Glory-theophany was presently withdrawn and the earth, though still under the sovereign control of the King of heaven, was left an unsanctified place. Only by way of redemptive intrusion does theophany-centered holy place reappear in the otherwise non-holy, post-Fall world — most prominently in the history of Israel.

Meredith G. Kline received a Th.M. from Westminster Theological Seminary in Philadelphia and a Ph.D. from the Dropsie College of Hebrew and Cognate Learning. He is a minister of the Orthodox Presbyterian Church and has taught Old Testament for almost half a century at several seminaries, including Westminster Theological Seminary in Philadelphia (1948-1965); Gordon-Conwell Theological Seminary (1965-94), where he is emeritus Professor of Old Testament; and Westminster Theological Seminary in California (1981-), where he is currently Professor of Old Testament. His books have focused on the development of a biblico-theological paradigm in the tradition of G. Vos.

Where sanctuary does emerge again on earth, its nature as a copy of the heavenly archetype is emphasized. The tabernacle and temple, restorations of Eden's sanctuary with a cherubim-guarded throne of God, are made after the pattern of the upper register temple revealed to Moses and Solomon.[8] They point ahead typologically to the apocalypse of the heavenly temple at the end of the ages. At that consummation of redemptive history, prefigured by the Sabbath ordinance, the visible-invisible differentiation of space comes to an end as the heavenly Glory is unveiled to the eyes of redeemed earthlings, their perceptive capabilities transformed now by glorification. The boundary of heaven and earth disappears. All becomes one cosmic holy of holies. God's own Glory constitutes this final temple, the realization of the hope symbolized by its earthly replicas.

Creation was sanctified in all its spatial dimensions, with lower register space a replica of the upper register archetypal temple.

Redemption is a way of achieving the original telos of creation despite the Fall. A successful probation by the first Adam would have led through a cosmologically two-register history to an eschatological climax at which Eden's Glory would have been absorbed into the surpassing heavenly Glory. At the dawning of the eternal Sabbath for humanity, all space, without distinction any longer of upper and lower cosmological levels, would have become a consummate revelation of the Glory of heaven's King. Because of the Fall, that eschatological omega-point had to be won by the second Adam.

Two-register cosmologies left their imprint on the form of ancient graphic and literary materials in a variety of ways. A quite literal case of the two-register format is seen in graphic representations like the Assyrian reliefs that picture the king in a lower register, whether driving forward in battle or returning triumphantly, and in a higher register the god in a matching stance.[9] The Book of Job offers a clear instance of the shaping of a piece of literature by the two-layer cosmology. In the prologue, heavenly scenes (Job 1:6-12; 2:1-6) alternate with closely related earthly scenes (Job 1:1-5, 13-22; 2:7-10). A similar movement from the upper to the lower register is found throughout the Book of Revelation. Each series of visions of happenings on earth is introduced by a disclosure of the heavenly control center of the universe, where the earthly judgments are decreed and from where their executive agents descend. With its characteristic opening of the heavens, the apocalyptic genre is a place we naturally expect to find the formative impact of two-register cosmology on literature. Another such place is a cosmogony like the Genesis prologue.

Cosmology of the Genesis Prologue

The creation prologue (Gen. 1:1-2:3) presents a theological mapping of the cosmos with space and time coordinates. Both these dimensions exhibit the biblical two-register cosmology, a construct that functions as an infrastructure of the entire account. And this, we discover, has a decisive bearing on the interpretation of the chronological data.

The Space Coordinate

Two-Register Space

Genesis 1:1. What this opening verse states is that God, in the beginning,[10] created both the upper and lower spatial spheres. "The heavens and the earth" is not just a merismus, a pair of antonyms which as a set signifies totality. The phrase rather denotes concretely the actual two components that together comprise all of creation. That does indeed amount to everything, but in translating, the separate, specific identity of each of these two components must be preserved. One thing demanding this is that verse 2, resuming "the earth" of verse 1, treats it by itself as a distinct, individual sphere.[11]

More precisely, what Gen. 1:1 affirms is that God created not just the spatial dimensions immediately accessible to man, but the heavens too, that is, the invisible realm of the divine Glory and angelic beings. This interpretation is reflected in the apostle Paul's christological exposition of Gen. 1:1, declaring that the Son created "all things that are in heaven and that are in earth, visible and invisible, whether they be thrones, or dominions, or principalities, or powers" (Col. 1:16; cf. John 1:1-3). Similarly Nehemiah, reflecting on the Genesis creation account, finds a reference there to the invisible heaven of the angels (Neh. 9:6), and the only possible referent is "the heavens" of Gen. 1:1 (and the reference to that in Gen. 2:1, if the latter summation does in fact include Gen. 1:1, not just 1:2-31).[12]

Moreover, in the context of Genesis 1 itself, the visible "heaven" or "firmament" (v. 8) is derived from what is called "earth" in verses 1 and 2. Hence,

the "heavens" that are distinguished from that "earth" in verse 1 must be the invisible heavens. This would not necessarily be the case if verse 1 were a summary heading for the entire account. But what Gen. 1:1 says about "the beginning" cannot be summing up the entire process of creation, for the allusions to the *bĕrēšît* of Gen. 1:1 in Prov. 8:22, 23 identify that "beginning" as prior to (no coextensive with) the developments traced in Gen. 1:2ff. Though it is an independent statement, Gen. 1:1 is, therefore, not a heading but a declaration concerning the initial phase of creation history.

Some oppose construing Gen. 1:1-2 as I have because, they insist, the phrase "the heavens and the earth" always signifies the finished product, the well-ordered, occupied universe, and hence "the earth" that appears in that phrase in verse 1 cannot be the unfinished, uninhabitable place called "earth" in verse 2.[13] But contrary to this often repeated claim, in other appearances of the phrase "(the) heavens and (the) earth" in Scripture, the idea that these realms were finished and inhabited is not what is signified by this phrase itself but would have to be supplied by the context. Even if all references after Gen. 1:1 happened to be to a heaven and earth in such a finished state, that would not be determinative for the Gen. 1:1 context, which deals with the very process of developing the product from an empty to a furnished condition.[14] In fact, it may well be that in all the appearances of "(the) heavens and (the) earth" (over half of which are allusions to the creation account, acknowledging the Lord as the maker of heaven and earth), the phrase signifies precisely the invisible and the visible realms, and thus the whole two-register world.

There is, therefore, no reason to resist the clear direction of Prov. 8:22-23 for the interpretation of Gen. 1:1 as referring to an earlier juncture, not to a later stage when the earth had become habitable for man. In point of fact, though the visible realm, the "earth," was not completed until the end of the creation "week," completion of the invisible heavenly realm (with its angelic hosts) had evidently been accomplished "in the beginning." Job 38:7 indicates that the celestial sons of God existed at the point in earth's development described in Gen. 1:2ff. Thus, in view of the close allusive relationship of Job 38 to Gen. 1, Job 38:7 also furnishes independent support for the interpretation of "the heavens" in Gen. 1:1 as the invisible sphere of the angels of God.

Gen. 1:1, therefore, states — and how eminently fitting is this affirmation for the opening of the canonical Scriptures — that God in the beginning made the whole world, both its upper and lower spatial registers, both its invisible and visible dimensions, heaven and earth, all.

Genesis 1:2. Both invisible and visible space, introduced in Gen. 1:1 as "the heavens" and "the earth" respectively, appear again in verse 2. Focusing on the lower register, this verse describes the earth at an early inchoate stage (v. 2a and b). But it also prepares for the following account of how this uninhabitable world was transformed into a paradisiacal home for man by pointing to the God of the invisible heaven, present above the darkness-enshrouded waters of the earth below (v. 2c). This creative Spirit-Presence is depicted in avian metaphor[15] as hovering in fostering fashion above the world. As shown (for one thing) by the striking echo of Gen. 1:2 in Deut. 32:10, 11, the "Spirit" here refers to that heavenly epiphany which is known in its manifestation within the visible world as the Shekinah, the theophanic cloud of glory.[16] Including as it does then the Spirit-Glory of the temple in heaven along with the earth below, Gen. 1:2 carries forward the two-register cosmology contained in verse 1.

While the "let there be" is uttered at the upper register, the "and it was so" occurs at the lower register.

Genesis 1:3-2:3. The several creative fiats by which visible space gets fashioned into a habitable world in the course of the six days (Gen. 1:3ff.) are sovereign decrees. They clearly evoke the throne of the King of Glory, the King invisible, the only God, dwelling in light unapproachable (1 Tim. 1:17; 6:16). Each such fiat, therefore, signals the continuing presence of the upper register sphere in the panoramic scenario of the creation narrative. That these fiats emanate from the invisible heavens is indicated with particular clarity in the account of man's creation in God's image. For there (Gen. 1:26) the divine fiat takes the consultative "let us" form that reveals the setting to be the angelic council,[17] the judicial assembly which is a regular feature in disclosures of the heavenly reality denoted "Spirit" in Gen. 1:2.

Another index of the continued inclusion of the heavenly register in the scene is the motif of the divine surveillance and judgment found in the refrain: "and God saw that it was good" (Gen. 1:4, 10, 12, 18, 21, 25, 31). For repeatedly conjoined with statements that the invisible heaven is the site of

God's temple-throne is the declaration that from there he engages in a judicial scrutiny of the world. From that throne "his eyes behold, his pupils try the sons of men" (Ps. 11:4c). It was from his throne in heaven that the divine Builder looked down, saw the unfolding work of his hands, and pronounced it "good," that is, in perfect accord with his master plan (cf. Prov. 8:30, 31).

Further, the full two-register cosmology comes to expression in the fiat-fulfillment format, which is the basic structure of each of the six day-stanzas. While the "let there be" is uttered at the upper register, the "and it was so" occurs at the lower register. The fiat of the Logos-Word above is executed by the Spirit in the earth below.[18]

Again, and quite directly, God's throne in the upper section of the two-register cosmos is alluded to in statements about the Creator's seventh day rest, which is his heavenly enthronement (Gen. 2:2b, 3b). The earthly register is also included in the day seven section, for along with the Creator's Sabbath of royal resting above, it also contains the appointment of the Sabbath ordinance for human observance on earth below (Gen. 2:3).[19]

Table 1. Two-register Space in Genesis Prologue

	Verse 1	Verse 2	Days 1-6	Day 7
Upper Register	heaven	Spirit	fiats	God's Sabbath
Lower Register	earth	deep	fulfillments	Sabbath Ordinance

The summary chart of the space dimension theme in the Genesis prologue (Table 1) shows that two-register cosmology is present not only as a concept but as a pervasive factor in the organization of the composition. Additional evidence of its influence on the literary structure of the passage will be noted below.

Replication Relationship of the Two Registers

The lower register relates to the upper as replica to archetype. Before seeing how that comes to expression in the creation account, we must call attention to how the six days fall naturally into two triads, one dealing with creation kingdoms and the other with the creature kings given dominion over them. As frequently noticed, the two triads run in parallel with obvious correlation of their successive members.[20]

The earthly products of the first three days mirror one or another characteristic of the invisible heaven, the above realm, the realm of light and overarching Glory (Gen. 1:2). The day-light called forth on day one was a replica of that Glory-light. The bright firmament-vault of day two was so much the likeness of its archetype that they shared the same name, "heaven" (Gen. 1:8). The lofty trees, the climactic fruit of day three, are used in Scripture as an apt figure for the cosmos (cf. Dan. 4:10-12). With their high spreading branches a realm for the birds of the heaven, they are comparable to the firmament-heaven in which the birds fly (Gen. 1:20), a towering image pointing to the overarching Spirit-heaven above.

The six days fall naturally into two triads, one dealing with creation kingdoms and the other with the creature kings given dominion over them.

Moving on from copies of the heavenly kingdom to images of the heavenly King, the second triad of days presents creature kings whose roles in the hierarchy of creation are earthly reflections of the royal rule of the Creator enthroned above. Royal terminology is explicitly used for the luminaries of day four. In that they regulate the cycle of light and darkness, they are said to "rule over" the kingdom of day and night produced on day one (Gen. 1:16; cf. Ps. 136:8, 9). God's blessing-mandate to the creatures of day five closely resembles the dominion mandate afterwards given to man. In each case royal occupation of the assigned domain is to be accomplished by being fruitful, multiplying, and filling (Gen. 1:22, 28). So the birds and fish would exercise their rule over the sky and sea, the kingdom realms of day two. Incidentally, the birds of day five and the luminaries of day four — both associated with the "firmament of heaven" (Gen. 1:14, 15, 17, 20)— are like the King of heaven in other ways besides their ruling function. The birds' overshadowing of their nests (Deut. 32:11) and the luminosity of the sun and moon become biblical figures for the Glory-Spirit as a protective covering, the heavenly Sun and Shield (cf. Ps. 84:12 [11]).[21] Culminating the series of earthly replicas of the Creator-King is the final creature of day six, man, the image of God and his holy angels (Gen. 1:26). In this earthling, made like unto the Glory-Spirit with respect to the threefold glory of royal dominion, moral excellence, and (in eschatological prospect) visual luminosity,[22]

creaturely reproduction of the heavenly King of kings is perfected.

The replication motif emerges distinctly on day seven in the Sabbath ordinance, designed to call man to the imitation of the divine sabbatical pattern. Discussion of this will be deferred, however, until we are dealing with the time coordinate of the Genesis cosmology.

As a final illustration of replication in the spatial dimension, we turn to the way the two-register pattern of the total cosmos, visible and invisible, is repeated within the visible, lower register by itself in its subdivision into an upper realm (heaven) and a lower realm (earth). This secondary, replicated two-register structure is highlighted by the arrangement of the contents of the two parallel triads of days according to their upper or lower location.

The first members of each triad are related to the upper level, the heaven: the light of the sky on day one and the heavenly luminaries on day four. The third members belong to the lower level, the earth: the land and its vegetation on day three and the land animals and man on day six. And the second members are strikingly designed to serve as links between the first and third members. For these middle units of the two triads each combines both upper and lower levels: the sky and the sea in day two and the birds of the air and fish of the sea in day five.

Table 2. Location of Triads' Productions

First Triad		Level		Second Triad
day one	—	upper	—	day four
day two	{	upper / lower	}	day five
day three	—	lower	—	day six

Here again we see that the two-register cosmology construct was a decisive factor in determining the literary shape of the Genesis prologue.[23]

The Time Coordinate

Space and time, the cosmological coordinates, are correlative. Interlocking of the two is pronounced in God's seventh day rest, a temporal concept that connotes the spatial reality of the holy site of God's enthronement. Also indicative of their correlation is the giving of the temporal names "day" and "night" to the spatial phenomena of light and darkness (Gen. 1:5). It is inevitable then that the two-register structuring of the spatial dimension will also be found in the temporal dimension, and with it the archetype-replica relationship between the two registers. We have seen that by reason of this replication relationship earthly things are a rich source of metaphor for the realities of the invisible heaven. God is portrayed as hovering like an eagle over its nest and as resting like a man after his work is done (cf. Ex. 31:17); upper register space is designated "heaven" after the upper level of visible space; etc. We naturally expect then that in the case of time, as of space, the upper register will draw upon the lower register for its figurative depiction. Therefore, when we find that God's upper level activity of issuing creative fiats from his heavenly throne is pictured as transpiring in a week of earthly days, we readily recognize that, in keeping with the pervasive contextual pattern, this is a literary figure, an earthly, lower register time metaphor for an upper register, heavenly reality.[24]

Lower Register Time

Twin Record. Earthly time is articulated in the astronomical phenomena that measure off and structure its flow. It is the astral-solar-lunar relationships of the earth that define the units, the years and the days, in which man experiences (lower register) time. They produce the sequence of light and darkness that marks the days. They arrange the signs in the sky that announce the seasonal round of the years. Time is named, its meaning is expressed, in this system of calibration. The establishing of this regulatory order by which lower register time is defined and in which it has its being is recorded in the creation account. Twice in fact: once at the beginning of the first triad of days (Gen. 1:3-5) and a second time at the beginning of the second triad (Gen. 1:14-19).

Temporal Recapitulation. The non-sequential nature of the creation narrative, and thus the non-literal nature of the creation "week," is evident from the recording of the institution of lower register time in both the first and fourth day-sections. This point must be developed here because of its importance as an independent argument against the solar-day and day-age views and because the exegesis involved is preparatory to other arguments below.

The forming and stationing of the sun, moon, and stars are attributed to day four. Their functions

with respect to the earth are also stated here, first in the fiat section (Gen. 1:14, 15) and again (in reverse order) in the fulfillment section (Gen. 1:16-18). They are to give light on the earth and to rule by bounding light/day and darkness/night, as well as by demarcating the passage of years and succession of seasons. These effects which are said to result from the production and positioning of the luminaries on day four are the same effects that are already attributed to the creative activity of day one (Gen. 1:3-5). There too daylight is produced on the earth and the cycle of light/day and darkness/night is established. In terms of chronology, day four thus brings us back to where we were in day one, and in fact takes us behind the effects described there to the astral apparatus that accounts for them. The literary sequence is then not the same as the temporal sequence of events.

The non-sequential nature of the creation narrative, and thus the non-literal nature of the creation "week," is evident from the recording of the institution of lower register time in both the first and fourth day-sections.

To avoid this consequence, alternative interpretations of day four have been sought. According to one proposal, the luminaries (though unmentioned previously) were in existence before the point in time dealt with in day four and were indeed present at day one as the source of light spoken of there.[25] Day four describes simply their coming into sight, not their creation. Any such view is falsified by the language of the text, which is plainly that of actual production: "Let there be ... and God made ... and God set (lit., gave)." The attempt[26] to override this language cannot be passed off as just another instance of phenomenological description. The proposed evasive tactic involves a very different notion — not just the general denominating of objects according to their everyday observed appearance at any and all times, but the relating of a specific event at a particular juncture in the creation process as though witnessed by an observer of the course of events, someone who at the moment reached on day four is supposed to catch sight of the luminaries, hitherto somehow hidden, perhaps by clouds. Disclaimers notwithstanding, this proposal is guilty of foisting an unwarranted meaning on the language affirming God's making and positioning of the luminaries. In the accounts of the other days, everybody rightly recognizes that the same language of divine fiat and creative fulfillment signifies the bringing into existence of something new, not just a visual detecting of something that was there all the while. There is no more excuse for reducing divine acts of production into human acts of perception in day four than there would be elsewhere.

Some advocates of the controverted approach to day four acknowledge more forthrightly its distinctiveness and develop more fully its peculiar feature of the seer figure.[27] An attempt is made to explain the precise sequence of the entire creation narrative by the exigencies of the visual experience of the hypothesized human spectator, as he is conducted through all the successive scenes. Besides the basic objection that it is belied by the language of origination used for the day four event, this form of the observer hypothesis is beset with a special problem of its own. Its suggested guided-tour perspective is a feature of apocalyptic visions, and there the presence of the seer figure is plainly mentioned. He is the one who narrates the visions unfolding before him. No such figure is introduced in the creation account; the alleged human spectator is a fiction imposed on the text contrary to its non-visionary genre.

Recognizing that the actual making of the luminaries is related in day four, but still trying to avoid the conclusion that the narrative order is thematic rather than sequential, some would subordinate the statement about the making of the luminaries (vv. 16, 17a) to the statement about their purpose or functions (vv. 17b, 18a), alleging that the only distinctive new development of day four is that these functions then become operational. But the primary declaration that the luminaries were made cannot be eliminated as a day four event in that way — no more so than the statement in the day two account that God made the firmament may be reduced to the idea that a previously existing firmament began to perform its stated purpose of dividing between the waters above and below (Gen. 1:6, 7). Moreover, this minimalist view of day four would share the fatal flaw of all views that eliminate the forming of the luminaries from the happenings of day four: it would leave day four with no new contribution, for all the functions mentioned there are already said to be operative in day one.[28]

Also entailed in the minimalist interpretation of day four is the pluperfect rendering of the verbs expressing the making of the luminaries in the fulfillment section (vv. 16, 17), introduced by "and it

was so" (v. 15b). If adopted, the pluperfect could not be restricted to these verbs. For consistently in Genesis 1, what immediately follows the fiat and the "and it was so" formula that answers to the fiat is a detailing of what God proceeded to bring into being in execution of the fiat. In day four then the verbs of fulfillment in verses 16, 17 cannot be pluperfect with respect to the fiat of verses 14, 15a. Temporally they follow the fiat, which means the fiat would have to be put in the same pluperfect tense as its subsequent fulfillment, yielding the translation "And God had said." That is, day four as a whole would have to be cast in the pluperfect, and that with reference to the time of the events in the preceding days. Ironically, such a translation would make explicit the non-chronological sequence of the narrative, the very thing the pluperfect proposal was trying to avoid.[29]

Understandably dissatisfied with the contrived nature of these attempts to avoid acknowledging that the act of making the luminaries was a day four event, other opponents of the non-sequential view of the creation narrative have been driven to seek a solution in a reinterpretation of day one. They would account for the presence of light and the cycle of day and night in day one by positing for this point in time some light source other than the one whose origin they admit is assigned to day four and which (according to their commitment to the temporally sequential order of the narrative) did not, therefore, exist until three days (or ages) after day one.

All indicators tell us that "in the beginning" belongs to the upper register, where Father, Son, and Spirit act together in sovereign purpose, word, and power to create the world.

Some speculate about a supernatural light source, a manifestation of divine glory in space. But that distorts the eschatological design of creation history, according to which the advent of God's Glory as the source of illumination that does away with the need for the sun awaits the Consummation.[30] Indeed, the assumption of such a supernatural mode of ongoing providence during the creation week is contradicted by the assumptions that inform Gen. 2:5ff.[31]

No more satisfactory is the suggestion that the hypothetical lighting system was some natural arrangement. That would raise questions about the wisdom of the divine procedure. Why would God create such a vast cosmic order only to discard it three days (or ages) later? Why create a replacement cosmos to perform the very same functions already being performed perfectly well by the original system?[32] Like the gap theory of Gen. 1:2, this scenario, with its mid-course cosmic upheaval and starting over, would introduce a jarring, discordant note into the simple, stately symphony of the cosmic house-building — planned, performed, and perfected by the all wise master builder.

Any such approach that disconnects the luminaries of day four from the light of day one, denying the cause-effect relationship of the two, violates the overall thematic scheme of the creation narrative. As we have seen, the successive members of the first triad of days correspond to the successive days of the second triad, the relationship of each matching pair being that of creation kingdom (theme of the first triad) to creature king (theme of the second triad). The correspondence is especially close in the day one-day four pair. It is clearly the light phenomena (kingdom) of day one over which the luminaries (kings) of day four rule, producing and regulating it. Temporal recapitulation most certainly occurs at day four and hence there is no escaping the conclusion that the narrative sequence is not intended to be the chronological sequence.

Upper Register Time

The Beginning. As observed above, the allusions in Prov. 8:22, 23 to the *bĕrēšît* of Gen. 1:1 show that this "beginning" precedes the situation surveyed in Gen. 1:2ff. It stands at the head of the creation days. While belonging to the creation week,[33] it marks the interface of precreation and the space-time continuum, pointing back to what is signified by "was" in the identification of God as the one "who is, and who was, and who is to come" (Rev. 1:8). In Gen. 1:1 the "beginning" is peculiarly associated with God himself. Similarly, echoes of *bĕrēšît* in the Scriptures focus on divine acts and intratrinitarian relationships back of creation. Equating the beginning with a stage "before the earth was," Prov. 8:23 asserts that the personified divine Wisdom was present with God at the beginning (cf. Col. 1:17). The prologue of John's Gospel identifies "the beginning" in terms of the relationship between God and the Logos, who was God and made all things (John 1:1-3), the one who identifies himself as "the beginning of the creation of God" (Rev. 3:14; cf. Rev.

21:6; 22:13; Col. 1:15-18) and speaks of the glory he had with the Father "before the world was" (John 17:5).

All indicators tell us that "in the beginning" belongs to the upper register, where Father, Son, and Spirit act together in sovereign purpose, word, and power to create the world. "In the beginning" is a time coordinate of invisible space. Entry into the six days that it is, "the beginning" serves to identify them as also belonging to the invisible cosmological register.

The six evening-morning days then do not mark the passage of time in the lower register sphere. They are not identifiable in terms of solar days, but relate to the history of creation at the upper register of the cosmos.

The Seventh Day. God is present at the beginning of creation; he is "the beginning." He is also "the end," for he appears at the completion of creation as the Sabbath Lord. The seventh day has to do altogether with God, with the upper register. The divine rest which characterizes the seventh day is the reign of the finisher of creation, enthroned in the invisible heavens in the midst of the angels.[34] It is precisely the (temporary) exclusion of man from this heavenly Sabbath of God that gives rise to the two-register cosmological order. At the Consummation, God's people will enter his royal rest, the seventh day of creation (Heb. 4:4, 9, 10), but until then that seventh creation day does not belong to the lower register world of human solar-day experience. It is heaven time, not earth time, not time measured by astronomical signs.

Not only the identification of the Sabbath rest with God's royal session on high, but the unending nature of that seventh day of creation differentiates it from earthly, solar-days. Consisting as it does in God's status as the one who has occupied the completed cosmic temple as the King of Glory — a status without the possibility of any interruption or limitation — the seventh day is in the nature of the case unending. This is confirmed by the treatment of the theme of God's "rest" in Hebrews 4. That rest is identified in verses 3 and 4 as God's seventh day of Gen. 2:2 (which is quoted). The passage then expounds God's rest as an ongoing reality, entrance into which is the eschatological hope of God's people (see esp. vv. 10, 11; cf. John 5:17). If the seventh day were not an unending Sabbath-rest for God but a literal day, would the next day be another work day, introducing another week of work and rest for him, to be followed by an indefinite repetition of this pattern? Are we to replace the Sabbath-Consummation doctrine of biblical eschatology with a mythological concept of cyclic time?[35] In the Genesis prologue the unending nature of God's Sabbath is signalized by the absence of the evening-morning formula from the account of the seventh day.

The Six Days. Under consideration here is the series of six numbered days and the accompanying evening-morning refrain. This refrain is not to be connected with the solar time phenomena of days one and four, for it is not confined to those two contexts but is included in all six day-sections and in every case is immediately conjoined to the numbered day. The imagery of the evening and morning is simply a detail in the creation-week picture. This refrain thus functions as part of the formularized framework of the account.

The question whether the references to the six days (with their evenings and mornings) describe lower register time phenomena or whether they belong to the upper register is answered in favor of the latter by the interlocking of the six days on both sides with upper register temporal features. Certainly the six days are part of the same strand as the seventh day, and the "beginning," as suggested above, is to be taken as the threshold of the creation week. Psalm 104 reflects this by similarly bracketing its treatment of the works of the six creation days (vv. 5-26 or 30) with upper register scenes of God in heaven, before (vv. 1-4) and after (vv. 27 or 31-35).

The six evening-morning days then do not mark the passage of time in the lower register sphere. They are not identifiable in terms of solar days, but relate to the history of creation at the upper register of the cosmos. The creation "week" is to be understood figuratively, not literally — that is the conclusion demanded by the biblical evidence.

Replication: The Sabbath Ordinance

Rounding out the series of acts of spatial and temporal replication in the Genesis prologue is the reproduction of the pattern of the Creator's time in the instituting of the Sabbath ordinance.[36] This ordinance superimposed a special temporal grid on

the calendar of days and seasons marked by astronomical sequences. The Sabbath was designed for symbolic purposes within the covenant community, as a sign calling to consecration and the imitation of God and as a seal promising consummation of the kingdom to the covenant keepers.[37] By this promise the Sabbath reminds us that lower register history as a whole is patterned after upper register time in that it is a Consummation-directed eschatological movement. The weekly scheme of the Sabbath ordinance portrays this overall seventh-day-bound design of lower register time while it symbolically mirrors the archetypal heavenly creation week itself.

Exod. 20:11 brings out explicitly that the continuing earthly pattern of sabbatical weeks is a human copy of a divine original. Within the two-register cosmology of the creation account with all its replications of upper register realities in the lower register world, all of them reproductions with a difference, there can be no doubt about the figurative nature of the relationship of the Sabbath ordinance to God's upper register creation week. The gratuitous insistence of literalists that the terms of the Sabbath ordinance in Exod. 20:11 demand that the creation week be one of literal solar days is contradicted by the metaphorical character of the whole series of creational replications to which the original Sabbath ordinance (Gen. 2:3) belongs. Like man's nature as image of God, man's walk in imitation of God's sabbatical way is not a matter of one-to-one equivalence but of analogy, of similarity with a difference. Like all the other lower register replicas, the sabbatical week of the ordinance is a likeness of its original, not exactly the same; it is an earthly metaphor for the heavenly archetype.

The Genesis prologue thus concludes with the record of the instituting of the lower register phenomenon that provides the figurative chronological framework on which this literary composition has itself been constructed, the seven-day metaphor for the time dimension of God's creating the heavens and the earth.

Cosmogony and Providence

Our argument for the metaphorical nature of the creation week has included evidence that the narrative sequence of Genesis 1 is determined by thematic factors and is not intended to correspond to the actual temporal sequence, as maintained by both the solar-day and day-age views. For further light on this issue we now turn to Gen. 2:5-7.

The Genesis 2 Context

After the prologue, Genesis divides into ten sections with a refrain formula ("these are the generation of N." [lit.]) serving as the heading for each.[38] In keeping with the uniform meaning of this formula, Gen. 2:4 signifies that what follows recounts not the origins but the subsequent history of the heavens and the earth. Gen. 2:5ff. is thus identified as a record of the sequel to the world's creation, not as a second account of creation. This section does, however, pick up the story within the creation period (as does the next section at Gen. 5:1ff.). In doing so, it incidentally reveals something about the nature of divine providence during the creation week, something that cannot be accommodated by strictly sequential interpretations of Genesis 1.

Genesis 2 fixes attention on the lower register and, more precisely, on Eden as it sets the stage for the covenant crisis of Genesis 3. Here again the arrangement of the narrative is thematic rather than strictly chronological. At the beginning (vv. 5-7) and end (vv. 18-25) the man and woman, the human principals in the probationary crisis, are reintroduced (cf. Gen. 1:27). The middle of the chapter describes the site of the dramatic event (vv. 8-14), calling attention to the two critical trees in the midst of the garden (v. 9). It reports the covenant stipulations on which the decisive testing was based (vv. 15-17), here too emphasizing the probation tree (vv. 16, 17). Thus the scene with its major features — the man, the woman, and the judgment tree — is set for the fateful action related in Genesis 3.

The weekly scheme of the Sabbath ordinance portrays this overall seventh-day-bound design of lower register time while it symbolically mirrors the archetypal heavenly creation week itself.

From this overview of Genesis 2 it is evident why, in the narrative of man's creation (vv. 5-7), the origin of vegetation (and thus of trees) is intertwined with his. Also, looking back at Genesis 1, we can now appreciate the artful designing that brought the first triad of days to a climax in trees and the second triad in man, so anticipating the crucial connection of the two unfolded in Genesis 2 and 3.

Exegesis of Genesis 2:5-7

To bring out the sovereign lordship of Yahweh-Elohim in establishing the covenantal order of man in the garden, under probation with its demands and promises, both represented by trees, the account takes us back to a time before there was a man or a garden and trees. It tells us how the Lord proceeded to form the man, plant the garden, and make its trees grow.

Gen. 2:5a says that at a certain time and place within the creation process vegetation did not yet exist. The language allows that the earth as a whole is referred to but the area particularly in view might be the Eden region, on which the following narrative focuses. Absent then were all plants, whether belonging to the unpeopled wilderness or to cultivated areas.

Gen. 2:5b explains why Yahweh-Elohim had not yet produced the vegetation. Rain is needed for the preservation and growth of plants, and God had not yet initiated the rain cycle. Of course, man can compensate for the local lack of rainfall by constructing an irrigation system, but man was not on the scene either. It is the assumption underlying this explanation for the timing of the creation of vegetation that confirms the conclusion that the Genesis 1 narrative is not chronologically sequential. To this we shall presently return.

Gen. 2:6 tells of the provision of a supply of water, the absence of which had previously delayed the appearance of vegetation. Whatever the meaning of the Hebrew *'ēd* (traditionally "mist"), this verse cannot be describing another circumstance adverse to plant life (like chaotic flood waters), for the effect of the *'ēd* was beneficial watering, such being the consistent meaning of the verb *šāqâ*.[39] Verse 6 must then be relating a new development, not something concurrent with the situation described in verse 5. For otherwise verse 6 would be affirming the presence of the supply of water necessary for the survival of vegetation at the very time when verse 5b says the absence of vegetation was due to the lack of such a water supply. The context thus demands the translation: "but an *'ēd* began to rise," an inceptive meaning that is agreeable to the usage of the imperfect form of the verb employed here.[40]

The *'ēd* in verse 6 answered to the previous lack of rain in verse 5b. If the *'ēd* does not refer to rain but to some satisfactory alternative, the previous absence of that alternative should have been included in verse 5b in the listing of the missing sources of water. Indeed, if the *'ēd* solution is not equatable with the rain whose absence was the problem, the citing of the absence of rain in verse 5b would itself be stranded as an irrelevance. These considerations argue in support of the identification of the Hebrew *'ēd* with the Eblaite *i-du*, "rain-cloud."[41] Also, the one other context where *'ēd* is found is all about rain-clouds. That passage, Job 36, extols the greatness of God, who spreads the clouds abroad and sends down showers on man, so giving food in abundance (vv. 26-33). Verse 27a speaks of God's drawing forth the drops of water and then, repeating the image, the parallel clause in verse 27b adds the source from which the rain is distilled, namely the *'ēd*, apparently the rain-clouds. Similarly in Genesis 2 the originating of the *'ēd* as a watering system (v. 6) is implicitly attributed to Yahweh-Elohim by virtue of the previous tracing of the absence of that provision to his determination (v. 5b). Another Joban echo of this is heard in Job 38:25-30. Challenging Job's knowledge of storm phenomena, the Lord illustrates his own creation-wide sovereignty by the example of his provision of rain and vegetation, not just in agricultural areas but in the wilderness where no man is.

Gen. 2:5 reflects an environmental situation that has obviously lasted for a while; it assumes a far more leisurely pace on the part of the Creator, for whom a thousand years are as one day.

The springing forth of plants (at least the wild plants that need only the rain, not man the cultivator) is taken for granted in Gen. 2:6 as a consequence of the provision of the prerequisite water, a consequence occurring before the creation of man (v. 7). Even the Lord's planting of the garden with its trees (v. 8) is not to be located after the creation of man, since the form of the verb for planting can express the pluperfect.[42] In the absence of rainfall, man can dig irrigation ditches to bring the necessary water to his cultivated land,[43] and therefore, to round out the explanation of the absence of vegetation in Gen. 2:5b, the absence of man was added to the absence of rain. But once God had caused it to rain, the Eden-garden could be planted without man being yet present.

When, therefore, the creation of man is narrated in Gen. 2:7, this act is not subordinated to the theme of the production of vegetation. However symbiotic

the relationship of man and the cultivated plants, man was not made for the plants but the plants for man. The report of man's creation (v. 7) stands apart as an independent statement announcing the presence of the main party in the upcoming probationary crisis to take place in connection with the trees of the garden — the theme of the following narrative.

Genesis 2:5 and the Creation "Week"

What was the nature of divine providence during the creation "week?" More specifically, by what means did God preserve such things as he had brought into existence? Embedded in Gen. 2:5 is an answer to that question that has decisive implications for the interpretation of the chronological framework of the creation account.

Whatever uncertainty may perplex the exegesis of various details in Gen. 2:5-7, the point I am now making does not depend on the adoption of a particular interpretation of any of these details. It rests on — indeed, consists in — the simple, incontestable fact that Gen. 2:5 gives an explanation, a perfectly natural explanation, for the absence of vegetation somewhere within the creation "week."[44] Gen. 2:5 tells us that God did not produce the plants of the field before he had established an environment with a watering system, the natural, normal precondition for plant life. The assumption underlying Gen. 2:5 is clearly that a natural mode of divine providence was in operation during the creation "days."

Acts of supernatural origination did initiate and punctuate the creation process. And had God so pleased, his providential oversight of what he had created might also have been by supernatural means during that process. Gen. 2:5, however, takes it for granted that providential operations were not of a supernatural kind, but that God ordered the sequence of creation acts so that the continuance and development of the earth and its creatures could proceed by natural means. This unargued assumption of Gen. 2:5 contradicts the reconstructions of the creation days proposed by the more traditional views.

The scenario conjured by the literalists' solar-day interpretation is, in fact, utterly alien to the climate and tenor of Gen. 2:5. Within the flurry of stupendous events which their view entails, each new cosmic happening coming hard on the heels of the last and all transpiring within a few hours or days, the absence of vegetation or anything else at any given point would not last long enough to occasion special consideration of the reasons for it. Within that timeframe such a question would be practically irrelevant. Gen. 2:5 reflects an environmental situation that has obviously lasted for a while; it assumes a far more leisurely pace on the part of the Creator, for whom a thousand years are as one day. The tempo of the literalists' reconstructed cosmogony leaves no room for the era-perspective of Gen. 2:5.[45]

And in specific contradiction of the disclosure of Gen. 2:5, both the solar-day and day-age theories must assume that God used other than the ordinary secondary means in the providential sustaining and further shaping of what his creative word had called into being.

The more traditional interpretations of the creation account are guilty not only of creating a conflict between the Bible and science but, in effect, of pitting Scripture against Scripture.

We have already seen that any view that insists day four presents events chronologically later than those in day one must posit some means other than the sun, moon, and stars of day four, something extraordinary or even supernatural, to account for the effects of light and the day-night cycle mentioned in day one. It would also have to be by some such means that the vegetation whose production is described in day three was sustained apart from the presence of the normally prerequisite sun of day four. Likewise, on any strictly sequential interpretation of the narrative, the existence of all flora (day three) before any fauna (days five and six) would include extraordinary means of preservation in those symbiotic situations where the survival of a particular kind of vegetation is dependent on the activity of animal life. And of course the existence of the earth itself on day one confronts the traditional approaches with a gigantic exception to normal providential procedure. For according to them the earth would have come into existence by itself as a solitary sphere, not as part of the cosmological process by which stars and their satellites originate, and it would have continued alone, suspended in a spatial void (if we may so speak) for the first three "days" of creation. All the vast universe whose origin is narrated on day four would then be younger (even billions of years younger) than the speck in space called earth. So much for the claimed harmony of the narrative sequence of Genesis 1 with scientific cosmology.[46]

In short, if the narrative sequence were intended to represent the chronological sequence, Genesis 1 would bristle with contradictions of what is revealed in Gen. 2:5. Our conclusion is then that the more traditional interpretations of the creation account are guilty not only of creating a conflict between the Bible and science but, in effect, of pitting Scripture against Scripture. The true harmony of Genesis 1 and Gen. 2:5 appears, however, and the false conflict between the Bible and science disappears, when we recognize that the creation "week" is a lower register metaphor for God's upper register creation-time and that the sequence of the "days" is ordered not chronologically but thematically.[47] ✡

Notes

[1]"Because It Had Not Rained," *The Westminster Theological Journal* 20 (1958): 146-157.

[2]Cf. H. Blocher, *In the Beginning* (Downers Grove: InterVarsity, 1984); C. E. Hummel, *The Galileo Connection* (Downers Grove: InterVarsity, 1986); R. Maatman, *The Impact of Evolutionary Theory: A Christian View* (Sioux Center: Dordt College Press, 1993).

[3]Theological differences aside, the cosmology of mythology is analogous. Indeed, mythology may be defined formally precisely as a portrayal of human affairs in terms of a dynamic interrelating of divine and human realms.

[4]Similarly, the depths of the sea or subsurface earth metaphorically signify the infernal realm.

[5]"Heaven of heavens" (cf. Deut. 10:14; 1 Kgs. 8:27; Neh. 9:6; Pss. 115:16; 148:4) apparently distinguishes a "higher" heaven, possibly the clouds of heaven (the waters "above the heavens," cf. Ps. 148:4) or the invisible heavens.

[6]For elaboration of this theme see my *Kingdom Prologue* (privately published, 1993), pp. 31, 32.

[7]Ibid.

[8]The tabernacle and temple were so designed that both in their horizontal and vertical sectioning they also portrayed the visible register of the cosmic temple with its corresponding partitioning. Cf. my *Images of the Spirit* (Grand Rapids: Eerdmans, 1980), pp. 39-42 (hereafter, *Images*).

[9]This example thus contains the additional feature of the likeness of the lower to the upper phenomenon. Comparison of these reliefs with literary accounts of warfare as a two-level affair involving earthly conflict of nations below and divine or angelic contention in the heavens (cf. Dan. 10:12, 13, 20, 21; Zech. 9:13, 14) illustrates how these cultural media can be mutually illuminating.

[10]For a discussion of *bĕrēšît*, see below.

[11]See further W. P. Brown, *Structure, Role, and Ideology in the Hebrew and Greek Texts of Genesis 1:1-2:3* (Atlanta: Scholars Press, 1993), p. 102, n. 12.

[12]The same question arises in Exod. 20:11. On this, see the discussion of the phrase "the heavens and the earth" below.

[13]If one does so insist, then recognition of what Proverbs 8 reveals about *bĕrēšît* in Gen. 1:1 would compel adoption of some variety of the discredited gap theory to account for the earth in Gen. 1:2.

[14]Cf. the observations of A. Heidel, *The Babylonian Genesis* (Chicago: U. of Chicago Press, 1963), p. 91.

[15]On the common use of avian imagery for deity in the ancient Near East see my "The Feast of Cover-over," *Journal of the Evangelical Theological Society* 37 (1994): 497, 498 (hereafter, "Cover-over"). Cf., e.g., in pharaonic nomenclature the Horus (or *serekh*) name.

[16]For an extensive treatment of this see my *Images*.

[17]Cf. *Images*, pp. 22, 23.

[18]This alternating sequence of heavenly and earthly scenes is similar to the pattern of the prologue to Job. The similarity is not just formal, for in each case what takes place in the lower register is determined by the sovereign word of God revealed in the heavenly council.

[19]Space and time are conceptually correlative in the Sabbath. In our analysis of the time coordinate of this cosmological charting the Sabbath will be given closer consideration.

[20]This will be spelled out in our discussion of the replication relationship of the two registers. Evidence will appear there for preferring the kingdom-king analysis of the themes of the two triads over something more general, like regions and their occupants or habitations and inhabitants.

[21]Cf. my "Cover-over."

[22]Cf. my *Images*.

[23]These data also attest further to the parallelism between the successive members of the two triads of days.

[24]Following nineteenth century theologian W. G. T. Shedd, C. J. Collins identifies the creation days as an anthropomorphism, part of an extended anthropomorphic portrayal of the Creator as the worker-craftsman; cf. "How Old Is The Earth? Anthropomorphic Days in Genesis 1:1-2:3," *Presbyterion* 20 (1994): esp. 117, 118 (herafter, "How Old"). As over against the literalists, this is moving in the right direction. But the explanation needs adjustment, for not all the metaphors used of God are anthropomorphic (cf., e.g., the avian image in Gen. 1:2) and some of them refer to heavenly realities other than God. It is rather a matter of two-register cosmology and an archetype-ectype relationship between the entire two registers in both their spatial and temporal dimensions.

[25]I would agree that this is in fact a correct view of the day one situation, but not that that situation was before day four.

[26]For a recent example, cf. Collins, "How Old," p. 123, n. 55.

[27]A recent case is D. L. Roth, "Genesis and the Real World," *Kerux* 9 (1994): 30-54.

[28]The role of ruling cannot be isolated as a new function distinct from those mentioned in day one. In Gen. 1:18 ruling the day and night is explicated as dividing the light from the darkness (equivalent to dividing the day from the night, v. 14).

[29]A pluperfect rendering of the *wayyiqtol*-form introducing this section is grammatically defensible, precisely because it begins a paragraph, and that would bring out the true temporal relationship of Gen. 1:14ff. to what immediately precedes. But though this would establish my thesis without more ado, I would retain the translation, "And God said (v. 14) ... and God made" (v. 16) in order to preserve the picture of seven successive days, leaving it to the other available evidence to demonstrate the figurative nature of this picture and the dischronologized sequence of the contents of the days.

[30]Note also that the presence of this divine Luminary puts an end to the cycle of day and night instituted on day one (Rev. 22:5).

[31]On this, see below.

[32]Indeed, in line with the anthropic principle, the original system would necessarily have been virtually the same as its replacement. Cf. R. Maatman, *The Bible, Natural Science, and Evolution* (Sioux Center: Dordt College Press, 1970), p. 111; A. Lightman, *Ancient Light* (Cambridge, Mass.: Harvard U. Press, 1991), pp. 117-121.

[33]This conclusion is required by Exod. 20:11, particularly if the "heaven" it refers to as being made during the "six days" includes the invisible heavens, whose formation, unlike that of the earth, was exclusively within "the beginning."

[34]Cf. my *Kingdom Prologue*, pp. 22-25.

[35]The issue of creation-consummation eschatology is theologically crucial, for bound up with it is the Bible's doctrine of the covenant with its decisive probationary crisis and the principle of federal representation.

[36]For a discussion of the Sabbath as a creation ordinance, see my *Kingdom Prologue*, p. 50.

[37]Ibid., pp. 51, 52.

[38]Cf. ibid., pp. 6, 7.N

[39]Ancient Near Eastern cosmogonies contain the motif of an absence of water that is subsequently remedied, with fruitful fields resulting. Examples are the Sumerian myth of *Enki and the World Order* and the Akkadian *Myth of Anzu*. For discussion see R. J. Clifford, *Creation Accounts in the Ancient Near East and in the Bible* (Washington, DC: The Catholic Biblical Association of America, 1994), pp. 34f., 84.

[40]See the discussions of preterital *yiqtol* in P. Joüon and T. Muraoka, *A Grammar of Biblical Hebrew* (Rome: Pontifical Biblical Institute, 1993), pp. 368-9 and of incipient past non-perfective in B. K. Waltke and M. O'Connor, *An Introduction to Biblical Hebrew Syntax* (Winona Lake: Eisenbrauns, 1990), pp. 503-4. Cf. S. R. Driver, *A Treatise on the Use of the Tenses in Hebew*[2] (Oxford: Clarendon, 1881), pp. 27, 36ff. Suggested examples, besides cases involving stative verbs, include Gen. 37:7; Exod. 15:5, 12, 14; 2 Sam. 15:37 (cf. 16:15); 1 Kings 7:7, 8; Jer. 6:14.

[41]Cf. M. Dahood, "Eblaite *i-du* and Hebrew *'ēḏ*, 'Rain Cloud,'" *Catholic Biblical Quarterly* 43 (1981): 534-38. Other suggested etymologies for *'ēd* produce meanings like flood or subterranean rivers, which break through and water the surface. On such interpretations (and on the rain-cloud view too) the *'ereṣ* from which the *'ēd* ascends could be the deeps beneath the earth (cf. Exod. 15:12).

[42]Compare the similar grammatical-compositional situation in Gen. 2:19, which surely does not intend to suggest that the animals were made after the creation of Adam and his experience in the garden described in verses 7-18.

[43]This is a function of mankind featured in the ancient cosmogonies.

[44]One thing showing that the situation described is within the six-day era is that man was not yet present. My essential contention is not affected whether the lack of vegetation mentioned be earth-wide or local (the Eden area) and no matter to which "day" the vegetationless situation pertains.

[45]Endorsing my argument as originally published, H. Blocher examines the criticism of it by E. J. Young (*Studies in Genesis One* [Philadelphia: Presbyterian and Reformed, 1964], pp. 58-65) and concludes that Young "misses the main point" (*In the Beginning*, p. 56, n. 56).

[46]Some of these problems of sequence (but not the major one involving days one and four) would be resolved by a variation on the day-age view which allows that the days may overlap. The idea is that while what is described as happening on a given day must have begun to happen before the next day's developments began, the completing of the earlier day's creative work would have overlapped the activity of subsequent days. This contrived interpretation not only fails to salvage the chronological sequence even in the compromised overlapping form proposed, but it actually amounts to a virtual acknowledgment that chronological sequence yields to thematic interests in the ordering of the days.

[47]In this article I have advocated an interpretation of biblical cosmogony according to which Scripture is open to the current scientific view of a very old universe and, in that respect, does not discountenance the theory of the evolutionary origin of man. But while I regard the widespread insistence on a young earth to be a deplorable disservice to the cause of biblical truth, I at the same time deem commitment to the authority of scriptural teaching to involve the acceptance of Adam as an historical individual, the covenantal head and ancestral fount of the rest of mankind, and the recognition that it was the one and same divine act that constituted him the first man, Adam the son of God (Luke 3:38), that also imparted to him life (Gen. 2:7).

The Creation of Man and the Evolutionary Record

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If we ask the question, "What if Genesis 1:1-2:3 resembled the evolutionary record?", we can avoid the pitfall of concordantism and search for perspectives which allow us to artistically render a resemblance between the Creation story and the currently postulated evolutionary record. The purpose of this article is to reiterate a recently published perspective that presented a comparison between the six days of creation and six epochs of the evolutionary record. This paper will also apply that perspective in a comparison between Genesis 1:26-30, which depicts the creation of man, and hominid evolution as described by recent scientific publications.

Christian writers throughout the ages have communicated the feeling that the creation story (Gen. 1:1-2:3) expresses both physical and moral truth.[1] Today, such a feeling runs counter to the modern ideal which separates moral and physical meaning, then denies physical meaning to Genesis. Consequently, Christian thinkers have explored new approaches to reestablish physical meaning to the creation story. One approach has been the *concordantist* view, which holds that the Genesis account conveys scientific or natural knowledge.[2] William Stokes's *The Genesis Answer* and Hugh Ross's *The Fingerprint of God* are examples.[3] For some, these comparisons are far from convincing. Why? Concordantists seem to be contemplating the question: What if evolutionary history resembled the creation story? When theory and data from scientific journals do not correspond to a particular reading of the Genesis text, theologically "scientific" descriptions are presented as alternatives. Unfortunately, this sword cuts both ways; opponents use scientific descriptions as evidence against God's creating power.[4]

Are there other ways to recover physical meaning in the creation story? One pathway is to invert the concordantist view and ask: *What if the creation story resembled evolutionary history?* This question opens the door for believers to aesthetically compare these two "origin stories" from novel perspectives. A perspective previously developed presents a comparison between the six days of creation in Genesis and six epochs of the currently proposed evolutionary record.[5] This paper will reiterate that perspective and extend the comparison to include a resemblance between the Genesis account of the creation of humankind (Gen. 1:26-31) and hominid evolution as described by recent scientific publications.

Perspective: Appreciating the Creation Story as Modern Poetry

The creation story is anything but modern poetry. However, nothing restricts us from appreciating the "poetic" creation story from a point of view where poetry is not bound by form. The modern regards poetry as a confluence of visualization and allusion. Visual phrases call to mind images. Allusions point to something familiar, such as a work of art, a feeling, or an ideal. Visual imagery and allusions flow together generating and connecting images and ideals, scenes and emotions, and visions and meanings.

The modern approach to poetry provides a tool for analyzing the Genesis account while contemplating the evolutionary record. Phrases in Genesis may be classified as visualizations and/or allusions. Let us consider visualizations first. Visual phrases call to mind images that may be compared to phenome-

nal features of the evolutionary record. At the same time, phenomenal features of the evolutionary record may "key into" visual phrases in Genesis. For example, day two describes *waters separating from waters*. This could correspond to many different images, except *God declares the water above the dome to be Heavens*. This leads one to imagine an era where the earth separated from the sky. Roughly, *waters separating from waters* resemble the accretion of the planet earth.

The epochs that correspond to each *day* cannot be arbitrary. The creation story presents a distinct sequence of *days* and the evolutionary record may be described as a sequence of *epochs*. This allows us to construct a correspondence from a few starting points. For example, the accretion of the planet earth was followed by, among other things, the formation of the earth's oceans and the appearance of the earliest continental crust. Day three contains phrases such as *"Let the dry land appear"* which resemble early continent formation. The progression from day two to day three images the progression from planetary accretion to continent formation. In this manner, we can identify a sequence of six epochs, with each epoch containing features which generally "match" visual phrases in each Genesis day. These epochs are listed in Table I.

Once six epochs have been bracketed, visualization and comparison reinforce each other until two incongruities become apparent. First, visualizations resemble features of various eras only from certain points of observation. For example, *the appearance of dry land* at the start of the third day resembles the initiation of continent formation (early Archean) only for an observer near the surface of the earth. Second, each Genesis day contains phrases which are not images or which present images that do not match the corresponding epoch. For example, images of *plants yielding seed* at the end of day three do not match the evolutionary era corresponding to the start of day three. Land plants appeared long after early continent formation. Consequently, descriptive phrases at the end of day three resemble the early Archean only if the phrase, *plants yielding seed*, is regarded as something other than a visualization. But if the phrase is not a visualization, what is it?

The phrase *plants yielding seed* may be regarded as an allusion. Besides continent formation, the early Archean marks the beginning of life which was photosynthetic (*vegetative*) and DNA mediated (*bore according to its kind*). Early life shares both phenomenal and essential features with plant life, and in this sense may be said to be the forebear of today's vegetation. In this, we can see that the *creation of vegetative life* at the end of day three resembles the early Archean. Consequently, the phrase *plants yielding seed* may be alluding to the relevance of this evolutionary epoch to humanity. The allusion connects events that took place during the early Archean with something that everyone can readily identify with.

Genesis phrases which are not visual or which present images that do not match the corresponding era may be classified as allusions. Like the allusion to plant life in day three, these phrases seem to convey, in readily understood terms, the importance of each corresponding evolutionary era to humanity. Allusions include: in day one, *God called the light Day*; in day two, *God called the firmament Heaven*; in day three, *God called the dry land Earth* and *God created plants yielding seed and fruit trees bearing fruit*; in day four, the creation is to *separate the day from the night and be for signs and for seasons and for days and years*; in day five, *God blessed* the creation *saying, "Be fruitful and multiply."*

The dictionary definition of the word *allusion* is "indirect reference." When used in literature, an allusion points from the dramatic episode at hand to another "situation," typically, a story or character in another work of art. This leads us to expect that allusions should point from the creation story to another work of art. Phrases classified as allusions play on our expectations. These phrases point from

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the evolutionary record to humanity. The evolutionary record is the "dramatic episode at hand." Humanity is the "work of art." In a sense, allusions answer the question, "How does this epoch relate to me?" In this, allusions may be seen as both paradoxical and meaningful. They are paradoxical because they point from the evolutionary record instead of the Genesis text; and they point to humanity as the pre-existing work of art. They are meaningful in that they relate the importance of each evolutionary epoch to humanity.

The acknowledgment of allusions resolves the two incongruities associated with a comparison between visual phrases in each *day* and features of a corresponding evolutionary *epoch*. First, phrases which are not visualizations or which present images that do not match the corresponding epoch may be classified as allusions. Allusions are meaningful in that they paradoxically relate the importance of the corresponding evolutionary epoch to humans. Second, allusions provide the perspective for an "observer" in connection with visual phrases. For example, in day four, allusions place the observer on the surface of the planet. Where else are *day and night, signs (for festivals) and seasons* celebrated? From this point of view, the creation of the sun, moon, and stars resembles an evolutionary epoch following the earliest appearance of continents and of life.

In summary, the modern definition of poetry as visualization and allusion allows us to look at the creation story from a new perspective, while also contemplating the evolutionary record. We have looked for a sequence of epochs in the evolutionary record which "key into" visual phrases in the sequence of Genesis *days*. Once we outlined a sequence of epochs, we found phrases in each *day* which were not visual or which presented images that did not resemble the corresponding epoch. We classified these phrases as allusions and found that allusions from each *day* had something in common: Allusions appear to relate the importance of the corresponding epoch to humanity. This perspective was used to present a comparison between the six days of creation and the evolutionary record. Now, this perspective will be extended to the creation of man and hominid evolution.

Table I. Comparison of A Genesis Day to An Evolution Epoch

Day	Corresponding Evolutionary Period
One	Formation of solar system and ignition of sun
Two	Accretion of planet earth
Three	Appearance of continents and the earliest life which was photosynthetic and propagated through DNA
Four	Reduction of greenhouse effect by weathering of continental rock and the transformation of the atmosphere by photosynthesis from anoxic to oxidative
Five	The beginning of the eukaryotes to the end of the age of dinosaurs
Six	The age of mammals

Applying the Perspective to Genesis 1:26-30

Because the creation of man is so compact, allusions will be identified as phrases that relate the importance of the corresponding epoch to humanity. Consequently, one phrase may be classified as both visualization and allusion.

Anthropologists today propose a distinct sequence of developments in human evolution: roughly speaking, first the feet (walking apes); then stone tools and speciations to prehuman (as seen by a more human-like cranium); then better tools and territorial expansion; then speciation to anatomically modern humans (among others); then innovative tools and artistic cultural expression; then the end of the ice age, leading to domestication of plants and animals (separately); then stockbreeding; then complex society and prehistory; then civilization and history.[6] Although details of geography and timing may change in the future, this sequence will probably remain unaltered.

Does the Genesis account of the creation of humanity resemble human evolutionary history? The account is composed of five movements, each corresponding to a verse from Gen. 1:26-30. The goal of this paper is to examine each verse in relation to the above sequence of eras. Each verse will be quoted from the *Revised Standard Version of the Bible*. Visualizations will be printed in italics. Allusions will be underlined. After a brief discussion of the Genesis text, we will review recent publications on human evolution. Then visualizations and allusions will be examined again while contemplating the evolutionary record. The comparison yields a recognizable resemblance between the Genesis account of the creation of man and the human evolutionary record.

Verse 26: The "Intention of Man" and Early Hominid Evolution

(26)Then God said, "*Let us make man* in our image after our likeness; and *let them have dominion* over the *fish* of the sea, and over the *birds* of the air, and over the *cattle*, and over all the earth, and over *every creeping thing* that creeps upon the earth."

God declares his intention to create humanity. The declaration is found in day six, which resembles the age of mammals. If the declaration is regarded as an act, then we are inspired to examine eras and species ancestral to *Homo sapiens* for something resembling an *intention of man*. To some extent, we can visualize this *intention of man* from our own appearance. For one, we expect "him" to walk. At the same time, the declaration may be considered an allusion, *man was intended to be created*, which relates the importance of the epoch and sets the stage for visual phrases. The visual phrases concern *dominion over animals*, probably referring to diet. The *intention of man* ate meat. Strangely, the juxtaposition of ancestors and meat eating calls to mind a key concept in the scientific search for human origins. Anthropologists propose that diet has been a major factor in the behavior and evolution of the primates.[7] For example, chimpanzees in the wild use tools to obtain food.[8]

Two important evolutionary sciences explore the origins of humanity: physical anthropology and molecular biology. I will concentrate on the work of physical anthropology (and archaeology), which studies fossil evidence of human evolution, and mention the results of molecular biology later.

Many anthropologists believe that humans evolved feet first.[9] Footprints remarkably similar to human footprints were found in hardened volcanic ash dating between 3.8 and 3.6 million years ago (Myr).[10] Alterations in habitat due to climatic changes in eastern Africa may have been the impetus for walking as an adaptation.[11] The earliest fossil evidences for walking primates (hominids) were found in Africa and date between 2.9 and 3.8 Myr. In 1979, Donald Johanson and Tim White proposed a new taxon, *Australopithecus afarensis*, to accommodate these Pliocene hominid fossils,[12] which may have been ancestors to later hominids.[13] *Australopithecus* means "southern ape."

What were *Australopithecus* like? *A. afarensis* walked. They also possessed an array of features characteristic of tree climbers.[14] Their diet was mainly vegetarian, similar to present day gorillas.[15] The brain size of a contemporaneous fossil walking ape, *A. africanus*, was about 440 cm^3, closer to the chimpanzee (about 400 cm^3) than the human (about 1500 cm^3).[16] Like many other primate species, they exhibited sexual dimorphism: the males were large and females small.[17]

Hominid fossils with a more human (or less ape-like) cranium appeared over a million years after the earliest *A. afarensis* fossil. These were classified as two species within the human genus (*Homo*). The earliest fossil crania representative of the highly heterogeneous taxon, *Homo habilis*, date to 1.8 Myr.[18] Earlier dates (of 2.5 Myr) have been given to recent finds of mandibles which may be classified *H. habilis*.[19] The earliest fossil crania of the other taxon, *Homo erectus*, date between 2 and 3 Myr.[20] The relationship between the two species is still debated.[21] The species differ physically and in territory. *Homo habilis* exhibits more australopithecine features than *H. erectus*. *H. habilis* fossils have been found only in Africa. The earliest *H. erectus* fossil crania have been found in both Africa and Java.[22]

God declares his intention to create humanity in day six, which resembles the age of mammals.

The discovery that *H. erectus* in Java has the same radiocarbon date as *H. erectus* from Africa may lead to a reevaluation of the current proposal of "late" migrations of *H. erectus* out of Africa into Eurasia. But this reevaluation will not change the overall picture of the emergence of hominid species similar to humans almost two million years ago. Though both *Australopithecus* and *Homo* walked, the former is considered an ape and the latter human enough that anthropologists agree that they belonged to our genus. What were some features which inspired anthropologists to draw this conclusion?

H. habilis and *H. erectus* exhibited a higher level of brain size and organization compared to Australopithecus.[23] Leslie C. Aiello and R. I. M. Dunbar, anthropologists at University College London, proposed one behavioral implication of increased brain size. They first demonstrated that increased neocortex size correlated with larger groups in primates. They concluded that the larger brain of *H. habilis* and *H. erectus* implied larger groups. Since primates maintain social cohesion by grooming, increased group size would have posed problems. Over 20%

of waking hours would have been spent grooming. Aiello and Dunbar proposed that with *Homo*, vocal and gestural communication began to replace grooming. This adaptation set the stage for the evolution of human language capabilities.[24]

H. habilis and *H. erectus* probably used stone tools. The earliest and most primitive stone tools are called Oldowan and date as far back as 2.5 Myr. These tools give anthropologists insight into their diet. Oldowan tools could have been used to skin carcasses and break fat-laden bones of already scavenged animals.[25] Evidence for scavenging has been found in cut and percussion marks, characteristic of stone tools, on fossil animal bones dating between 2.0 and 1.6 Myr.[26] An advance in stone tool sophistication called Acheulean, dating from 1.9 to 1.3 Myr, has been associated with H. erectus.[27] Later *H. erectus* carried this distinctive set of tools out of Africa into western Eurasia.[28]

In summary, the first hominid to appear was australopithecine over 3 Myr. Between 2 and 1 Myr, several species of *Australopithecus* and two species of *Homo* coexisted in Africa. *H. habilis* and *H. erectus* exhibited features which inspired anthropologists to classify them as belonging to the human genus. *H. erectus* (early specimens often labeled *H. ergaster*) is the only hominid species found outside Africa. After 1 Myr, the range of *H. erectus* included much of Eurasia.[29] For example, the oldest *H. erectus* fossil found in China dates to 800 thousand years ago (kyr).[30] Regional populations of *H. erectus* were precursors to later developments in the *Homo* lineage.

H. habilis and H. erectus ... are the earliest hominid species in the fossil record showing the possibility of "human-like" behavior and providing evidence of meat eating.

Turning from this synopsis of hominid evolution back to Gen. 1:26, note how the declaration of intention, *God said, "Let us make man ... ,"* combines with *"let them have dominion over fish ... birds ... cattle, every creeping thing."* This combination resembles phenomenal features of hominids of the *Homo* genus. *H. habilis* and *H. erectus* are ancestral species (if not directly, at least as species related to human ancestors). They are the earliest hominid species in the fossil record showing the possibility of "human-like" behavior and providing evidence of meat eating. The motion towards humanity declared in Gen. 1:26 resonates with physical evidence for *H. habilis* and *H. erectus'* larger brain size, stone tools, and the use of stone tools for scavenging meat (and later, hunting). In addition, the phrase, "Let us make man in our own image," may be considered an allusion, because the phrase points out the importance of the evolutionary epoch to humanity.

Verse 27: The Creation of Man and Late Hominid Evolution

(27) *So God created man in his own image, in the image of God he created him; male and female he created them.*

After the declaration of intention, God creates humanity. This portrayal inspires us to review a wave of speciation events within the regional populations of *H. erectus*, that led to (among others) *H. sapiens sapiens* and *H. neandertalis.*

The dispersal of *H. erectus* from Africa (and Java?) into Eurasia established partially isolated regional populations throughout the Old World. *H. erectus* remained remarkably stable for hundreds of thousands of years after these early dispersals. For example, the range of dates for *H. erectus'* fossils from Zhoukoudian in China extends from 430 to 200 thousand years ago (kyr).[31] Zhoukoudian *H. erectus* is notably similar to finds from Africa and Java dating over a million years earlier.

How later species of the *Homo* genus emerged from these populations has been a topic of heated debate.[32] Research has focused on Africa, Europe, and China. Gunter Brauer labeled three grades for changes in *H. erectus* starting about 400 kyr. These grades are "early archaic *Homo sapiens*," "late archaic *Homo sapiens*," and "anatomically modern humans."[33] The first two grades show regional variation. For example, early archaic fossils found in Atapuera Spain, dating to over 300 kyr, are distinct from similarly dated fossils unearthed in Yunxian China.[34] The Atapuerian hominids bear features common to *H. erectus, H. sapiens*, and *H. s. neandertalis* and the Yunxian fossils to *erectus* and *s. sapiens*. Despite strong similarities to anatomically modern humans, *H. s. neandertalis*, known as Neanderthals, are classified as late archaic and ranged throughout Europe from 130 to 35 kyr.[35] In China, non-Neanderthal late archaic fossils date between 300 and 83 kyr. The first anatomically modern human fossil found in China dates to 67 kyr.[36] Early and late

archaic *H. sapiens* fossils are typically associated with stone tools bearing strong continuity with the Acheulean "tool kit."[37]

The earliest evidence for anatomically modern humans has been found in southwest Asia (Near East or Levant) dating between 100 and 92 kyr.[38] Sites on Mount Carmel, Israel reveal a curious alternation in strata between anatomically modern humans and Neanderthals, which lead to the conclusion that only one type occupied the site at a time. The alternation suggests that two subpopulations evolved outside the Levant and coexisted in different regions of the Old World for thousands of years.[39] Both subpopulations used Mousterian stone tool technology, an Acheulean-like tool kit associated with Middle Paleolithic Neanderthal sites in Europe.[40]

Outside southwest Asia, fossils of anatomically modern humans were found at Border Cave, South Africa and date to between 80 and 70 kyr. Border Cave also yielded the first indication of a new stone tool technology similar to the blade technology of Upper Paleolithic Europe. Dates for Howiesons Port lithic industry range from 75 to 45 kyr.[41] To anthropologists Ofer Bar-Yosef and Bernard Vandermeersch, the biological appearance of anatomically modern humans cannot explain the technical and cultural revolution of the Late or Upper Paleolithic.[42]

Little or no archaeological evidence of "culture" dates to [the] first appearance of humans. Evidence for culture becomes abundant tens of thousands of years later.

Perhaps it is noteworthy to mention the contribution of molecular biology to deliberations on the evolution of *H. s. sapiens*. Briefly, the strong "out of Africa" hypothesis proposed in 1987 by Rebecca Cann, Mark Stoneking, and Allan Wilson (at the Universities of California at Berkeley and Hawaii at Honolulu)[43] has been discredited.[44] However, the same data are now being used with different statistical treatments to support a weak "out of Africa" hypothesis, which posits that modern humans appeared as a subpopulation of *H. erectus* and spread slowly over tens of thousands of years. Later, separated daughter populations bearing blade stone tool technologies expanded, producing the African Late Stone Age and the European Upper Paleolithic.[45]

Both fossil evidence and studies in molecular biology support the hypothesis that anatomically modern humans first evolved as a small population in Southwest Asia or Eastern Africa, then, tens of thousands of years later, underwent cultural revolution and population expansion.[46] Verse 27 resembles the first step, the evolution of anatomically modern humans. The visual phrases, *So God created man* and *male and female he created them* image the nondescript appearance of humans. The allusion, *God created man in his own image*, relates the importance of this evolutionary epoch. Humans are fully human at this time. However, little or no archaeological evidence of "culture" dates to this first appearance of humans. Evidence for culture becomes abundant tens of thousands of years later. The Genesis blessing in verse 28 echoes the later population expansion and the brilliant cultural innovations of the Late Paleolithic.

Verse 28: The Blessing and the Late Paleolithic

(28) And God blessed them, and God said to them, "*Be fruitful and multiply*, and *fill the earth and subdue it*; and *have dominion over* the *fish* of the sea and over the *birds* of the air and over *every living thing that moves* upon the earth."

What does God's blessing of humans imply? Many descendants? Material prosperity? Divine favor? Greater spiritual awareness? We can view this allusion, *God's blessing*, many ways. The allusion sets the stage for considering visual phrases which call to mind territorial expansion, population growth, material advance, and an emphasis on hunting. Evidence for all of these belong to the Late Paleolithic. But that is not all.

Territorial expansion of anatomically modern humans probably began soon after *H. s. sapiens* evolved. The early age of expansion is attested to by the fact that the axis for the largest component of total human genetic variation runs from east to west.[47] Daughter populations expanded again thousands of years later. Humans arrived in Australia as early as 50 kyr.[48] Humans became common in (then frozen) Europe by 35 kyr.[49] Paleolithic people colonized the Americas around 12 kyr.[50]

The extensively investigated transition from Middle to Upper Paleolithic in Europe may serve as an example of the latter expansion. The transition confounds two events: a change from Mousterian to blade stone tool technologies and the respective appearance and disappearance of human and Neanderthal fossils.[51] Although the simplistic equation

of technology and hominids has been abandoned, it remains that no Neanderthal fossils date later than 33 kyr.[52] Anthropologist Jared Diamond labeled the cultural florescence following human settlement in ice age Europe as "The Great Leap Forward."[53] Jewelry was made by 30 kyr and Venus figurines between 27 and 25 kyr. Siberia was colonized around the same time. The earliest needle yet found dates to 23 kyr, along with the earliest bow and arrow. A 17 kyr harpoon and 15 kyr cord have been found.[54]

In summary, the Late Paleolithic era is known for population expansion and cultural innovation world wide. Gen. 1:28 resembles this era. Humans *multiplied* and *filled the earth.* The phrase, *subdued the earth,* images cultural strategies adopted to overcome physical constraints. Bamboo boats may have been used in sea crossing to Australia.[55] Warm clothing and effective hunting tools were needed to settle ice age Europe. *Dominion over that which can be hunted* resembles the Cro-Magnon food strategy.[56]

But that is not all. In Gen. 1:27, *God creates humans in his own image.* Gen. 1:28 fulfills the preceding verse just as the Late Paleolithic era fulfills the potential of the earliest populations of anatomically modern humans. A creature created *in the image of God* calls to mind "something in nature acknowledging something beyond nature." This image resembles expressions of spirituality found in Upper Paleolithic art, ceramics, and burials.

The Late Paleolithic era is known for population expansion and cultural innovation world wide. Gen. 1:28 resembles this era.

There is no doubt that the humans of the Late Paleolithic were aware of "something beyond nature." For example, Bohyslav Klima unearthed a bizarre triple burial of two males and a female. The two males were murdered. The female was highly deformed. The arrangement of the bodies gives the impression that the three were laid out to reenact a real life drama of the woman giving birth. Red ochre was concentrated below the female's pelvis.[57] The earliest ceramic artifacts from Czechoslovakia are equally evocative. The firing and exploding of figurines may have been the prime function of their manufacture.[58] We may never know the intent of the burial or the practice of exploding figurines, but many anthropologists are guessing. The phrase *image of God* taps into important themes of this literature.[59]

Verse 29: The Giving of Plants to Humans and the Epipaleolithic/Archaic Neolithic

(29)And God said, "Behold, *I have given you every plant yielding seed* which is upon the face of all the earth, and *every tree with seed in its fruit; you shall have them for food.*"

In this verse, we can visualize *God giving plants to humans for food.* At the same time, the phrase alludes to the importance of the following evolutionary era to humanity. While plants may have been part of the Paleolithic diet, animals seemed to be more important. Late Paleolithic tools were designed for hunting. Late Paleolithic art represented animals and hunting scenes. However, the Late Paleolithic era came to a close at the end of the last "episode" of glaciation. Due to the nature of the earth's orbit, the current ice age has been periodically interrupted by passages of relative warmth, called interglacials.[60] The current interglacial ushered in ecological change in southwest Asia over 10 kyr ago.[61] The change established the conditions for a new era in human development, marked by an increased reliance on plants for food.[62]

The Fertile Crescent, a swath of land which includes the present states of Israel, Jordan, Syria, northern and eastern Iraq, and western Iran, has been the focus of research investigating the origins of agriculture and complex society.[63] Several large mounds or "tells" have been excavated. These excavations have provided enough information to overthrow the familiar one-step "Neolithic Agricultural Revolution" proposed in the 1960s.[64] What emerges is a picture of cultural development which may be broadly described as two-step: containing the Epipaleolithic and Archaic Neolithic in the first step and the Developed Neolithic in the second step.[65]

The Epipaleolithic means the replacement of mobile hunting and gathering societies by sedentary intensive collectors.[66] By 14 kyr, culturally diverse sedentary villages were common throughout the Fertile Crescent, at locations particularly rich in flora and fauna. Around 12.5 kyr, a new adaptive food gathering strategy appeared within the Mediterranean hill-zone of the Levant. The strategy emphasized the collection of wild cereals and nuts, which were later processed by mill stones. Originally, cereals were confined to rich soils at low elevation. When they colonized hill zones (with the aid of humans), they began to show characteristics of current domesticated grain. The new "gathering and sowing" strategy was practiced by a wide ranging village

culture known as the Natufian and would not have been possible but for the coincidence of increasing seasonality and Epipaleolithic ingenuity.[67]

The Natufian culture began as Epipaleolithic and ended as Archaic Neolithic, when stone tools became common for harvesting and grinding grain. Domesticated grain has been found along with these tools. The Archaic Neolithic may be regarded as the cultural product of reliance on plant cultivation. Villages were the centers of cultural activity. The diet included domesticated plants and hunted or semi-domesticated animals, such as goats and gazelles.

Gen. 1:29 ... resembles the Epipaleolithic and Archaic Neolithic eras, when plants were first systematically relied on and cultivated as a food source.

The excavation of Tell Abu Hureyra in Syria by a team led by Andrew Moore may serve as a specific example of the newly formulated two-step "Agricultural Revolution."[68] The first occupation of the site was almost Epipaleolithic and consisted of pit dwellings with reed roofs. The dwellings were temporary. Stone pestles and milling stones were used to process anatomically wild cereals. Blades, which could have been used for hunting or as part of a sickle, were common. Animal bones ranged from rabbit to onager, with gazelle most common. Freshwater mussel and fish came from nearby Euphrates River. The site was abandoned, then resettled hundreds of years later by an Archaic Neolithic culture practicing agriculture. This culture was labeled Pre-Pottery Neolithic B (PPNB). The economy rested on the cultivation of cereals and pulses. They may have used irrigation in the form of diverted streams. Gazelle, sheep, and goat were common initially. These were probably herded. Later, the number of gazelles declined and the number of sheep and goats increased proportionally. This transition marked the start of the Developed Neolithic, when animals were truly domesticated. Cattle and pigs were added to the settlement's herds early in the sixth millennium BC (8 kyr).

Now, let us examine Gen. 1:29, *plants are given to humans for food.* This divine act resembles the Epipaleolithic and Archaic Neolithic eras, when plants were first systematically relied on and cultivated as a food source. Animals were also cultivated, in that they were herded, but the connection between agriculture and animal husbandry had yet to be achieved. That achievement is the hallmark of the Developed Neolithic and is the real innovation behind the second step of the "Neolithic Agricultural Revolution."

Verse 30: The Giving of Plants to Animals and the Developed Neolithic

(30) And *to every beast* of the earth, and to every *bird* of the air, to *everything that creeps* on the earth, to everything that has the breath of life, I have given every green plant for food.

According to archaeologist Frank Hole, goats, sheep, and cattle were probably first domesticated on the margins of the Fertile Crescent, in Anatolia (cattle) and the foothills of the Zagros Mountains (goats and sheep). Domestication implies a willingness and an ability to provide fodder. The introduction of domesticated animals into the Levant occurred rapidly, as seen in the PPNB of Tell Abu Hureyra. An increase in the number of PPNB sites in the Levant followed that introduction. Advances in farming and stock raising techniques contributed to unprecedented population growth during the Developed Neolithic.[69] The new economy and the population expanded from the Fertile Crescent into Europe and Asia. The Neolithic expansion accounts for the largest principal component of regional genetic variation in Europe and in Asia.[70]

Gen. 1:30 resembles the essence of the productive economy of the Developed Neolithic, an economy which thrives today: *Give fodder to the animals.* It is noteworthy to mention here that the Developed Neolithic in the Fertile Crescent gave rise to complex societies which produced the world's first civilization, the Sumerian.[71]

A Note on Genesis 1 and 2

This rendition of a resemblance between the creation of man and the human evolutionary record eerily dovetails into the next origin episode in Genesis. Gen. 1 abruptly ends with a single sentence which keys into the Developed Neolithic. The second origin story in Genesis, the story of Adam and Eve (Gen. 2:5 on), also keys into the Developed Neolithic of the Fertile Crescent.[72] The creation story, written in the P (or priestly) style, portrays a sequence of events which could not have been observed by a human. At no point in the story is an individual human mentioned. On the other hand, only the first few lines of the story of Adam and Eve, written in the J (or Yahwist) style, depict an origin. These lines

serve to set the scene for the subsequent human drama. Because of this, we can imagine the origin in the story of Adam and Eve as an origin which was witnessed in this locale.[73] The context of the creation story is cosmological. The context of the Adam and Eve story is anthropological. In this, the transition from Gen. 1 to Gen. 2 stunningly mirrors the transition from prehistory to history that occurred as village cultures of the Developed Neolithic gave way to complex society, then civilization.

Conclusion

Gen. 1:26-30, contemplated from the perspective of poetry, has been compared to current scientific ideas and data concerning human evolution. Modern poetry may be defined as the confluence of visualization and allusion. The Genesis text was examined in terms of visual phrases and allusions while regarding the evolutionary record. The resulting comparison renders a striking resemblance between the Genesis account of the creation of humanity and current scientific proposals on hominid evolution. The comparison is summarized in Table II.

From the earlier comparison of the six days of creation and the evolutionary record, allusions were found to paradoxically relate the importance of a corresponding evolutionary epoch to humanity and to set the point of observation for visual phrases. We applied this finding to a comparison of Genesis and the human evolutionary record. Consider the sequence of allusions: *God intends to create humans; God creates humans; God blesses humans; God gives plants for food to humans; God gives fodder to animals.* Each allusion paradoxically relates the importance of an era of hominid evolution and sets the stage for imaging visual phrases. For example, *dominion over animals* for the *intention of man* may be visualized as simply eating meat, in this case, scavenging. After all, intention is not creation. *Dominion over animals* for the *creation of man* may be visualized as exactly that, a controlling power over animals hinted at in the eerie scenes of Late Paleolithic cave paintings.

Table II. Comparison of Genesis account to Hominid Evolution

Verse	Action	Resemblance
26	declaration of intention	*Homo habilis* and *erectus*
	declaration of dominion	Oldowan and Acheulean stone tools used for scavenging
27	creation	Appearance of *Homo spaiens sapiens* and *nandertalis* in fossil record: single source evolution predicted by molecular biologist
28	blessing and declaration of dominion	Late Paleolithic
29	plants given to humans	Epipaleolithic/Archaic Neolithic
30	fodder to the animals	Devoloped Neolithic: "Neolithic Agricultural Revolution"

In summary, we have found a perspective from which we can render a resemblance between the first chapter of Genesis and the evolutionary record. The rendition is *analytical*, since various phrases in the creation story are classified as visualizations or allusions. The rendition is *aesthetic*, since it speaks to an innate sense of beauty, our ability to recognize resemblances. A wide range of human witness, including Paleolithic art[74] and Christian religious experience,[75] similarly appeals to this sense of beauty.

The goal of this rendition of a resemblance is to induce a spark of recognition. *The creation story is an image of the evolutionary record.* As such, this rendition must be considered a work of art, not a reason-based demonstration. With that spark of recognition, the now frustrated feeling that the creation story expresses both moral and physical truth finds refreshment. This rendition of a resemblance suggests an aesthetic and paradoxical complementarity between the two "origin stories" without infringing on the integrity of either sacred text or scientific research.[76] The resemblance seems real. Yet there is no natural explanation for a resemblance. ✡

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C. S. Lewis on Creation and Evolution: The Acworth Letters, 1944-1960

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In his voluminous publications, C. S. Lewis infrequently addressed the subject of creation and evolution, and on such occasions he usually endorsed some version of theistic evolution. In a series of previously unpublished letters to his friend Captain Bernard Acworth, written between 1944 and 1960, Lewis explained at some length his views on the question of origins. These letters reveal that during the last years of his life Lewis grew increasingly uncomfortable with the claims being made for organic evolution. Here we present for the first time in their entirety the passages of Lewis's letters to Acworth that deal with creation and evolution; we also describe the historical context in which they were written.[1] *Unfortunately, Acworth's letters to Lewis seem not to have survived; at least they are not among the Lewis papers in the Marion E. Wade Collection at Wheaton College in Illinois.*

Exactly when Bernard Acworth (1885-1963) and C. S. Lewis (1898-1963) first met — or began corresponding — is unknown. It is clear, however, from the earliest of Lewis's ten surviving letters to Acworth that this was not the first contact between the two men. Lewis closed with a cordial invitation "to spend a night with me next term," and Acworth's son, Richard, recalls that his father sometimes stayed overnight with Lewis and his brother when visiting Oxford.

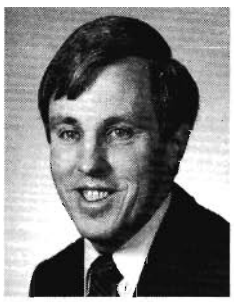
In the mid-1940s Lewis, a fellow of Magdalen College, Oxford, was already a famous medievalist, novelist, and Christian apologist. Acworth, too, was well known, especially in military and political circles. The son and grandson of Anglican clergymen, he had trained at the Royal Naval College before embarking on an illustrious career as a submariner, winning the D. S. O. during World War I and later becoming a pioneer advocate of sonar. Following his retirement from the Royal Navy about 1930, he became a freelance journalist, serving as naval correspondent for such newspapers as *The (London) Morning Post* and *The Yorkshire Post*. A staunch opponent of socialism, air power, and imported oil, he twice stood unsuccessfully for Parliament, in 1931 and again in 1942. His outspoken opposition to the policies of Winston Churchill during World War II and his calls for peace with Japan prompted the prime minister to urge electors to vote against Acworth and moved the London *Daily Mirror* to demand his arrest. The resulting notoriety severely damaged Acworth's reputation in the publishing world and led to what he called a "literary boycott" of his work. About the same time he became increasingly interested in evangelical Christianity and for a brief period toyed with the idea of becoming a lay reader in the Church of England.[2]

In 1929 Acworth published the first of over a dozen books, entitled *This Bondage*, an eccentric critique of evolution, relativity theory, and air power provoked in part by the military's growing infatuation with airplanes. Convinced that biologists derived one of their most conclusive proofs for the truth of organic evolution from the "mysterious and wonderful" migratory habits of birds, he sought to demonstrate that "the *scientific* treatment of birds in flight" — especially their alleged insensitivity to the wind — argued against the theory of evolution.[3] Although largely ignored by the scientific community, the book attracted the attention of Douglas Dewar (1875-1957), barrister and amateur ornithologist, who himself was beginning to doubt the validity of organic evolution. Dewar invited Acworth to lecture at the Victoria Institute, a religiously conservative organization that had long served as a haven for the dwindling remnant of British creationists. There Acworth met other like-minded men, including the distinguished electrical engineer Sir Ambrose Fleming (1849-1945), then president of the institute.[4]

In the mid-1930s Acworth, Dewar, and Fleming launched the Evolution Protest Movement, dedicated to opposing the teaching of organic evolution as a scientific fact. By this time Acworth had become convinced that evolution was not only false but responsible for "the present bankruptcy of civilisation." In a book entitled *This Progress: The Tragedy of Evolution* (1934), he denounced evolution as a child of Satan. "The *goal* of evolution," he declared, "through psycho-analysis, is *moral degradation;* through organised mass birth-control, and sterilisation, *extinction;* and through its social creed of communism, *revolution.*" He concluded with a call to overthrow evolution so that he could see "England prosperous, England merry and England *free.*"[5]

Acworth's conviction of the incompatibility of evolution and Christianity no doubt prompted him to press Lewis for his views — and to attempt to recruit his pen and prestige in the protest against evolution. Lewis's replies show that although he at first rebuffed Acworth's overtures to endorse creationism, he was by 1951 inclined to agree with Acworth in regarding evolution "as *the* central and radical lie" governing modern civilization. However, he still remained unwilling to lend his name publicly to the antievolution crusade. The following excerpts from Lewis's surviving letters to Acworth (which include everything in the correspondence relating to science and religion) chronicle Lewis's views.

September 23, 1944: "Do I agree that the theory of evolution, its truth or falsehood, is of fundamental importance to the Xtian faith?" This question can have several senses, in some of which the answer *yes* wd. most seriously misrepresent my position. I believe that Man has fallen from the state of innocence in which he was created: I therefore disbelieve in any theory wh. contradicts this. It is not yet obvious to me that all theories of evolution do contradict it. When they do not, it is not my business to pronounce on their truth or falsehood. My "message" on any biological theorem wh. does not contradict (or wh. I, with my imperfect process of



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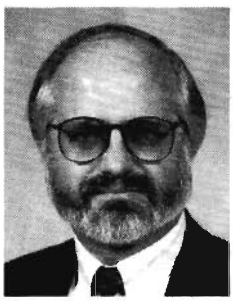

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reasoning, do not *perceive to contradict*) the Creed, is not "equivocal" but non-existent: just as my message about the curvature of space is not equivocal but non-existent. Just as my belief in my own immortal & rational soul does not oblige or qualify me to hold a particular theory of the pre-natal history of my embryo, so my belief that Men in general have immortal & rational souls does not oblige or qualify me to hold a theory of their pre-human organic history — if they have one.

December 9, 1944: Thanks for your interesting letter of the 8th: — I can't have made my position clear. I am not either attacking or defending Evolution. I believe that Christianity can still be believed, even if Evolution is true. This is where you and I differ. Thinking as I do, I can't help regarding your advice (that I henceforth include arguments against Evolution in all my Christian apologetics) as a temptation to fight the battle on what is really a false issue: and also on *terrain* very unsuitable for the only weapon I have. Atheism is as old as Epicurus, and very few polytheists regard their gods as *creative*.

There is no evidence that Lewis ever read the Genesis account of creation literally.

June 14, 1950: Thanks very much for the booklet. I don't see how at my age, I can start making myself a good enough Biologist to reply to the Darwinians.

September 13, 1951: I have read nearly the whole of *Evolution* [probably Acworth's unpublished "The Lie of Evolution"] and am glad you sent it. I must confess it has shaken me: not in my belief in evolution, which was of the vaguest and most intermittent kind, but in my belief that the question was wholly unimportant. I wish I were younger. What inclines me now to think that you may be right in regarding it as *the* central and radical lie in the whole web of falsehood that now governs our lives is not so much your arguments against it as the fanatical and twisted attitudes of its defenders. The section on Anthropology was especially good. ... The point that the whole economy of nature demands *simultaneity* of at least a v. great many species is a v. sticky one. Thanks: and blessings.

October 4, 1951: No, I'm afraid. I shd. lose much and you wd. gain almost nothing by my writing you a preface. No one who is in doubt about your views of Darwin wd. be impressed by testimony from me, who am known to be no scientist. Many who have been or are being moved towards Christianity by my books wd. be deterred by finding that I was connected with anti-Darwinism. I hope (but who knows himself!) that I wd. not allow myself to be influenced by this consideration if it were only my personal concerns as an author that were endangered. But the cause I stand for wd. be endangered too. When a man has become a popular Apologist he must watch his step. Everyone is on the look out for things that might discredit him. Sorry.

December 16, 1953: Many thanks for your cheering card ... . I can't help sharing a sort of glee with you about the explosion of poor old Piltdown [the fossil remains of an alleged human ancestor exposed as a hoax earlier in the year]: but I hope no one on the other side will rush in and try to exploit it. We might lay ourselves open to v. easy replies: (1) That the scientists have not yet been convicted of so many frauds as the Christians — forged decretals, faked miracles, and all! (2) That they themselves have discovered their own frauds & published them. But of course one inevitably feels what fun it wd. be if this were only the beginning of a landslide. I've never read [Charles] Lyell: should I?

September 18, 1959: I am most interested to hear of your young biologist [unidentified]; and his experience impresses me again with the suspicious *disingenuousness* of orthodox biologists.

March 5, 1960: Did you know that your theory of a catastrophic shift in the angle between our axis and the ecliptic [which Acworth invoked to account for the Noachian deluge and the sudden change of climate that froze the Siberian mammouths] is closely paralleled in [John] Milton's *P[aradise] Lost* Bk. X — or possibly IX. This in his view is one of the ways in which the change of conditions after the Fall cd. have been produced. Have you read this book by the Jesuit [Pierre Teilhard] de Chardin (*The Phenomenon of Man*) wh. is being praised to the skies? This is evolution run mad. He saves "continuity" by saying that before there was life there was in matter what he calls "pre-life." Can you see any possible use in such language? Before you switched on the light in the cellar there was (if you like to call it so) "pre-light;" but the English for that is "darkness." Then he goes on to the future and seems to me to be repeating [Henri] Bergson (without the eloquence) and [George Bernard] Shaw (without the wit). It ends up of course in something uncomfortably like Pantheism: his own Jesuits were quite right in forbidding him to publish any more books on the subject. This prohibition probably explains the *succès fou* he is having among our scientists — on the same principle whereby [Boris] Pasternak's (really, v. second rate) novel owes its [illegible] fame to the condemnation of the Russian government.

These letters to Acworth shed welcome light on Lewis's personal views regarding evolution. They complement the evidence from his published works and reveal to some extent the development of those views.

There is no evidence that Lewis ever read the Genesis account of creation literally. Repeatedly and publicly he described it as a folk tale or myth. In *The Problem of Pain*, published in 1940, four years before his first surviving letter to Acworth, Lewis constructed his own "myth" of human origins, which he described as "an account of what *may have been* the historical fact." Professing no objection to the notion that "man is physically descended from animals," he suggested that over time God "perfected the animal form" that was to become the first man by endowing it with human consciousness. The resulting "Paradisal man" engaged in full and unbroken communion with God while remaining, by our standards, a savage. Although he was as yet untainted by sin, his technology remained primitive. In joining an evolutionary picture of human biological development to the biblical account of the Fall, Lewis wished to demonstrate that the two views are not (as they seem to be) mutually exclusive. For him, technological backwardness implied nothing about intelligence or virtue, both of which might have been highly developed in prehistoric humans. When early man fell into sin (under circumstances Lewis does not describe), his spirit began to lose the control it had previously held over his body:

> The total organism which had been taken up into his spiritual life was allowed to fall back into the merely natural condition from which, at his making, it had been raised — just as, far earlier in the story of creation, God had raised vegetable life to become the vehicle of animality, and chemical process to be the vehicle of vegetation, and physical process to be the vehicle of chemical.[6]

Lewis's acceptance of divinely guided human evolution prompted him to modify not only the Genesis account of creation but also the traditional Christian understanding of the Fall.

Lewis's acceptance of divinely guided human evolution prompted him to modify not only the Genesis account of creation but also the traditional Christian understanding of the Fall. The existence of pain in the animal kingdom especially troubled Lewis, who devoted an entire chapter to the subject in *The Problem of Pain*. Theologians, he noted, had previously attributed the origin of animal suffering to the Fall of man. But the scientific evidence that carnivorousness was "older than humanity" had led Lewis to conclude that evil had manifested itself long before Adam in the law of tooth and claw. To account for this fact, he postulated a hypothetical pre-Adamic fall, in which Satan corrupted the world and caused animals to live by preying on one another.[7]

Lewis may have accepted a theistic version of organic evolution, but he resisted attempts to draw broad philosophical implications from scientific theories. This reticence is suggested most notably in his posthumously published essay on evolutionism, "The Funeral of a Great Myth," probably written in the 1940s. In this piece he distinguished between "the doctrine of Evolution as held by practising biologists," which he deemed to be "a genuine scientific hypothesis," and the speculative versions of evolution that preceded Charles Darwin's *Origin of Species*. Scientific evolution, he argued,

> is a purely biological theorem. It takes over organic life on this planet as a going concern and tries to explain certain changes within that field. It makes no cosmic statements, no metaphysical statements, no eschatological statements.

By contrast, popular evolutionism often claimed to account for the origin and development of both the universe and terrestrial life from an initial state of chaos to a future of almost infinite possibilities. According to the popularizers,

> Reason has "evolved" out of instinct, virtue out of complexes, poetry out of erotic howls and grunts, civilization out of savagery, the organic out of inorganic, the solar system out of some sidereal soup or traffic block. And conversely, reason, virtue, art and civilization as we now know them are only the crude or embryonic beginnings of far better things — perhaps Deity itself — in the remote future.

Lewis especially objected to the idea that human reason and an ordered universe could have arisen from the inorganic and irrational.[8]

The above statements on evolution, which date from the 1940s, suggest that Lewis accepted evolution while rejecting evolutionism. None of his published writings show a basic antipathy to science, although Lewis came to believe that all scientific theories are tentative and as dependent on changing presuppositions and climates of opinion as on new empirical data. Writing in the late 1940s, Chad Walsh, an acquaintance of Lewis's, described him as

> not anti-scientific in a Fundamentalist sense. He is not troubled by the "conflict between science and

religion" for the reason that his theology does not conflict with anything that science has so far discovered or is ever likely to discover. One cannot imagine him voting to prohibit the teaching of evolution in the schools of Britain.[9]

Lewis's early letters to Acworth, which deny that biological evolution is incompatible with Christianity, lend compelling support to this irenic portrait of the Christian apologist.

The later Acworth letters, however, indicate that during the 1950s Lewis became increasingly critical of evolutionism and what he called "the fanatical and twisted attitudes of its defenders."

The later Acworth letters, however, indicate that during the 1950s Lewis became increasingly critical of evolutionism and what he called "the fanatical and twisted attitudes of its defenders." He had much earlier come to feel that evolution was often held for dogmatic rather than for scientific reasons. Thus in "The Funeral of a Great Myth" he quoted D. M. S. Watson's assertion that evolution "is accepted by zoologists not because it has been observed to occur or ... can be proved by logically coherent evidence to be true, but because the only alternative, special creation, is clearly incredible."[10] Lewis's later writings reveal his belief that evolutionism had become a theological creed, a view that found humorous expression in his poem "Evolutionary Hymn," which concludes with the following verse:

> On then! Value means survival-
> Value. If our progeny
> Spreads and spawns and licks each rival,
> That will prove its deity
> (Far from pleasant, by our present
> Standards, though it well may be).[11]

Evolution was a creed so pervasive and so deeply held that even to appear to question it was to invite attack. For example, in a vitriolic article the Marxist geneticist J. B. S. Haldane accused Lewis of getting his science wrong and of traducing scientists in his works of science fiction.[12] It is probably because evolution formed the basis of theories of philosophical naturalism like Haldane's, which had become the dominant secular world view, that Lewis agreed with Acworth in regarding it "as *the* central and radical lie in the whole web of falsehood that now governs our lives."

To what extent Lewis came in his later years to reject his earlier belief in theistic evolution is more difficult to ascertain. His Oxford colleague Dame Helen Gardner recalled a conversation with Lewis over dinner in which she suggested that Adam was probably a "Neanderthal ape-like figure," to which Lewis coolly replied, "I see we have a Darwinian in our midst."[13] Nothing in his published writings suggests, however, that he gave up his long-held view that biological evolution was compatible with Christianity. Nevertheless, Lewis seems to have been favorably impressed upon reading Acworth's unpublished attack on evolution. "I must confess," he wrote on September 13, 1951, "it has shaken me." Lewis's later correspondence with Acworth suggests that he had begun a gradual shift away from his earlier unquestioning acceptance of evolution, but had stopped short of adopting Acworth's antievolutionist stance.

A few years ago a prominent young-earth creationist lamented Lewis's attempt in the 1940s to reconcile evolution and Scripture. "I like to think," wrote David C. C. Watson, "that, had he lived another 20 years, ... Lewis would have acknowledged his ... error."[14] It is doubtful that Lewis would have felt comfortable espousing the views of present-day creationists. He always carefully indicated that he opposed evolutionism as a philosophy, not evolution as a biological theory. At the same time his correspondence with Bernard Acworth suggests that he had come in his later years to entertain more doubts about the claims made for organic evolution than his published works indicate. ✡

Notes

[1]The original letters remain in the private possession of Captain Acworth's son, the Rev. Dr. Richard Acworth, who has graciously permitted us to quote from them and to deposit photocopies in the Marion E. Wade Collection at Wheaton College. Ronald L. Numbers has quoted a few sentences from these letters in *The Creationists* (New York: Alfred A. Knopf, 1992), p. 153. C. S. Lewis's Letters to Captain Bernard Acworth copyright ©1992, 1996 C. S. Lewis (Pte) Limited, reproduced by permission of Curtis Brown, London.

[2]This biographical sketch is based on A. G. T[ilney], "Origin of Evolution Protest Movement," *Evolution Protest Movement Pamphlet No. 82* (1963); Ronald L. Numbers's interview with Richard Acworth, October 2, 1984; "Capt. Bernard Acworth," *Who Was Who, 1961-1970* (London: Adam & Charles Black, 1972), pp. 4-5; and "Arrest This Man," (London) *Daily Mirror*, February 14, 1942.

[3]Bernard Acworth, *This Bondage: A Study of the "Migration" of Birds, Insects and Aircraft, with Some Reflections on "Evolution" and Relativity* (London: John Murray, 1929), pp. 1, 4.

[4]On Dewar, see Numbers, *The Creationists*, pp. 145-47.

[5]T[ilney], "Origin of Evolution Protest Movement"; Bernard Acworth, *This Progress: The Tragedy of Evolution* (London: Rich & Cowan, 1934), pp. 115, 333-34. E. P. M. publications date the founding of the society in 1932, but no extant evidence documents any activities before 1935.

[6]C. S. Lewis, *The Problem of Pain* (London: Geoffrey Bles, 1940), pp. 70-71. On Genesis 1 as myth, see ibid., p. 59; on Genesis 1 as folk tale, see C. S. Lewis, *Miracles: A Preliminary Study* (London: Geoffrey Bles, 1947), p. 42.

[7]Lewis, *The Problem of Pain*, p. 121. For criticism of Lewis's theory of a pre-Adamic Fall, see Austin Farrer, "The Christian Apologist," in *Light on C. S. Lewis*, ed. Jocelyn Gibb (London: Geoffrey Bles, 1965), pp. 41-42; and C. E. M. Joad, "The Pains of Animals: A Problem in Theology," *The Month* 189 (1950): 95-104. Joad's essay, together with a reply by Lewis, is reprinted in C. S. Lewis, *Undeceptions: Essays on Theology and Ethics*, ed. Walter Hooper (London: Geoffrey Bles, 1971), pp. 128-37. In his reply to Joad (ibid., p. 135), Lewis elaborates briefly on Satan's influence on the animal kingdom.

[8]C. S. Lewis, "The Funeral of a Great Myth," in *Christian Reflections*, ed. Walter Hooper (Grand Rapids, MI: Eerdmans, 1967), pp. 82-93.

[9]Chad Walsh, *C. S. Lewis: Apostle to the Skeptics* (New York: Macmillan, 1949), p. 129. For Lewis's views on scientific models, see C. S. Lewis, *The Discarded Image: An Introduction to Medieval and Renaissance Literature* (Cambridge: Cambridge University Press, 1967), pp. 221-22.

[10]Lewis, "The Funeral of a Great Myth," p. 85.

[11]*The Cambridge Review* 79 (November 30, 1957): 227; reprinted in C. S. Lewis, *Poems*, ed. Walter Hooper (London: Geoffrey Bles, 1964), pp. 55-56.

[12]"Auld Hornie, F. R. S.," *Modern Quarterly*, n.s., 1 (Autumn, 1946): 32-40. Lewis composed a rejoinder, "A Reply to Professor Haldane," which he never completed. It appeared posthumously in C. S. Lewis, *Of Other Worlds: Essays and Stories*, ed. Walter Hooper (London: Geoffrey Bles, 1966), pp. 74-85.

[13]A. N. Wilson, *C. S. Lewis: A Biography* (New York and London: W. W. Norton, 1990), pp. 209-10.

[14]David C. C. Watson, "C. S. Lewis and Evolution," *Biblical Creation* 7 (Spring, 1985): 9-10.

Chronology of The Fall

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The doctrine of the Fall is interpreted in many different ways in the Christian world. These interpretations are categorized in this article by the time scale in which natural and moral evil are believed to have come into the world. They are linked to different ideas of the creation of the world. Those interpretations that involve substantive changes in the physical world are difficult to reconcile with observational data. Those that involve no physical changes challenge our notions of the causal relationship between moral and natural evil. Though no interpretation is entirely satisfactory, each teaches some aspect of the truth.

The chronology of the creation of the world and the origin of life continues to be the focus of interest and controversy in theological and scientific circles. Techniques of scientific analysis and ridicule have been used in books, debates, classrooms, and courtrooms to support a creation time scale from six days to twenty billion years. The unfortunate consequence of this controversy has been the tendency to shift our attention away from the Creator and the fact of creation to the mechanics of creation. A positive effect has been a closer examination of the relevant scientific data and of our interpretation of the biblical text referring to our origins.

A closely related issue that has received much less attention is the chronology of the Fall. The problem of the introduction of evil into the world has generally been left to the philosophers and theologians except for an occasional chapter in books dealing with creation. However, our view of the origin of the world and of mankind is closely related to our understanding of the Fall. The immediate objective of this paper is to discuss various interpretations of the Fall and to note how they relate to different concepts of creation.[1] A longer range objective is to stimulate more interest and research into the problem of evil in the natural world.

There are several underlying assumptions in this paper. First, a theistic position is taken and atheistic interpretations of the Fall are not considered here. Second, the Bible is the Word of God revealed to men who were inspired by the Holy Spirit to write it. All Scripture must therefore be taken seriously and interpreted with care. Finally, the terms "natural evil" and "moral evil" are considered in a broad operational sense rather than a particular philosophical definition. In this paper, the term "moral evil" refers to human disobedience to God and its direct consequence. "Natural evil" refers to any physical phenomena leading to death and destruction that are not directly attributable to human activity. Different views of the relationship between moral and natural evil lead to differing interpretations of the Fall.

The various interpretations of the Fall can be broadly categorized by their view of the time scale and the scope of the curse. In this paper we will consider five possible time scales: (1) instantaneous, (2) double, (3) retroactive, (4) gradual, and (5) atemporal. Four ideas of the scope of the curse will be discussed for the instantaneous case: (a) physical, (b) physiological, (c) anthropological, and (d) spiritual and psychological.

The Instantaneous Time Scale

A chronological interpretation of Genesis 3 could lead to the view that original sin and the resulting

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curse occurred in a very short time sequence. Eve ate the forbidden fruit and persuaded Adam to do likewise. God found them, possibly that very evening, and told them of the consequences of their disobedience. They were immediately driven out of the Garden of Eden and in the following years began to experience the pain of childbirth and the toil of the land. The implication is that until a well-defined point of time the world was without sin and evil. Then sin entered the world through a single act of disobedience. Moral evil caused the introduction of natural evil into the world.

This "before and after" picture of the good, created world and the fallen world appeals to us because it has a simple cause and effect. It allows us to trace present-day evil back to an initial cause. It implies that evil is extraneous to this world and will someday be removed after the second coming of Christ. Attempts to specify in more detail what the world was like before this initial sin and how the world changed under the curse have led to many ideas about the scope of the curse. We will now consider four main categories of these ideas.

Physical Changes

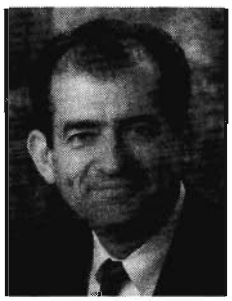
The most radical of all ideas is that the laws of physics were changed because of the Fall. The impact was universal and devastating in every aspect — not just human life but animal life, plant life, and even inanimate matter were dramatically and irrevocably altered under the curse. This idea follows if natural evil is considered to include disorder, randomness, chaos, decay, and increasing entropy. Since the Second Law of Thermodynamics describes the universal tendency for entropy to increase in a closed system, then at least this law of physics denotes natural evil. If natural evil is the result of moral evil, then this law and all related laws of physics must have been introduced as part of the Fall. The effect is a radical, detrimental change in all that exists, both inanimate and animate. In the inanimate realm, the result is entropy while in the animate world, it is disease, suffering, and death.

Henry Morris promotes such an interpretation when he says:

> The universal validity of the second law of thermodynamics is demonstrated, but no one knows why it is true ... the biblical explanation is that it is involved in the curse of God upon this world and its whole system, because of Adam's sin. ...We conclude that the Bible teaches that, originally, there was no disorder, no decay, no aging process, no suffering, and above all, no death, in the world when the creation was completed. ... Eve sinned, and Adam sinned ... and the perfect order of God's creation and purpose was disturbed by the entrance of disorder and rebellion into the world.[2]

A. E. Wilder-Smith believes that "the laws operating at the beginning were different from those operating now"[3] and that "our ideas of entropy must be completely invalid during an act of creation ... where creation is concerned the laws of thermodynamics, as we know them, are turned upside down. Here the laws governing time do not function either."[4]

Several problems arise from this radical view. First, from a biblical perspective such a dramatic change because of the curse is neither explicit nor clearly implied. God's statement of the curse in Genesis 3:14-19 taken in the literal sense applies only to the serpent, pain in childbirth, sweat, toil, thistles in tilling the ground, and death. The rest of the world does not appear to have been touched in a direct sense. Romans 8:22 does speak of the whole creation groaning and travailing in pain, but it is not helpful in explaining which aspects of creation are groaning. The Bible implies that the world before Adam and Eve was similar to ours; and the language of Genesis 1 and 2 very clearly describes a world with stars, oceans, plants, and animals, just as we see them today. Because the Scriptures do not teach a radical physical change as a result of



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the Fall, they are difficult to reconcile with such a change.

From a scientific perspective, a change in the laws of physics is obviously difficult to accept. Scientific methodology assumes the invariance of the laws of physics. The specific notion that the Second Law of Thermodynamics didn't hold before the Fall fails to allow for the comprehensiveness of the laws of thermodynamics. Not only does the law of increasing entropy imply a tendency toward more disorder but it also describes nearly all physical phenomena. The temperatures at which water freezes and boils, the behavior of gases in the atmosphere, the biochemical processes in living cells, and the solubility of alloys are but a few examples of how the Second Law of Thermodynamics affects everything around us. Phase transitions are characterized by a change in entropy. Water molecules could not exist in a liquid state without the Second Law of Thermodynamics. The creation of water prior to the Fall implies the existence of the Second Law. Therefore, to say that the law did not hold before the Fall is to maintain that the world before the Fall bears virtually no physical resemblance to the modern world. Even if a continuous supernatural extraction of entropy is invoked to compensate for the effects of the law before the Fall, the result would be a world totally alien to us. Neither can a selective application of the Second Law be granted for there is no basis on which to judge that an entropy increase is evil in one case and good in another. The simplest interpretation of Genesis 1 is that a world like ours was created and existed before the Fall. It may have been possible for God to create a universe with significantly different laws of nature but that does not seem consistent with a basic literal interpretation of Genesis 1.

The effect [of changing the laws of physics] is a radical, detrimental change in all that exists, both inanimate and animate. In the inanimate realm, the result is entropy while in the animate world, it is disease, suffering, and death.

From a philosophical point of view, the idea of a change in the laws of physics may resolve the problem of natural evil but it now creates the problem of "good." One foundation of Christian thought has been that God's creation is not inherently evil because God pronounced it "good." That notion is in jeopardy if any law of physics changed because of the Fall, since the character of God's creation depends critically on those laws. The problem of the origin of natural evil becomes the problem of the existence of goodness in a fallen world.

Physiological Changes

A less radical view maintains that the scope of the Fall is essentially physiological. The central notion is that God's statement "Ye shall surely die" implies that death was introduced into the world by sin. This is also based on Romans 5:12a " ... sin entered the world through one man, and death through sin ... "[5] The laws of physics are left untouched but biology is not. All living creatures lost their immortality. Carnivores appeared among the herbivores. Serpents began to crawl on the ground and thistles and weeds grew with the wheat. Men faced a life of toil, women the pain of childbirth, and together they faced death.

This view avoids some basic difficulties of the idea of radical physical change. The emphasis is shifted from inanimate matter to living creatures. The effect of sin is seen as death rather than disorder.

Biblical support for this view is not strong. The closest reference is Gen. 9:3 where God appears to sanction eating meat for the first time. The application of the term "death" to the animal kingdom is thus an extrapolation based on our own perception of animal death rather than clear biblical teaching.

It could also be argued that the notion of death must have existed before the Fall or else God's warning to Adam and Eve would have been unintelligible. Both the fact of death and its undesirability must have been known to Adam and Eve to understand the punishment for eating the forbidden fruit. Therefore, they must have observed death in the animal kingdom.

The major difficulty for the physiological view is the fossil record. Independent of any theory of evolution, there is strong scientific evidence that animals (both carnivores and herbivores) were fossilized long before any hominid lived on the earth. Fossil dating techniques have been refined considerably during the last few decades and the record shows that animals lived and died before any human lived to eat of the forbidden fruit. The "young earth" creationists respond by refusing to believe the dating

methods and by trying to show that all geologic strata and all fossils were formed during the flood in the days of Noah. Evangelical scientists point out in response that diluvial fossilization cannot be reconciled with the scientific evidence.[6]

There is also the difficulty of the discontinuity of biological processes. Although our understanding of the factors causing aging and death is still at an early stage, the aging process that leads to death appears to be a universal and inherent characteristic of living organisms. Life spans vary widely among animal populations, but death seems inevitable. If death did not occur before the Fall, biological processes such as cell replacement, digestive systems, etc., must have been dramatically altered after the Fall to the extent that we would not recognize pre-Fall creatures. The biblical teaching seems clear, however, that the animals created before the Fall are the same as those we see today.

[In this view] all living creatures lost their immortality.

It is also necessary to be more precise about the definition of death. If death in all forms was nonexistent before the Fall, then it must have been true at the cellular level as well. Macroscopic organisms grow and survive because of a continual sequence of cell multiplication and death. If cell death did not occur, all biological systems would be radically different. If cellular death occurred, however, then we lose the basis for distinguishing between organisms that died and those that didn't.

A related point is that the reproductive characteristics of animals are closely related to the survival probability of their offspring. Most fish, for example, produce large numbers of offspring but the probability of survival is very low. Orangutans have small numbers of offspring but have a very high survival rate. If no animal death occurred, the reproductive traits of nearly all animals would have to have been so drastically different that those animals would have no resemblance to the ones we see today.[7] This is not consistent with the message of creation.

It might be considered that the Garden of Eden had been an unusual refuge, an example of a pure state within a fallen world. It would be hard to imagine, however, that two radically different strains of animal life existed simultaneously in the world.

Finally, there is the philosophical question of whether animal death can really be considered as natural evil. The assumption that death in all its forms is evil is nebulous at best in a world where the life of many animals such as carnivores and the existence of nearly all ecosystems depend on the death of other organisms. Thus death, or at least animal death, may be part of the good created world and not a result of moral evil. The difficulty may be in our perception of evil rather than the reality of evil.[8]

Anthropological Changes

Because of the problems with the idea of sweeping physiological changes, it could be viewed that the primary impact of the Fall is on humans alone except for the serpent. This notion is based on the observation that the statements in Genesis 2 and 3 taken literally are directed only to Adam and Eve except for the reference to the serpent. The anthropological view is typical in progressive creationism. It is granted that animals lived and died as we see them today for long periods of time before humans appeared. The creation of man was unique and so was his downfall. The warning was clear. If Adam and Eve ate the forbidden fruit, they would suffer death like the animals. Their habitat would no longer be the verdant Garden of Eden but the vast arena of the earth where the struggle for existence was in progress. The pain of childbirth would be unique to humans and a constant reminder of the Fall.

This is probably the widest-held viewpoint among evangelical scientists today. It stems from a direct and simple reading of the Scripture and upholds the basic beliefs in the uniqueness of man and in human death as a direct consequence of sin. It seems consistent with the fossil record and the ideas of progressive creationism. Fischer articulates a similar anthropological view in the context of existing human civilization before the creation of Adam and Eve.[9]

This view also has difficulties. It is difficult to understand how the heavens and the earth itself contain natural evil if only humans were affected by the Fall. It may be possible to define most animal death, earthquakes, volcanoes, etc., as part of a "good" world rather than natural evil but that becomes very difficult when these natural processes lead to human pain, suffering, and death. If these processes occurred before the Fall, then there is not a clear cause and effect relationship between them and Adam and Eve's sin.

The difficulty with radical biological change is not avoided with this view either. The biological characteristics of man are now essentially the same as those in animals. If animal death is assumed to have occurred, it would be inconsistent to believe that human death did not occur unless there were significant biological differences. The man and woman created in Genesis 1 and 2 would be considerably different from the human beings we know today. Our relationship to the human being created in the image of God is not clear.

[In the anthropological view,] the primary impact of the Fall is on humans alone except for the serpent.

It is possible that humans did not suffer death before the Fall because, perhaps like Enoch, they walked with God and were taken to be with God without physical death. However, it is likely that the human body would still have been subject to pain, both physical and emotional, and would have suffered loss at the separation of a loved one. That death wouldn't have occurred by precisely the same mechanism then becomes academic.

Psychological and Spiritual Changes

A fourth idea is that the scope of the curse was essentially a spiritual and psychological effect. The basis for this is that biblical references to death often refer to spiritual death rather than physical death (e.g., John 11:25). The death referred to in Genesis 2 (and Romans 5:12-17) is considered to focus similarly on a separation from God and a lack of communion with him. The serpent's mocking challenge seems to point out that physical death is not a result of eating the forbidden fruit. Eve's action proved the validity of both statements: there was no immediate physical death but the communion with God disappeared. Spiritual death occurred and brought shame into the world. God covered their shame but drove them out of Eden to suffer the psychological impact of their sin. The pain of childbirth might imply the broader and deeper pain of raising children with sin and rebellion in their hearts. The "sweat of the brow" is more a psychological perspective on the struggle for existence than a change in the environment. Even the serpent's curse may be focused on his reputation rather than a change in locomotion. Physical death, though not a new occurrence, now becomes a dreaded event in the context of spiritual death. Awareness of physical death and its finality is the curse rather than the fact of death. This is consistent with Scriptures where redemption and the promise of everlasting life do not prevent physical death but remove the sting from death and the victory from the grave.

Such a viewpoint is consistent with all categories of creationism but is typically connected only with progressive creationism or theistic evolution. Its primary advantages are that it embodies the spiritual truths of the Scriptures and it does not contradict basic scientific data.

The biblical notion of death as the final enemy makes it difficult to exempt physical death from the curse. Most eschatological passages seem to point to a time when physical and spiritual death will be conquered. It is also difficult to understand how any pre-Fall being with an awareness of physical death could fail to view it as evil or at least as an undesirable event. Certainly spiritual death heightens apprehension about physical death but cannot easily explain all our fears and sadness.

Philosophically, the notion of natural evil as a consequence of moral evil can hardly be maintained. All natural phenomena that might be construed as evil existed before the Fall, since there were only psychological and spiritual changes. A possible solution is to consider natural evil to exist only in the eye of the beholder. In a sinless, unfallen state we might perceive these natural phenomena to be good rather than evil. If it is still maintained that moral evil is the cause of natural evil, then natural evil is little more than an illusion.

[If the scope of the curse was essentially spiritual and psychological, then] awareness of physical death and its finality is the curse rather than the fact of death.

These ideas share the view that at one time the earth existed in a state without moral or natural evil. Due to a single act of disobedience, evil was introduced into the world. The four cases discussed above indicate that our understanding of "natural evil" influences our idea of the state of the world before the Fall. If disorder and entropy are consid-

ered natural evil, then a radical change must have occurred at the time of the Fall. At the other end of the spectrum, if natural evil is not true evil but apparent evil due to our finite perception, then the world may have changed little, if at all, at the time of the Fall. This depends on the notion that natural evil, however we define it, is the direct consequence of moral evil. By relaxing that constraint, other possibilities arise such as the following ideas.

The Double Time Scale

Another approach to the introduction of evil into the world is to consider two separate instances of sin and consequent evil. The first occasion is Lucifer's rebellion against God. His fall is described in Is. 14:12 as the fall of the morning star. Gen. 1:2 is considered the physical effect of the action of Lucifer and the angels who joined him. The chaos and darkness represent radical upheaval and catastrophic changes in what was once a world free of evil. The six days of creation describe God's recreation of the heavens and the earth. Creation of man in the image of God presented the hope of a new creation living in the midst of natural evil. With the sin of Adam, a second curse came upon all humankind. Human beings in their sinful state began to struggle in their recreated world. Natural evil was the result of Lucifer's rebellion; moral evil was introduced through Adam's sin.

Such an approach is appealing because it neatly resolves the problem of natural evil occurring before Adam and Eve sinned. The world is the theater upon which the battle between Lucifer and God is fought. Lucifer is given a much larger role in the fallen world than merely the deceiver who suggested that Eve should disobey. Such a prominent role in the Fall correlates with the focus given in Scripture on Satan as the crucial enemy in redemption of both mankind and the heavens and the earth.

Natural evil was the result of Lucifer's rebellion; moral evil was introduced through Adam's sin.

This idea is essentially the gap theory of creation that was popular toward the beginning of this century. The death of animals before Adam and Eve existed, recorded in the fossil record, is seen as natural evil resulting from Lucifer's sin. Natural evil is inherent in the universe and manifests itself in both animate and inanimate forms. C. I. Scofield considered all the geologic strata and the fossils to have been formed in the chaos described in Gen. 1:2.[10] The subsequent verses describe the recreation of the world. A variation of this idea is that natural evil was introduced into an inanimate world in Gen. 1:2 and that the life whose creation is described in the rest of the chapter was subject to death, fossilization, and the basic laws of physics and biology as we know them today. This is a combination of the gap theory and the day-age theory of creation.

This idea lacks a clear biblical mandate. To draw such broad conclusions from a single obscure text in Gen. 1:2 may not be warranted. To consider the Genesis 1 account as a recreation rather than an initial creation goes well beyond the direct implication of the text. God's pronouncement of the creation as "good" must then be considered to mean "the best possible under the circumstances." Furthermore, Romans 5 seems to indicate that death came to all mankind through one man, not through Lucifer.

From a scientific point of view the double fall approach presents no major difficulties. Since natural evil is in the world from the beginning, any scientific theory of origins can be accommodated by some variation of the basic theme.

Philosophically, however, there is an important distinction from the instantaneous time scale. Natural evil is no longer the result of moral evil. Eve's temptation is a direct result of the serpent's taunt that could be considered part of Satan's injection of natural evil in the world. Moral evil is then, in a sense, a result of natural evil.

The Retroactive Time Scale

The contradiction between the notion that natural evil is the result of moral sin and the evidence that death existed in the world before man was created can also be addressed by a retroactive idea. God in his infinite foreknowledge foresaw man's rebellion when he created the world. The result of human sin is natural evil but the result preceded the act of sin itself. Jewitt says:

> To say that natural evil is a curse or judgment of God upon man for his sin is not to say that sin causes natural evil, as scientists speak of cause and effect ... A cause is always prior in time to an effect, whereas we know that death was in the world as a universal law, long before man was created, much less fell. Man's fall into sin is the reason, not the cause, of natural evil, including death ... God, then, created this world as the theater of fallen human

history, a world marked by death from the beginning, a world, to use scientific terms, in which there is a universal reign of entropy.[11]

According to the theological notion called lapsadarianism, this can all be seen as part of God's salvation purpose in creating the world. God's motive in creating the world is to carry out redemption — both in the natural and supernatural realm. Consequently, natural evil was a necessary part of creation. This comes dangerously close to making God the ultimate author of evil.

God in his infinite foreknowledge foresaw man's rebellion when he created the world. The result of human sin is natural evil but the result preceded the act of sin itself.

According to these ideas, the scope of the changes occurring after Adam and Eve's sin is primarily psychological and spiritual. The physical and biological effects were incorporated as part of the natural evil. The awareness of God and the rebellion against him can be considered either as a well-defined point in history or as an evolutionary development. In either case the issue of prior natural evil is addressed by a type of retroactivity.

The problem with this view biblically is that Genesis 1 speaks so strongly of a "good" creation that it is difficult to concede that it was already soiled by natural evil. The Bible also gives the clear impression that Adam and Eve were not predisposed to sin as might be supposed in a world already tainted by natural evil.

Philosophically, the whole conflict of free will and determinism is reopened, not so much for us but for Adam and Eve. If God created a fallen world for humankind, wouldn't humankind be bound to sin? Only the example of Jesus living sinlessly in a fallen world suggests that the problem may not be intractable.

The Gradual Time Scale

A significantly different approach is to consider a long time scale spanning many generations and possibly millions of years. The driving force is the scientific data used to support evolutionary theories. The best description of this view is presented by an atheistic evolutionist, Carl Sagan, although the idea is consistent with theistic evolutionary ideas and some versions of progressive creationism. Sagan points out in *Dragons of Eden* that there is a remarkable correlation between the evolutionary development of man and the Genesis account of the Fall. A key observation in the fossil record is that there occurred a rapid (i.e., hundreds of thousands of years) increase in the cranial capacity of hominids. This increase represents the development of that portion of the brain used for abstract and analytical thought. For the first time, hominids could grasp the concept of a God and of right and wrong. A simple clear way of describing it is that man ate the fruit of the knowledge of good and evil. The consequences are direct: the increased cranial capacity led to a skull too large for the female pelvic structure and, therefore, inevitable pain at childbirth. No other mammal experiences such a pain. With the analytical mind, the struggle for survival meant a switch from brute-force food gathering to cunning and skill in cultivating food — the sweat of the brow. Above all, abstract thought led to the awareness of death and its inevitability and finality. Here, too, came the recognition of God and the beginning notions of what it meant to communicate with him. Some of the earliest signs of civilization are burial grounds with crude items of worship.[12]

There is a remarkable correlation between the evolutionary development of man and the Genesis account of the Fall.

Whereas Sagan sees Genesis as a myth with amazing correlation to human development, the theistic evolutionist sees it as the inspired explanation of why humankind evolved in such a way. The Bible is not clear about the scientific details of our origin but is very clear as to the significance and meaning of our coming into being. Two concepts of initial sin are possible in this context. The first retains the notion of a historical Adam and Eve. They are the first to recognize the existence of God and that he expects us to obey him. They knowingly violated that code and by that action initiated the long evolutionary curse. The second concept sees Adam and Eve as representative of those generations of hominids who came to recognize that God was their Maker and was to be obeyed. The initial sin in this view is as evolutionary as the curse. The rebellion to God grows as the knowledge of good and evil grows. The curse develops in proportion to the rebellion.

Though somewhat foreign to traditional evangelical thought, this notion of an evolutionary development of the curse is intriguing. It is consistent with the spiritual truths of Scripture but challenges us to reconsider our long-held idea of an instantaneous Fall. Genesis does not explicitly give a time scale; the tenor of the story of the Fall is the only suggestion of an immediate action. Such an evolutionary concept of initial sin and the curse also allows a plausible correlation between the Genesis account and the prehistorical records of man's origins. Progressive creationists are constrained to draw a sharp distinction between a novel human race and very human-like ancestors whose fossils abound. Increasing evidence of continuity from hominids to humans makes those distinctions arbitrary.

Difficulties are immediately apparent. Not only does the biblical account in Genesis imply a sharp and sudden change in Adam's relationship to God but the Bible states that "... as sin entered the world through one man, and death through sin, and in this way death came to all men ..."[13] To interpret these passages in a context of long evolutionary development while respecting the entire Bible as the inspired Word of God implies a significant change in orthodox interpretations of these passages.

Scientifically, there seems to be no difficulty with this view but the philosophical problem of natural evil preceding moral evil still remains. An additional issue arises because the evolutionary enhancement of cranial capacity and knowledge of good and evil was scarcely a voluntary and willful choice as Eve seemed to make. The various cause and effect relationships between knowledge and disobedience are not clear.

The Atemporal Time Scale

In the final category of perspectives on the Fall, the Genesis account is not considered to teach a temporal "before and after" sequence but a philosophical "ought to and is" relationship. Bube explains the concept most clearly:

> The Biblical record tells us that the evil around us is something outside of, contrary to, different from, and an aberration on that kind of world which would correspond to the creation purpose of God. How can such a truth be set forth in a language and form acceptable and understandable to all people of all times, regardless of their cultural sophistication or their scientific knowledge? ... One way such revelation can be accomplished is to take what is an abstract philosophical concept and cast it into the form of a chronological account. Take the idea of goodness vs. evil as problems in ontology and reduce them to "before" and "after" in the framework of chronology ... Replace the goodness of God's creation purpose with a good creation before the Fall; replace the characteristics of evil as extraneous to God's creation purpose with a fallen creation after the Fall. Then the nature of God's good creation and the origin of evil are clearly distinguished.[14]

The central idea is that although evil in all its forms is extraneous to God's good creation, there does not exist a point in time when that evil was introduced. Goodness and evil coexist in a good creation in such a manner that they cannot be sharply distinguished. The same laws of physics that describe natural disasters also describe the processes that give us food and life. The same minds that sometimes make morally sinful choices also make morally good decisions. Although many situations can be seen as primarily evil or predominantly good, most circumstances cannot be neatly categorized. The ultimate good came out of the ultimate evil on the cross of Christ. Just as evil and goodness cannot be spatially separated, neither can they be separated temporally. The story of the Fall is not temporal but philosophical in its teaching.

Although evil in all its forms is extraneous to God's good creation, there does not exist a point in time when that evil was introduced.

This idea implies that natural evil is an inherent part of creation itself. Any physical universe that contains beings having moral freedom to do either good or evil must have a nature capable of either good or evil. Nature itself is not good or evil but has potential for either good or evil consequences as we perceive them. Only in such a world could humans have free moral choices. Natural evil is then not a result of moral sin but a precondition for sin. As Bube points out, natural evil might then be considered as original sin. Adam's sin would then be the representative embodiment of original sin and its impact on humankind.

The idea that the Fall is not a temporal occurrence avoids many of the "before and after" problems encountered so far. This idea makes the biblical account of the Fall an allegory rather than a historical event. Several phrases used in the story seem to support such an idea. The specification of a tree of

knowledge of good and evil and a tree of life could mean that the story is allegorical. Although supernaturally possible, the serpent speaking to Eve is also a typical construct of allegorical tales. Jesus and Paul's allusion to Adam's sin is then part of the allegorical concept. The validity and spiritual truths of these statements are maintained and only the time scale of the Fall is changed.

Orthodox views of Scripture have maintained that Genesis 3 must be a historical account due to the New Testament references to that story. Such a change in interpretation must be undertaken with care and deserves the attention of Bible scholars before it can be accepted.

Philosophically, many questions must be addressed to maintain this view. Moral evil and natural evil are no longer in a causal relationship of any kind but become intrinsically enmeshed together. If original sin is natural evil and inherent in this world, then it is not clear what is meant by Jesus being sinless in a fallen world.

Summary and Conclusions

Many ideas discussed in this paper involve some type of physical change in the universe at the time of the Fall. These views face grave difficulty in reconciling considerable scientific evidence of uniformity. The remaining ideas are consistent with scientific knowledge but not necessarily with our ideas of good and evil.

This discussion of the various interpretations of the Fall is intended to point out some merits and difficulties of each view. None of the views is without problems. My hope is that this paper will stimulate further discussion. It is important to recognize that it may work out that no logical framework can express how evil was introduced into the world. The relationship between the physical and the spiritual has never lent itself to simple logical explanation. Just as we find it difficult to explain the deity of Jesus, we cannot explain the chronology of how evil came into the world. Many different perspectives are required to emphasize the various truths that the Scripture teaches but we cannot expect any of them to express the truth in totality. Each view expressed in this article has been built on some aspect of truth found in the Bible or in scientific data. We err when we expect one concept to explain all other aspects as well.

The difficulty in discovering the chronology of the Fall suggests that the Bible does not teach us *how* evil came into the world. It only recognizes that there *is* evil in the world. The most important observation is that no matter which of these eight views is believed, the spiritual truths of Scripture and the fact of man's fall are never in question. Just as we are uncertain about how and when God created the world, we may also disagree about how and when sin and evil entered the world. This does not shake our firm belief that God created the world, that we are created in his image, and that man has rebelled against his Maker and is in need of redemption. This is the fundamental and paramount teaching of Scripture. We must always assure that these truths are clear in any discussion of the chronology of creation or of the Fall. ✡

NOTES

[1]R. H. Bube, "Creation (A) How Should Genesis be Interpreted?" *Journal ASA* 32, 34 (1980); "Creation (B) Understanding Creation and Evolution," *Journal ASA* 32, 174 (1980).

[2]H. M. Morris, *The Twilight of Evolution*, (Baker Book House: Grand Rapids, 1963) pp. 37-38.

[3]A. E. Wilder Smith, *Man's Origin, Man's Destiny*, (Harold Shaw Publishers: Wheaton, 1968) p. 74.

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[5]Romans 5:12a, New International Version, (Zondervan Bible Publishers, Grand Rapids, 1978).

[6]D. A. Young, *Creation and the Flood*, (Baker Book House: Grand Rapids, 1977).

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[13]Romans 5:12, op. cit.

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Communication

Real World Stratigraphy and the Noachian Flood

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Many people have assumed that all the rocks at the surface of the earth were deposited during the flood associated with the name of Noah (Gen. 6-8). This position, if it were to be substantiated, would eliminate all of geological history. It would nullify all the observational procedures that thousands of experienced geologists have used over many years of field work to record and understand the stratigraphic sequence. It would also destroy the geological principle, "The present is the key to the past."

One early version of "Noachian stratigraphy" was limited to the moraines and till sheets of Europe and North America: the widespread ice-age deposits which have now been shown to have had a glacial origin. Their very great extent led a few early observers to attribute them to a global flood. However, very little attention was paid to the fact that they are not present across three entire continents (Africa, Australia, and South America) and large parts of other continents (much of Siberia, China, India, the southern half of the United States, and Mexico). Therefore, they cannot represent a global marine phenomenon.

A more inclusive version attributes *all* strata, wherever they may be found, to the Noachian deluge. Neither interpretation has been based on geological field work, but on what might be said to have been an armchair exercise, without much data.

**Fellow of the ASA.*

Rock Cycle

Because many metamorphic rock bodies were once sedimentary rocks (prior to long, slow alteration), this approach crams almost all of geological history into a few months — contrary to the facts. The very slow solid-Earth processes that move sediments downward to great depths within the Earth, where they are converted by pressure and heat to metamorphic rocks before they are moved slowly upward again, would have had to occur in a few months.

This approach also denies the obvious fact that the products of erosion of older mountain ranges are incorporated, almost simultaneously, into thick sedimentary sequences which will not be converted into mountain systems until much later. That is, at any given moment — including now — we can note (1) the uplift and erosion of major mountain ranges, such as the Himalayas, and (2) the accumulation of thick stratigraphic sequences which will be folded, uplifted, and eroded at a much later date, such as the 18-km-thick (60,000-ft-thick) pile measured underneath southern Louisiana today. This is a mechanism that requires simultaneous subaerial (but not subaqueous) erosion, on the one hand, and subaqueous deposition on the other. The latter, in the global picture, is an almost synchronous result of the former. This thoroughly-documented and well-understood process cannot operate under a global flood.

Field Results

Geological field work has produced something quite different from the supposed global, but short-term, catastrophe that many people wish to infer from the Genesis record. For purposes of explanation of the critical differences, a simple model can be presented. In this model, one notes that sedimentary materials accumulate largely in relatively long, narrow belts — sometimes up to some hundreds of kilometers wide, and perhaps as much as a few thousand kilometers long. This is the geosynclinal model, and the facts summarized in the model have not been swept away by the advent of plate tectonics. Sediments deposited in the geosyncline were generally laid down, by more-or-less ordinary processes, on a slowly-subsiding floor in rather shallow water. In due time the sediments locally reached a thickness of 15-25 km, then were folded and squeezed into long, narrow mountain chains. In the overall process, part of the rock sequence was altered by pressure and heat to form a different category of materials (metamorphic rocks). This compression (lateral squeezing) was in effect a "sweeping-to-one-side" operation, which left wide areas without significant sedimentary cover.

The Appalachian Mountain system of eastern North America is such a mountain chain. A very thick sequence of sedimentary layers later was squeezed and folded into a mountain range, which has been eroding slowly to form the mountains that we can see today. These mountains are still being uplifted slowly, and the products of their erosion are being deposited now in depositional areas not too far away: primarily in the states of Virginia, North Carolina, and Louisiana. The agencies of transport that connect the erosion areas and the deposition areas include some well-known freight-carrying lines, including the Ohio and Mississippi Rivers.

The Himalayan Mountains are currently being squeezed and thrust upward at roughly one centimeter per year, and in the process, the thick sequence of sedimentary rocks which had been deposited previously is being folded. Therefore, it is becoming narrower in the map sense. The products of erosion now are being deposited not too far away, especially to the south: on the north shores of the Indian Ocean and to the northeast.

It is not necessary to think of only one geosyncline, or only one mountain range, at any one time. Two or more geosynclines might be accumulating sediments simultaneously, and two or more mountain systems might be under construction (and undergoing erosion) simultaneously. Furthermore, it is not necessary to avoid overlap between (a) filling of one or more geosynclines, and (b) folding and uplifting of one or more mountain systems. But it *is* necessary to recognize that very slow uplift and subaerial erosion of any given mountain chain is accompanied, essentially simultaneously, with very slow submarine deposition of the products of that erosion. Two examples were given above, but there are others today where the pertinent processes have been studied.

Stratigraphic Thickness

The field geologist who works on stratified (sedimentary) rocks, typically describes those rocks and *measures* (not guesses) their thicknesses with reasonable precision. This requires careful and detailed work, from older layers to younger, foot by foot and inch by inch (centimeter by centimeter). At the conclusion of his assignment, the geologist can say that he has measured (and described) a certain stratigraphic thickness of rock. I have worked on several such projects. To cite only one example, the Pennsylvanian (age) strata in western Arkansas are at least 12,000 meters thick, and they represent a very small part of geological time. "At least" refers to the fact that the upper limit is a fault; the original sequence was thicker before faulting, but how much thicker is not known. However, our incomplete knowledge today does *not* reduce the 12,000 meters.

A "composite stratigraphic section" can be made by matching measurements and descriptions from adjacent areas or regions, setting duplications (which are mostly easy to recognize) to one side, and then adding up the remaining thicknesses to find out what the total might be. Sediments in the folded mountain system — the Penokean Mountains, long ago worn down to a nearly flat surface on which Chicago is built — do not overlap the sedimentary sequence in the Himalayan Mountains. Therefore, *both* total thicknesses must be included in the final grand total.

The value of a "grand total" should be of great interest to us. It can only be estimated, because suitable field work has not yet been carried out in all places. However, this kind of estimate carries with it the corollary that a more nearly correct version — to be learned at some date in the future — will be numerically larger than the present value. That is, our errors due to incomplete field work are errors of omission, not of addition. We will increase the

numerical total as we fill in the gaps, but measuring additional thicknesses cannot possibly make the sum any smaller.

A general estimate of the combined (non-overlapping) thicknesses, for Cambrian time and later (that is, for Phanerozoic time), is 300 km of deposits, plus-or-minus 100 km. The high value is more likely than the low value, because it is almost impossible to find (or to have access to) the thickest part of the stratigraphic section while doing geological field work. The geologist ordinarily must settle for some high result, but not necessarily the highest.

Rates

If we accept (as being roughly correct) a radiometric age for the beginning of Cambrian time as 600 million years ago, we get a long-term average rate of accumulation of half a millimeter every year. This is a reasonable figure in terms of measured modern processes (excluding highly localized events). If, on the other hand, we think that this entire pile of deposits accumulated in the five months assigned to Noah's flood, we must assume 2,000 meters of deposition per day, or 83 meters of additional thickness every hour, coming from some large subaerial landmass, which in some mysterious way was not drowned by the flood. The key figure here is not the *rate* that can be calculated, but the *total thickness*: about 300 km of sediment. This figure does not include any part of the probably thicker Precambrian stratigraphic sequence, and therefore, it is a very low value.

Besides this unrealistically low result (300 km thick), we have an equally important problem of a different kind. The deposits of the past were not laid down in uniform sheets like a giant layer cake, or, for the earth as a whole, like a giant onion. Rather, they were concentrated in a few regions, here and there, as indicated above. A single stratigraphic section, covering a small slice of geological time (cited above), is more than 12,000 meters thick. One important aspect of this field result is that nothing has been added to this one stratigraphic sequence since it was squeezed and crumpled into the Ouachita Mountains, which in turn took place before an equally thick section was developed to the west, in Oklahoma. That is, after a relatively long time, deposition shifted from one site to another, some distance away. This kind of long-term history is what the geologist actually finds, but it is far from what we should expect for a very short global flood.

Slow Uplift

A third, serious problem rests on the fact that mountain systems are not uplifted instantaneously. At a more-or-less realistic (but high) rate of one centimeter of uplift per year, a mountain like Mt. Everest requires more than 900,000 years to reach its present height, provided erosion of the rock surface is somehow prevented during its uplift. If erosion is taken into account, this figure should be much larger. Such episodes of folding and uplift must be fitted *between* observable depositional sequences.

Finally, there is the problem of erosion of the mountains. Many field geologists have had to contend with the time gap that must be inferred along the more-or-less horizontal plane which separates younger, as yet not folded, rock layers (above) from highly contorted layers (below). The latter, where extensive, suggest a long history of mountain-making and concomitant folding. But these mountains must have been eroding greatly to produce a more-or-less flat surface, and this erosion (removal) requires that millions of years of history are missing locally along this plane. Nevertheless, *all* of this missing time must be integrated into the stratigraphic sequence at that site.

No "Layer Cake"

The picture obtained by the field geologist is definitely not a uniform series of coats, like the paint that an artisan might put on an expensive piece of cabinet work. In fact, "layer cake stratigraphy" is commonly a term of derision. A better picture, although still not complete, is as follows: first, a sequence of layers is deposited here at this one locality, then there is a lateral compression and folding of these layers; second, a set of layers is deposited over yonder, followed by squeezing of this second set of layers; third, a set of layers is deposited elsewhere, again followed by deformation; and so forth, up into fairly high numbers. There is nothing global about any part of the checkerboard pattern in this depositional history.

Dating

The radiometric dates that are now available — more than 1,000,000 of them — agree with the "checkerboard deposition" scheme outlined above, but are directly contrary to the layer-cake interpretation that must follow any effort to use the Noachian deluge as the model for stratigraphic history. The time-mosaic of deposition, reviewed here,

does *not* arise from the radiometric dates, but instead is a necessary result of the geological field work. The mosaic was established first, many decades ago; the radiometric dates were added later. *After* the mosaic had been established firmly, by means of field work, it became possible to examine radiometric dates and to note that they are consistent with the mosaic model. However, the mosaic pattern and the great amount of time required are necessary results from the field work. The radiometric dates do not create nor alter the framework. They provide *only* some additional detail.

The basic stratigraphic model was established long before any dates were available from radioactive materials. It was known even then that the time intervals had to be very great. Various other methods of dating — not as accurate as radiometric procedures — were available to help estimate the amount of elapsed time. The results were startlingly large. Radiometric dating has added some precision that was lacking previously and an increase in the total time involved.

Conclusion

The long slow processes of folding and uplift, erosion, transport and deposition — visible and measurable today — require that the business of emplacing the surface rocks on our planet has had an extremely long and complicated history. The physical characteristics of sedimentary rocks indicate that deposition was particularly slow. The tremendous thickness of the composite stratigraphic column similarly shows that this history cannot be explained in terms of one or two catastrophic events. Instead, as the experienced field geologist well knows, there have been many catastrophes, and they were not global. ✡

For further reading on rates of various processes:

Fairbridge, R. W. (ed.), 1968. *Encyclopedia of Geomorphology*. Reinhold Book Co., New York; pp. 47, 169-172, 205, 224, 262-268.

Garrels, R. M., and F. T. Mackenzie, 1971. *Evolution of Sedimentary Rocks*. W. W. Norton and Co., New York; pp. 121-124, 199, 267-270.

Books Received and Available for Review

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

Jeffrey H. Boyd, *Soul Psychology: How to Understand Your Soul in Light of the Mental Health Movement*, Soul Research Institute, 1994

Michael Cromartie, Ed., *The Nine Lives of Population Control*, Eerdmans, 1995

David Darling, *Soul Search: A Scientist Explores the Afterlife*, Villard Books, 1995

John Earman, *Bangs, Crunches, Whimpers, and Shrieks: Singularities and Acausalities in Relativistic Spacetimes*, Oxford, 1995

Denis Edwards, *Jesus and the Wisdom of God: An Ecological Theology*, Orbis, 1995

Kitty Ferguson, *The Fire in the Equations: Science, Religion and the Search for God*, Eerdmans, 1995

M. W. Friedlander, *At The Fringes of Science*, Westview, 1995

Vicky Genia, *Counseling and Psychotherapy of Religious Clients*, Greenwood, 1995

M. M. Gifillan, *The Bible May Agree with Evolution*, Wenzel Press, 1995

Francis Harrold and Raymond Eve, Eds.,*Cult Archaeology and Creationism: Understanding Pseudoscientific Beliefs About the Past*, Iowa University Press, 1995

Ervin Lazlo, *The Choice: Evolution or Extinction?*, Putnam, 1994

T. A. Morrill, *Evolution As Growth of One Earth Organism*, 1995

Evelyn Reed, *Sexism and Science*, Pathfinder, 1993

D. M. Rivage-Seul & Marguerite K. Rivage-Seul, *A Kinder and Gentler Tyranny: Illusions of a New World Order*, Praeger, 1995

Susan Leigh Star, *Ecologies of Knowledge: Work and Politics in Science and Technology*, SUNY Press, 1995

M. R. Steele, *Christianity, Tragedy, and Holocaust Literature*, Greenwood, 1995

Anthony Van Den Beukel, *The Physicists and God: The New Priests of Religion*, Genesis, 1995

Shelley Wachsmann, *The Sea of Galilee Boat*, Plenum, 1995

Richard Webster, *Why Freud Was Wrong: Sin, Science, and Psychoanalysis*, Basic Books, 1995

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Book Reviews

SHOW ME GOD: What the Message from Space Is Telling Us About God by Fred Heeren. *Wonders that Witness*, Vol. 1. Wheeling, IL: Searchlight Publications, Daystar Productions, 1995. 337 pages. Hardcover; $19.99.

This book is for tough-minded students of science interested in its relationship to the biblical world view. Non-Christian skeptics, "the major identifying characteristic of 'baby busters' (those now in their teens and twenties)" and biblical believers are both shown how cosmology impacts wider beliefs about the universe and God. Fred Heeren interviewed many of the big names in contemporary cosmology, such as Alan Guth (father of big-bang inflationary theory), Stephen Hawking (a leading theoretical physicist), Robert Jastrow (founder of NASA's Goddard Institute and now head of the Mount Wilson observatory), John Mather and George Smoot (COBE satellite experiment), Arno Penzias and Robert Wilson (1978 Nobel Prize for discovery of cosmic background radiation), Jeremiah Ostriker (co-discoverer of dark matter) and others. George Smoot says in the Forward: "This cutting edge book explores creation where science and religion ask the same questions and think the same thoughts. This is the place where all seek and see the hand of God. Everyone, layman and scientist alike, expects to find enlightenment about the big questions in the beginning of the Universe." The theme of the book (and the series, of which it is the first volume) is to present facts and arguments in support of the credibility of the Bible that serve as "equal time" to what is often found in school curricula or the information media.

One of the best parts of the book is the preface, "Facts That Changed Three Minds." In 1929, Albert Einstein abandoned his "fudge factor" in general relativity, required to avoid a beginning of the universe; Archaeologist William F. Albright excavated Bronze Age cities on "The Way of the King" eventually persuading him of the historicity of Genesis 14; and C. S. Lewis's atheism was shaken by a fellow atheist acknowledging evidence pointing to the historicity of the gospel accounts. Lewis described his awakening by saying: "It was more like when a man, after a long sleep, still lying motionless in bed, becomes aware that he is now awake."

The format of the book is varied and unusual. In an age lacking the time (or will) to read carefully reasoned multi-chapter arguments in fine print, Heeren has scattered small conceptual chunks of a page or less into the book. Chapters end with a boxed summary of its main points. Throughout are grayed sections, entertaining interludes of imaginary conversation with a Christian book publisher who (like some of those Heeren talked with) shows little interest in truth or literary content, but in banal appeals to prospective readers and sales. These sections are intended to address topics of interest to young students, to keep their attention. Chapter 3 is a science-fiction story about extraterrestrial intelligence. Would humanity care to listen to just *any* message from space?

After introducing the logical support for the existence of a biblical Creator (ch. 4), the book gets down to the business (in ch. 5) of covering the alternatives to the Big Bang, ending in a discussion of the limitations of science to tell us anything about the universe before Planck time. Heeren says: "Those scientists who claim that science tells them something about ultimate origins are not being quite honest, be they atheists or creationists." He invokes scientist/celebrity Carl Sagan to demonstrate the point, and others such as Arno Penzias, John Mather, and even Fred Hoyle, to deny that the universe could come from nothing and that space is not nothing.

The book continues to discuss the key issues of Big Bang theory at an in-depth popular level. Mathematics is absent, but many effective illustrations, measurement data, pictures, and conversations with leading astronomers are woven into the scientific discussion, demonstrating the rich relevance of human personality in science.

Chapter 8 turns theological, discussing the recent creationist position and "The Other Christian Tradition" dating back to at least Augustine, of an ancient earth. While Heeren takes a harmonizing view of science and Scripture, he also faults the view that opts for a biblically-derived science to the exclusion of revelation from creation. Chapters 9-11 address chance and design, with arguments about the fine-tuning of the universe: the proton-to-electron mass ratio, electron charge, protein formation, expansion of the universe, etc. Versions of the anthropic principle are discussed as ways of avoiding the design alternative. Chapter 11 explores the implications of a designed universe and its connection to values and meaning.

The final chapter (12), "Is the Gospel Logical?," argues that "there is good logic in believing the one cosmic history that fits what we know of God." Common objections to the Gospel are answered. Two "bonus sections" follow. The first is a brief survey of the origin of science and descriptions of "Fifty Believers Who Led the Way in Science." Section 2 is a chronology of 20th-century cosmological discoveries.

Fred Heeren has been working in a variety of media (film, radio, audio tape drama, theater) and has spent five years on the *Wonders That Witness* book/tape and radio series to bring the gospel to skeptics. Vol. 1 is a good start at providing a resource for the intelligent non-specialist, whether skeptic or Christian.

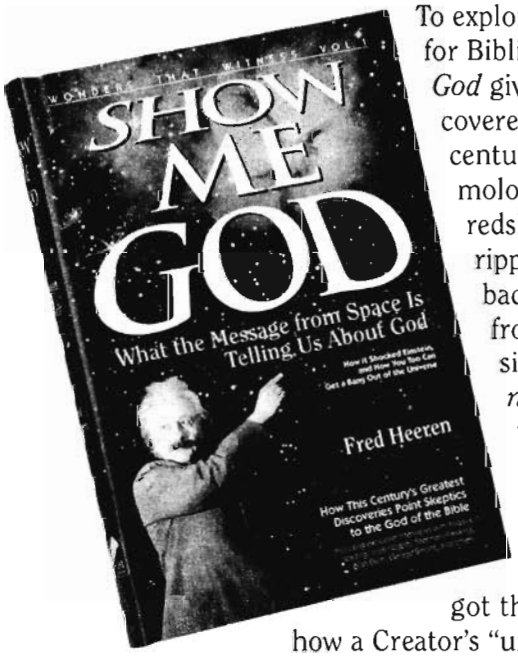
Reviewed by Dennis L. Feucht, RD1 Box 35A Townville, PA 16360.

Is There Good News from Space?

Show Me God is the first book to bring together the great cosmologists of our time to record their thoughts about their discoveries—and the implications about God.

In exclusive interviews:

- **Stephen Hawking** speaks of "the nature of God."
- Nobel prize-winning physicists **Arno Penzias** and **Robert Wilson** describe their discovery of the greatest evidence for a creation event.
- **George Smoot** tells how he discovered "fingerprints from the Maker" with NASA's COBE satellite.
- **Alan Guth**, father of the inflationary big bang theory, speaks of the universe's inexplicable "fine-tuning."



To explore the implications for Biblical faith, *Show Me God* gives the reader a discoverer's-eye-view of this century's greatest cosmological findings, from redshifted galaxies to ripples in the cosmic background radiation, from modern versions of creation *ex nihilo* to the latest theories about the universe's fine-tuning. Learn how only the ancient Hebrews got their cosmology right, how a Creator's "unnatural" selections became nature, and how the best non-theistic explanations for apparent design provide the best argument for the Biblical God.

This ground-breaking book shows that Bible believers and scientists can have a healthy and—for both—uplifting dialog, a thing I have long felt crucial for humanity.
—George Smoot, Ph.D., head of the NASA satellite team that first detected cosmic "seeds"

Brings the latest space results down to Earth—a story well told.
—John Mather, Ph.D., COBE satellite chief scientist

What a superb basis for a new kind of witnessing to post-modern man—building on the unimaginable grandeur of the world God made!....Here we see science undermining its own agnosticism.
—Ralph D. Winter, Ph.D., General Director, U.S. Center for World Mission

In this well-researched and thoroughly enjoyable book, Fred Heeren makes contemporary cosmology accessible to the rest of us, enabling readers to see that recent discoveries in science present theologians and scientists with very encouraging prospects for dialogue.
—Robert A. Pyne, Th.D., Dallas Theological Seminary

I would strongly recommend this book to the scientist and the lay reader alike who are interested in learning more about scientific evidence for the existence of God.
—Walter L. Bradley, Ph.D., professor and senior research fellow, Texas A&M University, Department of Mechanical Engineering

Any seeker of truth will find much to ponder in its pages and Heeren's conclusion is both reasonable and profound.
—J.P. Moreland, Ph.D., Talbot School of Theology, Biola University, Editor of *The Creation Hypothesis*

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BLAISE PASCAL: Mathematician, Physicist and Thinker about God by Donald Adamson. New York, NY: St. Martin's Press Inc., 1995. 297 pages including notes and references, bibliography, list of Pascal's writings, index. - Hardcover; $59.95.

This book summarizes Pascal's achievements and gives excellent references to more detailed works on Pascal. It has 11 chapters beginning with a chronology of Pascal's life before examining specific aspects of his life in each chapter. The text is well indexed and contains an extensive bibliography (19 pages).

This is an excellent book for an introduction to Pascal's accomplishments, his character, and his thinking. The second chapter, "Foundations," really sets the style of the book with Pascal's early work in geometry and how this led Pascal to develop a mechanical calculator. Several of these vignettes are discussed in detail, such as the invention of the calculator and the experiments with vacuums and atmospheric pressure. Woven through this is related work by Descartes, Leibniz, and others that provides a balanced picture of how Pascal's contributions affected others and vice versa. Pascal's Christian writings are treated the same way. Several pages are devoted to the death of Pascal's father and how that led Pascal to pen some profound theology that presaged his famous *Thoughts*.

Most of the book does not focus on Pascal's scientific achievements but his Christian writings and development. This begins with Pascal's association with Port-Royal des Champs, a monastic community with a school that promoted the teachings of Cornelius Jansen (total depravity, irresistible grace, and predestination). Adamson provides succinct examples of how Pascal's involvement at Port-Royal led him to defend Jansenism through his famous *Provincial Letters* that are treated in a separate chapter. The chapter is full of quotations and excerpts that show how Pascal's literary skill was used to make potentially dull topics light and humorous by writing the *Letters* to an intelligent, but misguided, friend and Father. Adamson cleverly provides continuity between these excerpts with intervening responses to the *Letters* so that the reader gets a real feel for Pascal's style and wit. A fine example of [Pascal's] ingenuousness occurs in the discussion of Probabilism, in Letter VI, where Pascal is in the process of demonstrating that the Jesuits' new moral theology will permit or condone any crime or sin, however heinous.

> "And how does he reconcile that with [sin]?" I asked him.
>
> "By the subtlest of all the new methods," replied the Father, "and by the utmost refinement of probability. I will explain. As you saw the other day, the fact is that both the affirmative and negative of most opinions have some probability, in the view of our doctors, and enough to be followed with a clear conscience. This does not mean that the pro and con are both right — that would be impossible — but just that both are probable and consequently safe ..."
>
> "O reverend Father," I replied, "how lucky the world is to be governed by you! How useful these probabilities are ... [so] that people can choose between pro and con just as the spirit moves them, even if they do not believe it to be true ... From which I realize that a single casuist can lay down new moral rules as he pleases, and decide in any way he thinks fit any matter of moral behaviour." (pp. 88-90.)

Adamson follows this with a well-researched discussion and analysis of Pascal's *Letters* as seen near the conclusion of this section. "Even today Molinism, the doctrine of sufficient grace, and Probabilism, are the approved doctrines of the Roman Catholic Church" (p. 111).

After the *Provincial Letters* Adamson moves to describe circumstances that profoundly affected Pascal's Christian convictions. These circumstances inspired Pascal's ideas on human nature and his famous *Thoughts* that Adamson suggests were intended for publication as an *apologia*. The final chapter summarizes Pascal's achievements and places them in the context of their effect on society.

This is an exceptional book for those wanting to learn more about Blaise Pascal. The only two annoyances with this book are the lack of diagrams for some discussions (for example, the discussion of self-enclosed vacuums, p. 29) and the lack of references to the illustrations included in the middle of the book (reference to the photograph of Pascal's calculator would have been particularly helpful). The text is concise, but complete, and is full of references for those who want to read more. Given the high caliber of this book, the price seems warranted but for those who may balk at the price I strongly recommend lobbying your library to purchase copies.

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

PUTTING IT ALL TOGETHER: Seven Patterns for Relating Science and Christian Faith by Richard H. Bube. Lanham, MD: University Press of America, 1995. 213 pages, index. Paper, $28.50; cloth, $46.00. This book may be purchased directly from ASA.

Physicist Richard H. Bube is emeritus professor of materials science and electrical engineering at Stanford University. For 25 years he taught a course at Stanford entitled "Interactions Between Modern Science and Christianity," and has lectured on that topic on more than 60 college and university campuses. Today, as any walk through a college bookstore will show, there is an abundance of writing published on the relationship between science and theology. How does one evaluate all the authors and various positions and discern which understanding promises to remain true to the natures of both science and theology, or which attempt to relate the two fields promises the most fruitful insights? Perhaps the best guide available is Bube's newest book, *Putting It All Together*. His vast experience both as a working scientist and science educator, combined with his ability to communicate clearly, enhance this book and make it very "user-friendly."

The author examines the enormous body of literature (from New Age to biblical inerrantist perspectives) and all the ways in which scholars relate or unrelate science and the Christian faith, and finds that the published positions fall into seven basic patterns of thought. Before evaluating each basic pattern, Bube provides a thorough (and helpful) discussion on what is the nature of authentic science and authentic Christian theology. The task is daunting, but the author attempts it because "among all those actively involved in the practice of science" there is a core agreement about what constitutes authentic science. Also, given the difficulty of resolving disagreements in Christian theology without recourse to experimental tests, the author still contends that "the basic methodology and the central content of authentic Christian theology can be defined with sufficient agreement among different sectors of the Christian community to constitute a meaningful activity." Bube proceeds with great skill and, I believe, does succeed in providing a working understanding of what constitutes authentic science and authentic Christian theology, though one might have wished for more on the doctrine of the Holy Trinity, as that doctrine is essential to understanding the Christian teaching on revelation, redemption, and the personal nature of God.

The task of setting forth what is authentic science and authentic theology is fundamental, and with that groundwork laid the reader is then equipped to evaluate each of the seven basic positions against the standard of authenticity, and is thus in a position to recognize when the ways of relating science and theology fail and degenerate into the belief or practice of a pseudo-science or a pseudo-theology. In the course of the book, many of the inadequacies of the various positions are exposed. For example, Bube incisively critiques the belief that science is the only source of valid knowledge (scientism), and his critiques of New Age positions on science and the environment are very timely. Furthermore, he helpfully relates why "deterministic" or "chance" as scientific descriptions do not rule out God's interaction with the universe or lend credence to world views of "Determinism" or "Chance."

Bube sees the most promise in the pattern of complimentarity, wherein different models or descriptions of reality are brought together and integrated into one coherent picture that, as a whole, provides richer and deeper insight into reality than either model could have provided in isolation. While I share the author's enthusiasm for the complimentary approach to relating science and theology, I cannot agree with his statement that "the insights obtained from science and theology are insights into the *same* reality" (p. 168) unless some qualifying definition of "*same* reality" is provided. Science searches to understand the universe while theology seeks knowledge of God. God is uncreated Reality, but the universe is created reality and therefore contingent. Thus the two cannot be confused. Nor is there any necessary or logico-causal relationship between God and the created universe. Yet there may be room for overlap and sharing between the two disciplines, for God became incarnate man in Jesus Christ and in his revelation accommodated himself to our human life, speech, and knowing. Furthermore, in both science and theology the methodological necessity to accommodate our understanding of reality to what is given and disclosed by reality, rather than impose our own subjective thoughts upon the object of our inquiry, and the factor of the human knower is the same.

None of this detracts, however, from the fact that the author provides a very helpful discussion on what complimentarity is and what it is not, together with some illustrations of complimentarity. It would have been more icing on the cake if the author had referred the reader to historical studies that present how science and theology have benefited from mutual interaction (such as Stanley Jaki's *Science and Creation*), or other studies that demonstrate the intellectual gain of a complimentary interaction between the disciplines of science and theology — various works by Thomas F. Torrance come to mind, as well as *The Knight's Move* by James Loder and Jim Neidhardt).

Without a doubt, a wide readership should be exposed to this book. Bube has done a very fine job in analyzing a massive amount of material, and many can benefit from his insights. We can only hope that he will continue to publish. One regret: it is unfortunate that the publisher has priced this book out of the buying range of most students.

Reviewed by Rev. Mark Koonz, Pastor, First Lutheran Church, P.O. Box 347, Opheim, MT 59250

VITAL DUST: Life As A Cosmic Imperative by Christian de Duve. New York, NY: Basics Books, 1995. 362 pages, index. Hardcover; $25.00.

Author Christian de Duve is Nobel Laureate, Professor Emeritus at the Medical Faculty of the University of Louvain (Belgium) and Rockefeller University, and founder and past president of the International Institute of Cellular and Molecular Pathology (Belgium). He has written two other books, *A Guided Tour of the Living Cell* and *Blueprint for a Cell*, that deal with the subject matter closely related to that of the book under review here. In fact, *Blueprint for a Cell* documents in great detail the theories that are presented in *Vital Dust*.

The author believes that life is a product of deterministic forces, as the similarities of various living organisms are much closer than could possibly be accounted for on the basis of chance. In this book, he attempts to reconstruct the history of life on earth, starting with the formation of chemical compounds that are significant to life and ending with the operation of human minds. Thus, the book is mainly a step-by-step description of the evolutionary processes of life from inanimate matter to human beings. This description is based on a combination of extant evidences, fossil records, current theories, assumptions, conjectures, hypotheses, suggestions, and even speculations. The author clearly indicates which of the above is used at each point in his presentation.

This book is well written and well organized. The readers must have some background in biochemistry to understand fully the chemical aspects of the arguments; just introductory organic chemistry and general biology are not enough. Although there are many technical terms of biology and chemistry, the writing flows smoothly. So as not to bore the readers, the author has inserted several poetic passages and a few humorous ones throughout the book.

The bibliography is extensive and contains many monumental works in various disciplines. The 68 references in the bibliography are grouped according to their subject matter. The author provides a brief description of and general comments on each of the references. This valuable service is not commonly found in many books nowadays. A glossary of terms is also furnished. However, the book lacks a list of acronyms with definitions which save the readers' time and minimize their frustration. Readers would also benefit from a few more illustrations than the mere seven in the book because, as we know, biology and chemistry are "picture sciences."

The author does not attempt to address every missing piece of the evolutionary puzzle. For example, although the author mentions the chirality preference of the extant amino acids and sugars in living organisms, he has not provided an explanation for the preference. Nor has he explained how flowering, fruit-bearing plants and pollinating insects evolved to have arrived together at the same time in the history of life.

I believe the most notable part of the book for members of the American Scientific Affiliation is in the last few chapters where the author discusses the human self and free will, the biology of ethical values, and the meaning and purpose of life, all from a scientific rather than a biblical point of view. Here, the author comments on the philosophies of life of others and then presents his own outlook, not only on the meaning of life on earth, but also on the meaning of the universe. These chapters show that the author is indeed a great thinker in addition to being an eminent scientist.

Incidentally, this book has also been reviewed by chemist Richard A. Lerner in the May 15, 1995, issue of *Chemical and Engineering News*.

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

FOUNDATION, FALL AND FLOOD: A Harmonization of Genesis and Science by Glenn R. Morton. Dallas, TX: DMD Publishing Co., 1995. 159 pages, index. Softback; $15.00.

Most conservative Christians have puzzled over the question of how to reconcile Genesis with science. For those with backgrounds in science and applied science, this is a significant question, since its answer affects how we carry the Gospel to our colleagues, as well as our colleagues' perception of our integrity. Whether or not we accept the young-earth view, we Christians view the Bible as an inspired document.

For young-earth creationists, the points of friction between science and Scripture include the age of the earth, evolution and the flood of Noah's day. By interpreting the creation week as six literal days followed by a literal day of rest, and by interpreting the genealogies in Genesis 5 and 11 as describing gapless lists of successive generations, young-earth creationists conclude that the age of the earth must be no more than 7,000-10,000 years. A straightforward reading of the flood account in Gen. 7-9 leads to the conclusion that the flood was global and lasted approximately a year. Evolution is ruled out by, among other things, interpreting the creation account as relating direct acts of God, by the scriptural statement "and God saw that it was very good," ruling out millions of years of death implied by evolution, and by the shortness of the available time. Seven to ten thousand years is not enough time for evolution. Young-earth creationists view the fossil record as the sediments deposited by the flood.

Glenn Morton is a geologist and a Christian. Although he was once a young-earth creationist, the compelling evidence of the earth's age he encountered in his work led him to an agonizing reappraisal of his faith and his understanding of how the Bible should be interpreted. Happily, Morton exited from this reappraisal a Christian. He no longer subscribes to the young-earth view, however, and this book explains why. In addition, it provides an alternative harmonization of Genesis and science which honors Scripture while treating the physical evidence honestly.

Despite his acceptance of an old earth and evolution, Morton remains convinced that the Bible must be interpreted literally, except where compelling evidence dictates otherwise. The book is a tightly reasoned, meticulously documented interpretation of Scripture and physical evidence which aims to show that acceptance of an old earth and evolution do not require the Christian to abandon a straightforward, honest reading of Scripture. In the process of developing his scenario, Morton derives insights which demand serious attention.

How then, does Mr. Morton make his case? First he shows that the creation days can be understood to be twenty-four hour days in which God announced what he was about to begin creating. The actual realization of the creation took longer, but God set in motion all the required processes in six literal, 24-hour days. Morton is not a deist, however. He sees continued involvement by God in oversight of his creation.

In Morton's harmonization, the origin of man occurred about 5.5 million years ago by a direct intervention of God. While the 5.5 million year figure violates the time scale creationists infer from the genealogies, Morton shows that the phrase "so-and-so lived x years and became the father of y" can as easily mean that at age x so-and-so

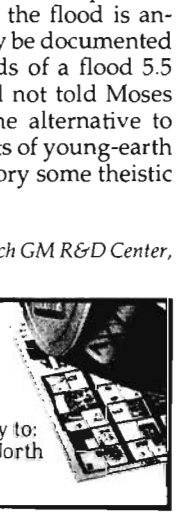
became the ancestor of y, and that this is a legitimate interpretation of the Hebrew.

While such an ancient origin of man might seem to cause a problem with genealogies, it solves a problem with the flood of Noah. As a geologist, Morton learned early in his education that there is no evidence for a world-wide flood occurring about 2350 B. C. True, there are few places on the surface of the earth that show no evidence of ever having been flooded, but the flooding of various locations occurred at different times, and there is no time when every location was flooded. Morton's solution for the flood is the filling of the Mediterranean about 5.5 million years ago. There is ample geological evidence that prior to 5.5 million years ago, the Mediterranean was a deep valley. The total inflow from rivers and rainfall did not exceed the water loss by evaporation, and a land bridge at Gibraltar kept the Atlantic Ocean out. This land bridge collapsed, causing a cataclysmic flooding of the Mediterranean.

Some implications of this scenario may seem unsettling. For example, so-called modern man did not appear on the scene until some 100,000 years ago, implying that Adam and his descendants, including Noah, were most likely one of the earlier hominids, such as *homo habilis*. However, this does not imply that Noah was some sort of subhuman. The physical differences between these hominids and later men do not necessarily imply that they were genetically different. Dogs are all the same species. But a fossilized Chihuahua and a fossilized Malamute might be mistaken for different species if these two fossils were found and dogs were not extant today. Furthermore, fossil differences cannot tell us whether modern man and earlier hominids differed spiritually.

Reading *Foundation, Fall and Flood* can be tough slogging at times, because of the huge volume of detail presented. But the detail is well organized to support the central theme of the book, and the reader who persists will be rewarded with fresh insights into how Scripture and scientific knowledge can be integrated. If Morton's scenario is correct, the question of whether the earlier hominids were human is answered, at least in part. The question of why the Bible tells us so much about the flood is answered. A flood in 2350 B. C. would surely be documented in the literature of many nations. Records of a flood 5.5 million years ago might be lost had God not told Moses about it. Morton's scenario is a welcome alternative to the disconnected, contradictory arguments of young-earth creationists and the overreliance on allegory some theistic evolutionists are prone to.

Reviewed by Bill Hamilton, Vehicle Systems Research GM R&D Center, Warren, MI 48090-9055.



EINSTEIN LIVED HERE by Abraham Pais. New York, NY: Oxford University Press, 1994. 282 pages, index. Hardcover; $25.00.

Abraham Pais is a well-known theoretical physicist, who in recent years has devoted himself to the history of science. He knew Einstein personally from 1946 until his death in 1955. In 1983 Pais's biography of Einstein, *Subtle is the Lord*, won an American Book Award. This book is a companion volume to his earlier biography, providing new inputs, reproducing a few previously published articles, and devoting the entire second half of the book to discussions of Einstein and the press. The epigraph he has chosen for the volume is a quote from Einstein from the *New York Times* in 1944, "Why is it that nobody understands me and everybody likes me?" although he is quick to point out that the statement is not precise. The central purpose of this book is to show how Einstein was perceived by the outside world of non-scientists. The extensive treatment of "Einstein and the press" is the result of the author's conviction that "the world-wide nature of his renown was the result of the attention he had received from the media."

In spite of Einstein's phenomenal reputation and contributions to theoretical physics during the earlier years of his life, and his role in national and international affairs before and during the difficult days of World War II, it might be inquired as to why this biographical work should be reviewed in *Perspectives on Science and Christian Faith.*

Einstein's personal family life was a tragedy. He fathered a child, who was never heard of again, before his marriage to his first wife. After their divorce, he remarried. The second marriage was also unhappy, and Einstein had several affairs before the death of his second wife. Pais says of him, "To be creative in establishing lasting deep human relations demands efforts that Einstein was simply never willing to make. His full creative exertions went completely and always into science." Perhaps here we find an answer to the question why so few dedicated Christian scientists have ever won the Nobel Prize. Einstein "did not really care for teaching classes, and ... never delivered a Ph.D."

Although at several critical junctures of philosophical discourse Einstein used the word "God," he was by his own profession not a traditional, religious Jew. He "went through an intense religious phase when he was about eleven years old. ... His brief religious ardor had left no trace, just as in later years he would often wax highly enthusiastic about a scientific idea, then drop it as of no consequence." He wrote, "Through the reading of popular scientific books I soon reached the conviction that much in the stories of the Bible could not be true." He did not "become *bar mitzvah* ..." He did not believe that "the course of events can be influenced by prayer ... addressed to a supernatural being." He could not "conceive of a God who rewards and punishes His creatures, or has a will of the kind that we experience in ourselves." He did not believe in "a God who concerned himself with the fates and actions of human beings." At the same time, however, he said that "all the finer speculations in the realm of

science spring from a deep religious feeling," and "science without religion is lame, religion without science is blind." His statement that "God does not play dice" was his way of stating "that he could never stomach the abandonment of classical determinism and classical causality, nor that our physical knowledge depends on specifying how that knowledge is acquired, how experiments are set up." Pais reflects on this with the words, "I have often wondered, why did this man, who contributed so incredibly much to the creation of modern physics, remain so attached to the nineteenth-century view of determinism and causality? — but have never been able to produce a satisfactory answer." Again Einstein said, "Honestly I cannot understand what people mean when they talk about the freedom of the human will."

Concerning the relationship between Einstein and the press, which occupies the last half of the book, Pais writes, "To Einstein applies *par excellence* the whimsical yet profound definition of a celebrity: a person who is famous for being well-known," and cites 297 references in newspapers and magazines to make his point. As Einstein's scientific contributions waned in the later years, "the press grew ever more ecstatic about this work." In these years Einstein also became well known for a number of pronouncements in the political area: on pacifism, supranationalism, and civil rights.

This is a well-written, strongly documented account of the life and thought of a scientific genius of recent years. It poses a challenge for the reader to reassess what is truly important in life and how best to invest one's time and efforts if a God-serving witness and lifestyle are desired.

(Reviewer's Footnote. When I was a new graduate student in physics at Princeton in 1946, I was living temporarily in a room in a home in town before moving to the Graduate College. One day a young man, recently arrived from the Netherlands, rang the door bell to inquire whether a room might be available for rent. That man was Abraham Pais.)

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

SCIENCE AND THE BIBLE by Henry M. Morris. Chicago: Moody Press, 1986. 128 pages, bibliography, index. Paperback.

Imagine a world in which the practice of science is primarily qualitative. A world where the highest use of science is seen as that of supporting one group's interpretation of secondary references in an ancient and honorable book on ethics. A world in which the primary rule of science, "assume no supernatural," is replaced by its exact opposite, and "God-of-the-Gaps" is an adequate explanation. A world where only two concepts of life's origins are thinkable: God-caused *ex-nihilo* appearance in six days, or accidental development with no outside intelligent involvement.

Welcome to Henry's World, the world of Dr. Henry M. Morris, a kind, gentle and well-meaning man, who has guided the ICR (Institute for Creation Research) for many years. Welcome to a world in which dissent implies satanism, skepticism implies evil thinking, where shades of gray seldom exist. This book, first issued in 1946 as *That You May Believe*, was revised and reissued in 1951 as *The Bible and Modern Science*. Its popularity prompted reprinting in 1956, 1968 and 1979, and now, again, revised and updated, it is reissued under a new title. Its purpose is not to explain science, but rather "to win people to a genuine faith in Jesus Christ ..." And so it may, but not people who understand science. For these, it may be an excuse to turn away from our faith, for the science it portrays is myopic, irrational, avoids the hard questions, and takes little note of real science, either historically, or in this age.

As the leader of the "Religion & Science" section of Compuserve's *Religious Issues Forum*, I regularly see ICR-trained people come by to participate, enthusiastically at first. A week or so later, they generally creep away, bloody and bowed; their ideas on science severely shattered. Tight definitions, quantification, understanding of the issues and, in particular, understanding of opposing positions are tested in our forum, and ICR-trained people are continually found wanting. It is because they have come from Henry's World, and that world does not equip them to compete in the battlefield of modern ideas!

Mentioning all of the problems in this book is not practical in a short review, but a few stand out:

Page 8. Morris claims "thousands of scientists" who support an inerrent Bible. He does not mention that many of these find his ideas quite fantastic. He claims "multitudes of Christian believers" also in support, as if this was meaningful (How many people read horoscopes daily?). In Henry's world, "what most people think" has scientific validity.

Page 13. "It has only been a few centuries since the scientists and teachers all believed in a flat earth." Henry's world does not have the same secular history as ours!

Page 86. The "world population" argument is still cited as support for a young earth, the author not grasping that it is an argument only for the possibility of a young earth, not an argument against an old earth. Logic is not part of science in Henry's world.

Page 87. Morris continues to assert that 80,000 animals could be herded into the ark in a single day (Gen. 7:13-16). No mention of the problems with insects (1,000,000 species), spiders (35,000 species), or worms, snails, freshwater fish, corals, sponges, etc. He makes no mention of the logistical problem for eight (highly motivated) individuals to herd these life forms aboard the ark and bed them down for a year-long voyage — at the rate of about one

pair every two seconds for a 24 hour period! Let's allow him the use of the doomed townspeople. And give him the full seven days from the Lord's command (Gen. 7:4) to the ark shutting. Still not enough time. In Henry's world, this is not a problem. Perhaps he should watch a circus set up and tear down!

The influence of ICR on this country is extensive; their publications are to be found in thousands of conservative Christian churches. Those of us who see science differently need to know what Morris is saying. For when students come to us, whose training in science is limited to the world of ICR, what shall we tell them? If we are silent, their faith, not founded on the rock of Christ, but on the sands of Henry's world, will likely founder.

Put this book on your shelf then — right next to that of Immanuel Velikowski. But it is Morris who is the man of influence. Make no mistake about that. He it is that we will have to deal with in the hearts and minds of students yet to come.

Reviewed by John W. Burgeson, IBM Market Research (retired) 6715 Colina Lane Austin, TX 78759

RIVER OUT OF EDEN: A Darwinian View of Life by Richard Dawkins. Science Masters Series. New York, NY: Basic Books, 1995. xiii + 172 pages, index. Hardcover, $20.00.

In *River Out of Eden*, Richard Dawkins, author of *The Selfish Gene* and *The Blind Watchmaker*, writes with two chief purposes in promoting the gospel of naturalistic Darwinism: to "accord due recognition to the inspirational quality of our modern understanding of Darwinian life" and to "convince my readers that 'ways of making a living' [i.e., the vast array of diversity in evolutionary development in organisms] is synonymous with 'ways of passing DNA-coded texts on to the future'" (xii). Using simplified terms, illuminating (though sometimes overly ambitious) illustrations, and disarming humor, Dawkins attempts to explain to the non-expert the plausibility of Darwinian evolution as he has done more technically in other places.

In his first chapter ("The Digital River"), he explains how the "river out of Eden" — the river of information (DNA) — accounts for speciation (i.e., the 30 million "branches" of this river). Through accidental geographical separation and the resultant variations this produces in a species, interbreeding among animals from the same species eventually becomes impossible (e.g., red and grey squirrels). Chapter two ("All Africa and Her Progenies") tracks human origins back to African Eve (or Mitochondrial Eve), who lived fewer than 250,000 years ago. In this chapter, Dawkins crassly asserts, "Scientific beliefs are supported by evidence, and they get results. Myths and faiths are not and do not" (p. 33). Not only does such a remark reflect a naive positivism (which is self-refuting) and philosophical amateurism (by reducing all reality to the scientific realm — an example of the fallacy of misplaced concreteness), it overlooks the explanatory capacity of a religious system (such as theism) to plausibly account for the origin and design of the universe, the emergence of first life, and the existence of objective morality. (His later assertion that a miracle is nothing more than "the total absence of explanation" (p. 83) makes sense only if philosophical naturalism is true — an unproven assumption that Dawkins continually makes in his writings.)

Chapter three ("Do Good by Stealth") seeks to show how complexity and beauty are not obviously the result of design but of gradualness in evolution. To prove his point, Dawkins discusses the gradual emergence of the "dance language" of bees and the adequacy of even semi-blindness for survival among certain animals.

The fourth chapter ("God's Utility Function") begins by pointing out that humans have "purpose on the brain" (p. 96). That is, we find it hard to look at anything without wondering what its purpose is. (Could this possibly reflect the *imago Dei*?) Natural selection, however, answers the question of design. Dawkins goes back to the social habits of the bee to illustrate his argument. Dawkins concludes this chapter by the stark admission that the purposeless universe is "nothing but blind, pitiless indifference" (p. 133).

The final chapter ("The Replication Bomb") tracks the progression of life (which is "the replication bomb") from its "spontaneous" emergence and self-replication on a life-permitting satellite of Sol (p. 137) through its passing a number of thresholds to its final stage ("the Space Travel Threshold," in which life is transported to other pockets of the universe for colonization and self-replication), which Dawkins admits is highly unlikely.

Despite Dawkins's attempt to defend Darwinism, serious questions emerge that go beyond empirical method and speculative extrapolation to significant philosophical presuppositions: Why can't the finite universe's origins be plausibly explained by a powerful Creator? At what point is it *irrational* to hold that pure chance is a plausible explanation for the complexity of cosmic constants that make life possible in favor of intelligent design? What indicators could Dawkins give that particular phenomena in nature are best explained by God's creative/sustaining power over against purely naturalistic causes? How does Dawkins *know* that God was not involved in the process of evolution? When Dawkins admits (in *The Blind Watchmaker*) that each living cell's nucleus contains "a digitally coded data base larger, in information content, than all 30 volumes of the *Encyclopedia Britannica* put together," why, apart from metaphysical prejudice in favor of naturalism, should God be excluded from serious consideration as the primary or secondary cause for such complexity? In this case, when it comes to choosing between unassisted random processes versus divine design as the ultimate cause for such complexity, theism hardly seems the less-credible option.

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EVOLUTION, GUILTY AS CHARGED by Frederick C. Kubicek. Shippensburg, PA: Treasure House, 1993. 176 pages, index.

The author of this book has only the highest aim in mind — that of bringing honor and glory to God. But his misunderstanding of the nature of science, his confusion over the nature of evolutionary theory, his dogged adherence to one possible interpretation, long discredited, of the book of Genesis, and his unfortunate mindset which sees enemies where none exist have led him to produce a volume which will surely wreak more mischief than good among much of its target audience. It is likely that more than one young Christian, who has "learned" the story of origins from this book, will find his faith shattered when encountering the data and arguments of the real world of science.

The book has many obvious errors, such as calling Michael Denton "an evolutionist," coining a new term "entrophy," equating that term directly with the second law of thermodynamics, and alternately using the spelling "Segrave" and "Segraves" as the person associated with the Scopes II trial. The Christianity it presents is a sham; the science it presents is dogmatic nonsense. In short, this book is not recommended.

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THE SCARS OF EVOLUTION: What Our Bodies Tell Us About Human Origins by Elaine Morgan. New York: Oxford University Press, 1994. 196 pages, index. Paperback; $12.95.

This book is a summary of the arguments to support the Aquatic Ape Theory. The theory explains the many unique features of *homo sapiens* by an aquatic environment or wetland ecosystems in which our earliest ancestors evolved from the arboreal apes. The unique features, called "scars of evolution" by the author, include the bipedalism, loss of fur (virtual nakedness), body fat distribution, tears, sebaceous glands, eccrines and vanished apocrines, descended larynx (crossing of the trachea and oesophagus), absence of oestrus, ventro-ventral copulation, and others. The author believes that these scars could have developed only in an aquatic and not in a savannah environment, in contrast to the Savannah Theory of human evolution.

The book is well organized and generally well written, and the text is comprehensible at the high school level. However, although a bibliography is given at the end of the main text, no reference is marked in the text. The bibliography is also incomplete. For example, in Chapter 2 alone, as many as seven of the important references cited are not included in the bibliography. Thus, the readers will not be able to find the original sources of these references. This is a major deficiency of the book.

The author has not mentioned some other oddities in our bodies, such as the male's nipples, toes, baby teeth, wisdom teeth, and unceasing growth of finger nails. Are they also "scars" of human evolution? Any theory of human evolution should justify these seemingly useless oddities, as they make our Intelligent Designer look stupid.

The word "scars" in the book's main title may be confusing. A scar is a mark left by the healing of a wound. In human evolution, did our hominid ancestors really encounter wounds and healing to have produced those "scars" that are mentioned in the book? I think the words "peculiar products," "oddities," and "strange features" are more explicit than "scars" for the title. On page 157, where the author discusses mating of a she cat, the precise word "queen" should have been used in place of "she cat." A queen is a mature female cat that can mate; a she cat can be an immature female cat which cannot, does not, and would not mate.

This book nevertheless should interest those who believe in evolution, creation, or both (yes, there are such people). The unique features of and the oddities in our bodies would indeed challenge these people to come up with their rational commentaries. Incidentally, Elaine Morgan has just written another book entitled, *The Descent of the Child: Human Evolution from a New Perspective*, in which she adds new evidence to support the Aquatic Ape Theory. I am anxious to see it in print.

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

AN EARTH-CAREFUL WAY OF LIFE: Christian Stewardship and the Environmental Crisis by Lionel Basney. Downers Grove, IL: InterVarsity Press, 1994. 168 pages. Paperback; $9.99.

This book, written by an English professor at Calvin College, is important for scientists because it continues a tradition of writing going back at least to Thoreau that questions modern science and technology. Basney provides personal reflections on our current culture that raise fundamental questions about its sustainability. The book is not a theology of creation or a list of "100 simple things you can do to save the earth." Instead, through reflection on everyday activities like working or shopping for food at the supermarket, Basney helps the reader to understand the easily overlooked sinfulness of aspects of modern Western culture. Basney makes accessible and extends many of Wendell Berry's insights, while providing some historical context and very direct suggestions for repentance. We would do well to pay attention.

Basney claims that the way of life we have chosen and idolized cannot continue. One aspect of the problem is our assumption that technology is morally neutral, its goodness depending on how it is used. Basney claims that many technologies are inherently bad and that a cen-

tral problem in our culture is the use of machines to replace our direct human interaction with nature. This leads us to think of nature as another industrial component available to be exploited without much care. A related aspect of the problem is that science and scientists are controlled by money and the market. Lacking a community in which to meet their basic needs, scientists are forced to sell their skills on the market to make a living.

This makes it difficult to orient science and technology toward Christian service. Like most church people, we lead split lives, reserving our Christian ideals for Sunday, but surrendering our practical lives to the technological culture that systematically destroys community and God's good creation. Basney's solution to these problems is for each of us to again take some responsibility for our basic subsistence and the part of God's good creation that supports our life.

In a brief book of reflections, Basney obviously cannot develop these themes with the full depth that they deserve, but his writing is urgent and insightful. He intends to spur his readers toward awareness and repentance, for he sees that the environmental crisis is at base a spiritual crisis, not a technical one. Basney raises issues that all ASA members must struggle with as we attempt to dedicate our science to the service of God. Highly recommended.

Reviewed by C. R. Boardman, graduate student in environmental studies, UW Madison, Madison, WI 53706.

LIVING WITHIN LIMITS: Ecology, Economics, and Population Taboos by Garrett Hardin. New York: Oxford University Press, 1993. 339 pages, index. Hardcover.

This book both captivates and exasperates. Garrett Hardin presents a logical and convincing re-interpretation of Thomas Malthus' theory of population first proposed in 1798. Like Malthus, Hardin foresees a pessimistic future because population growth cannot continue indefinitely in a finite world. But Hardin goes beyond theoretical explanation to also promote strategies for population control, such as eliminating foreign aid and banning immigration. These strategies, rooted in social Darwinism, affront those who accept the biblical command to love one's neighbor, and extend Christ-like compassion to the poor.

Garrett Hardin is Professor Emeritus of Human Ecology at the University of California, Santa Barbara. He is particularly known for "The Tragedy of the Commons" (*Science*, 1968) and "Living on a Lifeboat" (*BioScience*, 1974), both of which are espoused in this book.

The book is written for a general audience, using a mix of scientific explanation with historic anecdotes and philosophical musings. The 27 chapters are organized into three parts, moving generally from population theory to criticisms of contemporary population solutions to prescriptions of how to live within a resource-limited world.

The population problem is defined relative to available resources. Malthus, an English economist and minister, is credited with the mathematical explanation that population growth is exponential while increase in subsistence (food) is arithmetic. Contrary to theory, the increase in population over the past 200 years, the highest in human history, has been sustained by procurable resources. Hardin amends Malthus' theory with a Malthusian demostat, a type of cybernetic or homeostatic regulator which acts to maintain an equilibrium between population and resources. Natural forces regulate the demostat through negative (e.g., starvation, disease) and positive (e.g., fertility rate) feedback. However, the homeostatic equilibrium or demostat is periodically reset by advances in human ingenuity (e.g., technology). This resetting of the demostat is the main reason why Malthus's vision has, as yet, not been fulfilled.

While Malthus identified food as a limiting resource, Hardin focuses on finite living space and dependence on non-renewable fossil fuels. Extra-terrestrial migration is rejected as a means of increasing habitable space. Nuclear energy is discounted as a viable alternative to fossil fuels because of its environmental and technological risks. According to Hardin, the resource side of the homeostatic equilibrium is at its limit, but population continues to grow. The only way to live within the limits imposed by available resources is to contain population growth.

Hardin knows that controlling population is not about abstract theory but human behavior. He disparages behavior motivated by the faith qualities of compassion and charity, and substitutes them with a psychological motivator: "reward determines behavior." Hardin advocates withholding all forms of foreign aid, except information sharing, unless poor and populated countries demonstrate population control. He invokes his analogy of life boat ethics whereby poor nations of the world are swimming around a life boat with rich countries already on board, but which cannot possibly hold everyone without certain death for all. Hardin clearly places his faith in the demostatic mechanism of natural selection to control population.

The logic of the tragedy of the commons is used to denounce the welfare state generally, and the "medical commons" in the United States specifically. For example, Hardin decries the high cost of neonatology which benefits only a few infants but whose cost is shouldered by all.

Hardin goes beyond biology, demography, and ethics to also include a religious perspective. He extends the conventional bounds of religion to fittingly label "progress of economic growth" and "ideology of western individualism" as religions, but faith and spirituality are treated simplistically, even disdainfully. Scripture is quoted now and then, and occasional reference is made to Judeo-Christian beliefs and events, sometimes reverently but mostly sarcastically. Hardin, a non-Buddhist, claims a Buddhist path of looking for the causes of human sorrow before seeking freedom from it. This is thin religious veneer.

Hardin's faith in natural selection prevents him from integrating a meaningful spirituality or faith perspective in this inquiry into a major human predicament.

This book raises penetrating questions for Christians about population growth and control, especially those who readily defer to the cultural mandate. There is an urgent need for advanced Christian thought on population and resources. This book demonstrates the type of thinking which Christians will need to confront.

Reviewed by Harry Spaling, Department of Geography, University of Guelph, Guelph, Ontario, Canada N1G 2W1.

CARING FOR CREATION: An Ecumenical Approach to the Environment Crisis by Max Oelschlager. New Haven and London: Yale University Press, 1994. 285 pages, bibliography, index. Hardcover; $30.00.

Oelschlager is professor of philosophy and religious studies at the University of North Texas. In this book he wants to show how religion can help us clean up our ecological mess. Religion is not limited to the Christian and Jewish religions, although Oelschlager discusses the Judeo-Christian tradition more extensively.

The writer hopes that religious awareness and action may change the direction in which the indexes of environmental degradation are moving. Oelschlager confesses that in the past he thought that Christians caused the ecological crisis. Gen. 1:28 gave man dominion over creation. Now he realizes that this dominion is no more than being stewards for God. That is not to say that Oelschlager is a Christian. He wants *all* religions to act to save the world. Modern life is an ecological disaster. Government and business are only considering short-term economic, and egotistical arguments to rule. Many point out that future generations must pay huge bills to correct the damage done to the environment. Politicians are only offering short time solutions, if any. Most people think that science will find a solution. In the past decades, science has not solved the problem and the disaster is growing.

Oelschlager believes that only religious people together can produce a voice strong enough to reverse the tide. He calls religion a legitimating narrative and discusses it following a Wittgensteinian socio-linguistic path. Religious discourse remains a language of the heart which speaks about purposes and issues outside the modern materialistic vocabulary of utilitarian individualism, he says. The language of utilitarian individualism is strong, and institutionalized in our political economy. It dictates governmental social policy and influences everything else, including our character. This last statement is strong, but I think that Oelschlager is right. We are often like our neighbors, who are just living for the moment and a good income. For that reason this book is a call to action for us all, even if we do not agree with the writer's background.

In chapter three the writer describes the administrative despotism, which evolves out of the political system we now have. It is virtually impossible to change direction politically. Political parties are almost indistinguishable. Consequently, administrators rule. Oelschlager claims (p. 109) that the church is perhaps the only institution in modern society which can resist administrative despotism. He shows how several religions are committed to care for creation. He provides Christians with biblical texts, which show that they must take care of their surroundings. We are God's stewards. Now, says he, the economist is high priest and GNP the holy Grail. Even ecological questions are considered from an economic point of view. The author rightly shows that economics is not value free. Some economic growth undercuts the possibility of a good society, and he gives examples. Religion can show how to expand the cultural conversation.

Oelschlager discusses the views of several Christian and Jewish conservative, moderate, and liberal churches and synagogues. He even proposes plans for church education based on the Bible. He does not shy away from original sin and its consequences. One great plus of the book is that he shows how Christians may work together to achieve the purpose of taking care of creation. Only religion can achieve that purpose.

I heartily recommend this book to all Christians, scientists and non-scientists. Christians must take care of God's creation. Maybe the concerted effort of churches can reverse the ecologically disastrous direction in which we move.

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CHRISTIANITY, EVIDENCE AND TRUTH by Roger Forster and Paul Marston. Crowborough, Great Britain: Monarch Publications, 1995. 113 pages, index. Paperback.

Forster has an M.A. in theology and mathematics, while Marston has a B.S. in economics, an M.S. in statistical theory, another M.S. in the history and philosophy of science, and a Ph.D. in science/religion issues.

This is a brief book on apologetics written from an evidentialist perspective. The authors review some of the standard evidence for the existence of God. There is an attempt made to interject humor into the discussion with some amusing cartoons at the beginning of each chapter.

The book is fairly easy to read with the exception of part of chapter 5 which deals with biology in a technical manner. As one who eschewed physical science courses throughout my college career, I was lost when the discussion turned to eukaryotic and prokaryotic cells!

While the basic material will be familiar to anyone

who has done much serious thinking about apologetics, the book does have some new and fresh ways of presenting old ideas. I enjoyed the card trick illustration one of the authors uses to illustrate the chance vs. design debate (p. 32).

The main weakness of the book is the same weakness found in all books which argue evidentially for the existence of God. You end up with statements like these: "Our physical universe *seems to* cry out that it was designed" (p. 19, italics added), and "... the Christian view makes overall *the most coherent sense* of reality ..." (p. 21, italics added). While I believe there is a place for evidentialism, when it stands alone it offers not certainty concerning God, but possibility. *It seems that God possibly exists* is the bottom line for evidentialism. This is inevitable when one begins with evidence as perceived and evaluated by fallible human beings. The problem is that evidence is subject to different interpretations and therefore can only lead to "maybe God exists." The intelligent unbeliever can easily respond by saying "I interpret the evidence differently."

The book would have been strengthened by having at least a chapter on presuppositional apologetics where the argument for God is reversed. Instead of starting with man and trying to reach God, presuppositionalists start with God and then challenge the unbeliever to give a sensible explanation for reality apart from presupposing the existence of God (e.g., Cornelius Van Til's *The Defense of the Faith*). In my own days of confusion and unbelief, I would not have been impressed with the arguments in this book. I agree with the evidentialists conclusions now, and I enjoyed reading the book, but that is only because I am a converted Christian.

The book seems to be aimed at college students or new Christians. It could be a useful tool to put into the hands of someone who believes that science rules out the possibility of God's existence. If an unbeliever will even admit "perhaps God exists," he or she may then be more open to the claims of Christ. However, at some point it is important for every Christian to come to the realization that nothing makes sense apart from the Christian/biblical world view being presupposed. While the human mind can sometimes correctly understand evidence in the natural world, the notion than our human wisdom is adequate to reach up to God is arrogant at worse and foolish at best. We must come to grips with Paul's inspired revelation which declares, "the word by wisdom knew not God" (1 Cor. 1:21) and his ironic statement "the foolishness of God is wiser than men" (1 Col. 1:25).

Reviewed by Richard M. Bowman, Director of Research and Publications, Disciple Renewal, Lovington, IL 61937.

This periodical is indexed in **Religion Index One: Periodicals, Index to Book Reviews in Religion, Religion Indexes: RIO/RIT/IBRR 1975- on CD-ROM** and **ATLA Religion Database on CD-ROM**. Published by American Theological Library Association, 820 Church Street, Evanston, IL 60201-5613, E-mail: atla@atla.com, WWW:http://atla.library.vanderbilt.edu/atla/home.html.

IRRATIONALALITY: Why We Don't Think Straight by Stuart Sutherland. New Brunswick, NJ: Rutgers University Press, 1994. ix + 357 pages, bibliography, index. Hardcover; $24.95.

Is there any hope that humans can learn to make rational decisions that will enable responsible and optimal actions in their daily lives? Reading this book will make one rather pessimistic about the answer to that question. Sutherland's thesis is that everyone from the completely unsophisticated to the highly trained professional is irrational for at least two reasons: one is their unrecognized irrational nature and the other is the fact that even intellectuals shy away from the hard thinking required to make rational decisions.

Sutherland began his career as a journalist but is now Professor of Psychology at the University of Sussex and has written extensively on psychological subjects. *Irrationality* is written for a lay audience, although the work is well footnoted and has a short bibliography. The narrative flows smoothly, is enlivened with a dry wit, and contains a minimum of clearly explained technical jargon. Each chapter is closed with a list of "morals" drawn from the data.

After an introductory chapter setting forth the folly of the human race, Sutherland devotes 18 chapters to individual areas of failure. For example, the American fleet was completely surprised at Pearl Harbor because Admiral Kimmel ignored warnings from above and obvious evidence from all around him, even refusing to believe that the Japanese sub sunk outside the harbor was Japanese. He was, naturally, supported by his staff, who were busily being a good example of the irrational tendency of subordinate staffs and committees to rubber stamp nonsense advocated by a strong leader. Sutherland's point is that this is "normal" behavior; we all do it every day, albeit usually without the headline grabbing results of Kimmel's blunder.

Ingeniously designed experiments have demonstrated that we cannot concentrate on enough of the evidence at the same time, we selectively remember the evidence, and when the results are in we "remember" that the results are what we had predicted all along, even when that is not true at all. Two chapters follow setting forth methods that can be used to make rational decision, one based on a modern statistical version of Ben Franklin's pro and con lists, and the other based on calculating utility, broadly based. He concedes that these methods are too cumbersome for any but really important decisions, however. A chapter on the paranormal deals mostly with magic, clairvoyance, astrology, and related disreputable activities, by which he rejects all supernal. In fact, early in his book, he unwittingly demonstrates his own categories of the irrational, the "halo effect" and distorting the evidence, by classing the squeaky clean Billy Graham with religious charlatans and profiteers, specifically with Jim Bakker.

Sutherland provides some hope for a methodology for major decisions by government and corporations or perhaps major life decisions of an individual, but little else is provided for the individual except the suggestion that a habit of rational thinking will have a snowballing effect.

The final summary chapter, "Causes, Cures and Costs," is good as far as it goes, but seems a bit weak in view of the overwhelming pessimism of the preceding material.

The chapter headings give a nice gross structure; unfortunately, there is within the chapters a disturbing amorphous quality to the structure of the presentation. It is an entertaining string of results of psychological experiments, anecdotes, theoretical examples, and comments, but to get the full benefit of the material, one must read critically and thoughtfully, organizing and analyzing for oneself, an activity which the bulk of the book seems to be assuring the reader that he cannot and will not do. The "Moral" at the end of the chapters is often insightful and always contains at least one humorous, even facetious, point, but seems weak. The book does not adequately summarize the points made in the chapter, nor does it provide satisfactory guidance for doing something about the doleful situation. Sutherland's confidence in statistics is unconditional.

On the other hand, the book brings to us a comprehensive and impressively documented exposé of the ways we all misinterpret evidence, ignore evidence, simply refuse to believe the obvious, and generally mess up our lives. If we refute the author's thesis by actually doing a significant amount of "hard thinking" we are bound to improve our personal and professional lives and the lives of those affected by our decisions.

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CHRISTIAN SCIENCE IN THE AGE OF MARY BAKER EDDY by Stuart E. Knee. Westport, Connecticut: Greenwood Press, 1994. 158 pages, index. Hardcover; $49.95.

Peculiarities and contradictions appear to have been the only consistent aspect of the life of Mary Baker Eddy, the founder and high priestess of the Christian Science Movement. This book chronicles many of these.

Eddy's relationship with her parents was peculiar for the early nineteenth century as she seemed more heavily influenced by her father than her mother. Likewise, her relationship with her son was hardly what one would expect from a woman who liked her adherents to call her "mother." She was generally an absent mother until her son was twelve when she essentially abandoned him to be raised by relatives and friends. Knee writes, "Before 1866 she dealt with this dilemma by rationalization. After 1866 she did so by an interesting twist: she became the 'mother' to a community that she could not be or was not capable of being individually."

Around the same time Eddy became interested in medicine. About the time of the Civil War, the medical profession in America was beginning to come into its own. Eddy began to study some of what was going on and began to dabble with drugs as a means of healing. She claimed to have healed a person using drugs that had been so diluted as to have become placebos. "There was my first discovery of the science of the mind," according to Eddy.

Though at times unwilling to be much involved in many of the workings of her organization, and thus avoiding conflict, Eddy certainly did not lack in ego. In 1900 she wrote, "Jesus was not Christ. Christ is spiritual ... Jesus was a Godlike man. I am ... a Godlike woman ... Jesus was not understood at the time [he] demonstrated ... so I am not." Knee writes, "Her frequent allusions to abandonment, friendlessness, loneliness, suffering, martyrdom and spiritual — not bodily — resurrection indicate that she reserved a position for herself at the heart of the drama rather than at its periphery." She also once told a convert, "I was born an unwelcome child but I mean to have the whole world at my feet before I die."

After examining the beginnings of Eddy's physical and philosophical life, Knee traces the history of the Christian Science movement, the responses from society, both church and secular.

The response to Eddy's work was, not surprisingly, a point of division among the religious community. In England, many in the nobility began to embrace Christian Science. English theologians responded by criticizing "Science's rejection of the cross, public prayer and Anglican communion." The criticism "was stimulated by a desire to defend the scientific age ... Christian Science, clerics intoned, was unscientific." The response to Christian Science from the fundamentalists, evangelicals, Baptists, Presbyterians, and Methodists tended to be much more negative. Knee contends much of the Methodist opposition was due to a large loss of membership to Christian Science. Among the criticisms was Christian Science's inclusion of the evil eye, witchcraft, and voodoo and lack of participation in Christian missionaryism. Knee writes, summarizing other criticisms, "the 'gospel' of Christian Science, if it had one at all, bore no similarity to Christ's. The Presbyterian *New York Observer* referred to Science as 'a craze of speculators and clairvoyants.'" Among the American Episcopal Church, the Congregationalists, and the Unitarians, Eddy found support, though rarely enthusiastic.

Particularly interesting is Knee's discussion of Mark Twain's dabbling with Eddy's philosophy. Knee paints a picture of Twain that is different from the usual perceptions. He shows us a guilt-ridden man going through many financial problems who seeks "mind cures" for his ailing daughter. The death of his daughter, in spite of mental science, drove Twain further into guilt and "his work was informed less by humor and hominess than by a certain grayness tinged with bitter memory, cynicism and bleakness." The failure of Christian Science to help his daughter led Twain to write several very scathing articles about Eddy and Christian Science. "Christian Science is for sale and the terms are cash ... in advance. Its god is Mrs. Eddy first, then the dollar." He also stated

that Eddy's followers would one day replace Virgin Mary with Matron Mary.

Knee does a wonderful job of bringing together the philosophy and history of the day and the philosophy and history of Christian Science. The result is a highly interesting, insightful treatment of Christian Science that is likely to be enjoyable reading for anyone interested in learning about an unusual woman and her legacy.

The book can be ordered with a credit card by calling: 1-800-225-5800.

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THE FACTS OF LIFE: Science and the Abortion Controversy by Harold J. Morowitz and James Trefil. New York: Oxford University Press, 1992. 179 pages, index, illustrations. Hardcover; $19.95.

Having been charmed by previous "science meditations" written by popular science writer and physicist James Trefil, I was anxious to read his contribution to the abortion debate written in collaboration with his colleague, biologist Harold Morowitz. Setting out to provide a summary of current scientific literature relevant to the abortion issue, the authors argue from paleontology, evolutionary history, developmental biology, neurobiology, and neonatology that abortion on demand up to the twenty-fifth week of gestation is legitimate because it is around this point in fetal development that "humanness is acquired."

According to the authors, what makes us human is our large cerebral cortex. They argue that while at a molecular level we are no different from other living things, our tremendous cerebrum (and its glorious products) makes us unique and serves as *the* characteristic feature of *Homo sapiens*. Nothing is said about what contributions religious or philosophical conclusions about "humanness" make to the abortion debate (and in all fairness, they never pretend to).

Having identified a large cerebral cortex as the obvious human distinctive, they then proceed to demonstrate that its function begins at 25-32 weeks, the period during which humanness is acquired. They argue that synapse formation (rather than brain size) is crucial for neural activity, and this occurs from weeks 21-38. EEG testing can identify meaningful signals at 25 weeks, suggesting the initiation of organized neural activity. This is the basis for their assignment of 25 weeks as the crucial point at which human fetuses acquire humanness. One question never answered was whether neural activity at 25-32 weeks *was the* humanness to be acquired, or whether it *allowed* humanness (some other attribute) to be acquired, i.e. does the ability to perform cerebral functions *make one* a person, or *allow one to become* a person?

Finally, the authors argue that in spite of tremendous advances made in medical technology and neonatology since 1973 (the year of Roe v. Wade) the survival rate for premature neonates born earlier than 25 weeks gestation continues to be very low and before 24 weeks virtually zero. It is suggested that this period of fetal development represents a wall, before which the developing fetus cannot live outside the uterus, and in their understanding, before which the fetus has acquired humanness. The initiation of brain function at 25 weeks, coupled with the realization that fundamental developmental processes necessary for independent fetal survival occur leading up to 24 or 25 weeks of development, provides the basis for their conclusion that humanness is acquired at 25 weeks of fetal gestation.

The authors conclude that while abortion is not desirable; it is a necessary part of living in a less than ideal world. They argue that while a decision as important and sensitive as abortion cannot be made on purely scientific grounds (but they themselves offer no other grounds), we must use scientific information to guide our moral and political judgments. Surely this is a perspective which we in the ASA welcome.

While done in a friendly, inoffensive manner, *The Facts of Life* is clearly designed to defend abortion on biological, unemotional, and a-religious grounds. For example, the authors take pains to discredit the film "Silent Scream," calling it the traditional "pathetic fallacy." They also demonstrate that the often mentioned evidence for the beginning of brain function at eight weeks is a canard passed around carelessly since 1963.

While recognizing that much of the furor of the anti-abortion movement stems from religious or philosophical convictions, and that these convictions are an important part of the process of evaluating the appropriateness of abortion, there is a subtle implication that religious convictions which lead one to conclude that fetuses possess dignity as persons before the twenty-fourth week of gestation, and perhaps even to the point of conception (a point in development which they consider irrelevant to the abortion issue), are unscientific and unreasonable.

While I enjoyed this book and agreed with the approach taken in determining the contribution of biology to the abortion issue, I thought the book failed to take seriously the basic tenet which underlies most pro-life thinking, the spiritual uniqueness of humans. So it is at this point I need to recommend as companion reading to *The Facts of Life* parts 9 and 16 of Dick Bube's "Science and the Whole Person" series, "The Significance of Being Human" *Journal of the ASA* (March 1979) and "Abortion" (September, 1981). As with Horowitz and Trefil, Bube distinguishes between the terms *human* (those organisms possessing a *Homo sapiens* genotype) and *person* (a human creature beyond a certain necessary stage of human development). Acknowledging the process of development necessary for the acquisition of personhood (*humanness* in Horowitz and

Trefil's terminology), Bube used a *biological* argument in agreement with Horowitz and Trefil, but expands the discussion to also account for the soulful (intellectual) and spiritual aspects of humans and how they figure in the abortion debate.

The Facts of Life is written for a lay audience. To those well-versed in biology, the science is rather simple, but the conclusions they draw are new and convincing. It may be a book to share with pro-life friends who in passionate defense of the spiritual uniqueness of humans, ignore the biological components of personhood. If willing to have your personal views of abortion held up to the light of reasoned biological evidence, consider reading this commendable little book.

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EMOTION AND SPIRIT: Questioning the Claims of Psychoanalysis and Religion by Neville Symington. New York, NY: St. Martins Press, 1994. 197 + viii pages, index. Hardcover.

Symington, an Australian psychoanalyst, believes that traditional religion is not relevant to modern man: human sciences repudiated core values of religion. With Freud as its founder, psychoanalysis has explicitly and vehemently abjured religion. Symington claims that the core values of religion are locked away within a primitive religious framework making them unavailable for us in our world (p. 27). He believes that Socrates is a better model than Buddha or Jesus (p. 42). Thus "Reason" becomes God.

In chapter seven Symington defines religion, after telling the history of religion, as he sees it. He says that about 100,000 years ago men started burying their dead, a sign that they honored the individual. Symington calls it the beginning of "primitive" religion. With Socrates, Isaiah, and Buddha, "mature" religion began. Here Symington shows faith in progress through evolution. For Symington the stories about the battles between God and the devil are just a picture of battles between good and evil within us.

The author believes that traditional religion failed to bring true spirituality into the world. Religion caused man to flee the world, rather than reform it. Since psychoanalysts try to heal the inner person, psychoanalysis is, like religion, a spiritual activity. The author thinks that this "spirituality" can save the world and that psychoanalysis works with modern scientific methods. Therefore, Symington concludes (p. 191) that because psychoanalysis is scientific, it is appropriate for our scientific age.

The title of the last chapter is "Science and Religion." For Symington science is religion. In psychoanalysis he uses the scientific method: starting from a hypothesis, he probes inner man. Symington knows that his psychoanalysis is atheistic. The book shows how modern scientific thought can be dangerous for Christians. We must discuss modern science's presuppositions. Only then are we able to see the danger of psychiatry based on the philosophy Symington uses.

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LEAVING THE FOLD by Edward T. Babinski. Buffalo, NY: Prometheus Books, 1995. 462 pages, 4 appendices, index, notes. Cloth; $32.95.

The purpose of *Leaving the Fold* is to give a clear picture of what attracts a person to the fundamentalist faith and what can drive believers away from their religion. There are more than 30 testimonies from people who have left the fold of fundamentalism. The first section is called "Fundamentalism's Grotesque Past." In the next section, eleven testimonies of former fundamentalists who are now more liberal Christians are given. The bulk of *Leaving the Fold* is found in the third section where testimonies are given by former fundamentalists who are now agnostics or atheists.

The author, Edward T. Babinski, is on the staff of J. B. Duke Library at Furman University. Judging from his personal testimony given in the book, he is well-qualified to write on this subject. Before becoming an agnostic, Mr. Babinski was an evangelical Christian who felt he had the "absolute knowledge of life and death" (p. 210).

Over and over in *Leaving the Fold,* it is pointed out that fundamentalists hold to the belief that the Bible is "absolute knowledge" without any trace of error. Professor John Barnhart, department of philosophy at the University of North Texas, put it this way: "I came to believe that without an error-free or infallible Bible to serve as the foundation of the Christian structure, the structure would collapse and possibly morality along with it" (p. 234). Having "absolute knowledge" is one of the attractive things about fundamentalism. Another one is having the "promise of eternal life." Kevin R. Henke said, "How could I live without God, and the promise of eternal life?" (p. 245).

The two most common reasons people leave the fold according to this book are the hypocritical lives of fundamentalists and errors in the Bible. A turning point in Babinski's life came when he read a series of articles in the *Skeptical Inquirer* in which scriptures were cited that seemed to show that the Bible's authors truly believed in a "flat circular earth" (p. 229). However, this so-called scientific error of the Bible is actually a result of Mr. Babinski's weak interpretation of scripture. No scientific inaccuracy can be found in the verses he cites (Is. 40:22, Jer. 31:37 and Ps. 22:27). For instance, Isaiah 40:22 says, "He (God) sits enthroned above the circle of the earth ..." The

word "circle" in this verse is the word "sphere" in Hebrew (*chuwg*). It is a figure formed by a circle turning about its diameter.

Jeremiah 31:37 says: "Only if the heavens above can be measured and the foundations of the earth below searched out will I reject all the descendants of Israel." Mr. Babinski comments: "In other words, just as Israel will never be totally 'cast off' the foundations of the flat earth are portrayed as ever remaining a mystery to man" (p. 230). A better interpretation would be that God will preserve Israel as a nation, and man will never be able to find the end of the universe. Of course, the facts are that in 1948 Israel was constituted a nation again, and even with our largest telescopes man has not found the end of our huge universe. Furthermore, Mr. Babinski says, "the biblical earth is often described as having 'ends' ... A flat, circular earth would square well with such speech" (p. 229). Psalm 22:27 says: "All the ends of the earth will remember and turn to the Lord and all the families of the nations will bow down before him." This is just a figure of speech meaning that everyone everywhere will bow before the Christ of the cross one day. King David in this passage is describing Christ's crucifixion hundreds of years before the Jews knew of that method of capital punishment. The Jews executed by stoning. Yet, you read these words in Psalm 22:16, "They have pierced my hands and my feet." In fact, over a dozen exact medical descriptions of death by crucifixion are given in this passage.

Although there is some extremely bad interpretation of scripture in *Leaving the Fold*, it does have value. It is a very thought-provoking book which discusses almost every aspect of the fundamentalist viewpoint. The major weakness of this book is its failure to realize that leaving the fold is never caused by intellectual problems with the Bible. That is just a popular excuse. Hebrews 3:12 tells us the real reason people leave the fold. It says, "Take heed, brethren, lest there be in any of you an evil heart of unbelief, in departing from the living God."

Reviewed by Everette Hatcher III, P.O. Box 23416, Little Rock, AR 72221.

PAIN: The Gift Nobody Wants by Paul Brand and Philip Yancey. HarperCollins Publishers, New York, NY: 1993. 352 pages. Index.

Known for their previous books, *Fearfully and Wonderfully Made* and *In His Image*, Paul Brand and Philip Yancey have again collaborated to produce this fascinating book. *Pain: The Gift Nobody Wants* is a combination of autobiography, non-technical science, and personal philosophy.

The book is divided into three parts. In Part One, "My Path Into Science," Brand describes his birth and early life in India, schooling in England, training as a carpenter, plans to return to India as a missionary, decision to enter medicine, and training as a surgeon prior to and during World War II. "A Career in Pain," Part Two, contains a discussion of Dr. Brand's career as a surgeon and leprosy specialist. He describes how he returned to India as a surgeon to work with the medical college at Veilore, and how his life was changed by an invitation to visit a leprosarium. Shortly after this visit, he began to treat leprosy patients. Eventually he did pioneer work in surgery and rehabilitation of the hands and feet of patients suffering with this disease. This continued throughout his career and eventually brought him to the United States to a hospital for leprosy patients in Louisiana. Not only did he work with the physical treatment and rehabilitation of these patients, but also with their re-entrance to society, much of which required education of the outside world in regard to this disease.

In Part Three, "Learning to Befriend Pain," Brand discusses the nature of pain, its effects upon the person, and some approaches to living, dealing, and accepting pain. Much of this reflects his own personal philosophy. One might ask why, other than his medical background, did he write about pain? It has to do with the nature of leprosy. This is a disease which destroys nerve tissue leaving the patient without the sensation of pain. Brand points out that a lifetime of treating patients without the sensation of pain has convinced him of the necessity for the existence of pain.

This is not merely a philosophical book and actually deals very little with the so-called "problem of pain." Also, although the two previous books were somewhat apologetic in nature, this book was not written in that style. That is not to say, however, that it does not present a very positive view of Christianity. Further, the combination of Brand's faith and scientific and medical research makes this book a well-written description of the interaction of science and faith in the life of an individual.

I enjoyed this book very much and have a feeling that I will be coming back to it for further reflection as I deal with pain in my life and in those around me.

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

THE MAKING OF THE NEW TESTAMENT by Arthur G. Patzia. Downers Grove, IL: InterVarsity Press, 1995. Softback.

In answering the question, "How did we get our New Testament?" Patzia emphasizes the humanity of the writers whose "ears were more likely assaulted by the urban clatter of busy intersections and bustling markets than attuned to a still small voice." This volume could well serve as a textbook on the origin, collection, copying, and canonizing of the New Testament documents. The material is familiar (e.g., criteria for canonization), the questions asked elementary (e.g., Why are there four gospels?), the writing succinct (e.g., just 205 pages to cover seven major

parts with sub-sections, six appendices, a glossary, notes, bibliography, and two indices) and evangelical (the Scripture is inspired). Patzia, a faculty member associated with Fuller Theological Seminary, has previously written *Ephesians* and *Colossians*. The book is dedicated to his parents, one of whom is alive and 92 years old. They introduced him to the New Testament, and it is a touching illustration of how "the apple doesn't fall too far from the tree."

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

THE NEW TESTAMENT AND PSALMS: An Inclusive Version. New York: Oxford University Press, 1995. 535 pages. Hardcover.

Does the world really need another translation of the New Testament? Whether it does or not, there has never been one like this, a version which could properly be called — and has been — the first "politically correct New Testament." It seeks to make the New Testament language inclusive in its descriptions of God, human relationships, physical disabilities, dark and light imagery, and references to Judaism.

Here are two examples:

New Revised Standard Version (NRSV): "All things have been handed over to me by my Father; and no one knows the Son except the Father..."

Inclusive Version: "All things have been handed over to me by my Father-Mother, and no one knows the Child except the Father-Mother..."

NRSV: "Foxes have holes, and birds of the air have nests; but the Son of Man has nowhere to lay his head."

Inclusive Version: "Foxes have holes, and birds of the air have nests; but the Human One has nowhere to lie down and sleep."

This Inclusive Version may meet a need, but that need probably does not exist in the conservative, evangelical community. The idea that the Inclusive Version is theologically correct will not be strong enough to change the preference of most Christians for the versions so strongly influenced by the vernacular of the King James Version.

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Letters

Response to Newman

This letter is in response to the recent article (*PSCF*, Sept. 95) by Robert Newman entitled "Scientific and religious aspects of the origins debate." I was very disappointed with the sweeping, and inaccurate, generalizations made concerning "theistic evolution," a term which I assume is meant to include all those who accept evolution as a persuasive scientific account of origins. The article also repeats statements about evolutionary theory and the fossil record commonly encountered in popularized Christian writing, but that are wholly without support from the scientific literature.

I will first address some of the theological and exegetical questions raised. On page 172 Newman states that theistic evolution "... sees the account of the creation of humans in Genesis 2 as parabolic (fictitious history) ..." This statement would seem to imply that anything but a literalistic reading of a scriptural passage is deemed somehow less true and is tagged with the pejorative term "fictitious history." Scripture is rich with many types of literary styles influenced by many different cultures and writers. The challenge of scriptural exegesis is to recognize the type of literature being employed and its theological intent. The superficiality of the exegesis employed by Newman is also reflected in his comment on page 170. To the claim that Adam was created by evolution from a hominid ancestor, Newman responds "If so, why did the Genesis account not make this clearer?" Scripture doesn't make many things clear! It also doesn't make clear that the history of the Earth spans billions of years, a position which Newman appears to accept. Such issues were simply foreign to the people of the time, and irrelevant to the purposes of the passage. The scriptural image of the creation of Adam from the dust of the Earth communicates quite effectively that our beginnings are rooted in the Earth. We are made of the same stuff as all of life, and thus are inseparably part of the rest of creation. It is an accurate, powerful, and theologically rich image.

It disturbs me that the author's critique of evolution seems to be driven by a fear that the questioning of widely held evangelical positions will "draw many young Christians into various forms of theological liberalism" (page 166). Because a particular idea raises doubts among some evangelical Christians, does that make it wrong? As Christians we believe that God is the God of truth, and that truth most certainly does not correspond in all particulars with what any group of believers accepts as true. There is much in scripture that is hard to comprehend and to integrate into an easily grasped picture of the nature of God and his interaction with the created universe and us, his image-bearers. The complexity, contradiction, and mystery present in both scripture and nature confirm for me the truth and reality of the Christian faith. A picture of God and nature that was not "bigger" than me, and that did not cause me to doubt and question, would not have the ring of reality, but of a human invention.

Newman repeats several widely held misunderstandings of evolution and the fossil record. He makes the com-

pletely unfounded assertion that there are absolute limits to evolutionary change. The anatomy and genetic composition of a given species imposes constraints on possible directions of morphologic change (at least in the near term) but not on the ultimate magnitude of change. I challenge Dr. Newman to provide a single example from the scientific literature in which an absolute fixed limit of morphological change has been demonstrated. He also perpetuates misunderstandings of the evolutionary theory of punctuated equilibrium.

This model of evolutionary rate extends the theory of allopatric speciation in isolated populations to the fossil record. It proposes that most evolutionary change is associated with the speciation process. Contrary to Newman's claim (page 168), it is completely consistent with population genetics and natural selection. This theory in no way denies the existence of intermediate forms or of the occurrence of gradual transitions between species in some lineages.

As a paleontologist, I find Newman's statement that "... the fossil record is characterized by gaps between all the major biological types ..." (page 169) particularly egregious. This claim is categorically false! The fossil record contains many examples of organisms with intermediate morphologies, as well as fossil series of transitional species or genera that cross family, order, and class boundaries. Intermediates are now known between many high-level vertebrate taxonomic groups. A few of the more well-known examples include: the transition from reptiles to mammals,[1] from amphibians to reptiles,[2] from fish to amphibians,[3] and the recently discovered "walking whales" that bridge the transition from mesonychids to fully marine whales.[4] For those with access to the internet, a visit to the Talk.Origins Archive (http://rumba.ics.uci.edu:8080/faqs/faq-transitional.html) will provide many other vertebrate examples.

Lastly, the comment that "... virtually all the phyla appear suddenly at the Cambrian 'explosion' ..." (page 169) is not a statement of fact but a highly speculative, and I believe incorrect, interpretation of the fossil record. Actually, without significant qualification, it is demonstrably false. Many animal phyla including several living ones appear as fossils in the Late Precambrian. The Ediacaran (~580-560 My) was dominated by solitary and colonial coelenterates that may have included all four living cnidarian classes[5] (Conway Morris, 1993). Also important in these ancient communities were burrowing and trail-making worms that may have included annelids, priapulids and palaeoscolecid worms.[6] There is also evidence for the presence of arthropods as well as echinoderms before the beginning of the Cambrian.[7] Furthermore, many of the organisms that did appear in the Cambrian possess morphologies that bear similarities to more than one phylum. This is, they are intermediates. For example, the Early Cambrian caterpillar-like lobopods occupy a transitional morphological position between several living phyla,[8] and have morphological features in common with the arthropods.[9] Similarly, a very important group of Cambrian slug-like animals bearing tiny cap-shaped and scale-like skeletal elements are mosaics of phylum-level characteristics, having similarities with both the mollusks and the polychaete annelid worms.[10]

Those who would critique evolutionary theory and "theistic evolution" should have at least as good a grasp of the arguments and evidence as the advocates of those positions. To do less invites those criticisms to be ignored or scorned.

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Responses to Mark T. Clark

Mark T. Clark's "The Paradox of War and Pacifism" (December 1995) has at least three flaws. First, Clark makes much to do about Christ's praising a centurion without condemning his profession. A Roman centurion's mission was much closer to today's state troopers than today's soldiers.

Second, Clark attempts to score points when Christ neither condemns nor condones an invading king in his analogy. Following Clark's reasoning, we should also believe that our Lord is neutral about the house breaking mentioned in Matt. 12:29.

Finally, Clark states that an individual cannot have greater knowledge or wisdom concerning a war than does the state. If we learned anything from our Vietnam experience, it is to be skeptical about the knowledge and wisdom of pro-war leaders.

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Jesus, the Prince of Peace (not of Just War)

I read with interest the article by Mark T. Clark on "The Paradox of War and Pacifism." I had expected that the premise of the article would be to weigh the two views that Christians have had on "Just War" and "Pacifism." Unfortunately, I found that there was really very little on the latter. I understand that Dr. Clark comes form a military background, but this does not justify the one-sided view. There were no references anywhere in the text to some of the classical Christian theologians of the pacifist side: John Howard Yoder (*The Politics of Jesus*), Ronald Sider (*Christ and Violence*), Maynard Shelly (*New Call for Peacemakers*), etc. or to some of our pacifist forefathers, such as Menno Simons or Conrad Grebel.

Despite having lost family in the concentration camps of Nazi Germany, I still have problems with the "just war" hypothesis. As Christians we are called to live life "differently," to be more like Christ. As Donald Kraybill wrote, the Kingdom of God is an "Upside-down Kingdom" where we do not conform to the ways of this world. If we learn to work against poverty, bigotry, and hatred and teach and live the ways of love, we will learn to be true pacifists, or rather, "active peacemakers"! This is the true alternative to "just war" and I am convinced that is the Christian way.

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Response to Tanner

Assuming that a Fellow of the ASA lacks the hubris to succumb to the popular fallacy of picking and choosing which parts of Scripture to accept as true and authoritative, and which to deny as historical errors, it appears to me that William Tanner exacerbates the inherent difficulties of the Noah flood story with "implications that are not in the original story, and a willingness to brush factual details aside as inconsequential."

Tanner tells us that Hebrew word *harim* must be translated "hill" because the "15 cubits" refers to the absolute water level rise. But his scenario fails a simple reality check: the waters were mighty upon the earth for 150 days; when in recorded history has any other 20-foot flood taken five months to diminish enough for a 400-foot barge to come to rest on the hilltops? Even completely empty, a 40-foot-high ark will draw nearly ten feet, but this one was stocked with every conceivable animal (at least of those known to Noah) two or fourteen, plus supplies for a whole year or more.

Let's grant that the text is unclear about what the 15 cubits refers to, and ask what it *could* mean. We have perhaps four or five options:

1. The absolute rise from the normal river level to the maximum water level, as apparently preferred by Tanner.

2. The rise above the river banks to the maximum water level. Tanner himself is somewhat unclear; perhaps this was his intended preference. Rivers often cut a channel in the flood plain so that the normal water level must rise at least that much before it can be called a "flood." This could as much as double the total rise of option 1.
3. The depth of the water over the highest hills of the flood plain, the traditional translation, but limited to Tanner's interpretation of *harim*.

4. The depth of the water over the highest hills of the whole earth, the traditional interpretation.

5. The depth of the water over the highest mountains of Mars, the silly straw man Tanner puts up to make the traditional interpretation look less credible.

We can dispense with #5 very quickly: the waters covered "all the high hills under all the heavens." Mars is *in* the heavens, not under them. Mars was visible and known to the ancients; the fact that they did not know of its mountains hardly excuses their use of exclusive language if the Almighty God had intended his inspired author to include it. Note, by way of contrast, that the first chapter of Genesis explicitly allows for waters above the sky, such as in Mars.

Option #1 falters, as mentioned, on the dual problems of flood persistence and the ark draft. In fact, it does not even get so far. I live in a flood plain perhaps one tenth the dimensions of the Tigris-Euphrates river plain, and this year we enjoyed the unusual opportunity to see a rare (I believe it was) 17-foot absolute rise in the water level, which overflowed the river banks. Outside the river channel the deepest water was only about five feet. Because the valley floor is, of course, not flat, the flooding never spread more than a mile from the channel. Not even the low hills were covered.

A quick look at the maps in the back of my Bible shows the Tigris-Euphrates river plain to be perhaps 200 miles wide and 700 miles long. That is a lot of water to come from the not-very-miraculous sources postulated by Tanner, especially when it must stay around for five months, then be gone in a year. Assuming this valley is, as the saying goes, "as flat as the state of Kansas," that still allows for (like Kansas, which is in another of the world's great river valleys) 1000 feet or more altitude differential between the high up-river west end and the lower east end. However, I speculate somewhat, lacking ready access to the geographical facts.

The high-water point in the flood of my experience travelled down the river at about five or ten miles per hour. From the time the water went over the banks and they closed the highway (at 2 a.m. Sunday morning) until the waters receded enough to reopen the highway was only slightly over 15 hours. At that rate, the 15-cubit high-water in the localized Noachian flood could start at the headwaters of the Euphrates near Haran and be completely washed into the Persian Gulf and drying up a week or two later.

Tanner responds in advance to such a criticism by referring to his research work on a "15-25 meter coastal flood ... some 8,000 years ago," but then admits that its "combined rise and fall were spread across three or four centuries." Really now, don't you think that's a little longer than the 150 days of Noah's flood? Tanner has no other natural flood source to offer that comes even close to the required duration.

With option #3 there still remains the question of just how much of the Tigris-Euphrates river valley must be covered to kill off "all flesh that moved on the face of the earth"? Even granting the author's putative intent to refer only to all living creatures and humans within the circle of human experience, the Tigris-Euphrates river valley floor is rather a myopic view. The most conservative dating of the growth of humanity from Adam to Noah is over 1,500 years; to most people arguing for a local flood, that is far too short (Tanner does not give us his opinion on this matter). Yet it took less than 300 years for a small number of settlers on the east coast of the United States to spread out over an area some two orders of magnitude larger, mostly before there was any technical assistance from the industrial revolution. Also less than 300 years after the Flood, and during a 75-year period of his life, Abraham's father Terah moved from Ur at the mouth of the valley to Haran near the headwaters of the Euphrates, in the foothills approaching Ararat, which is the full length of the valley. So clearly the flood must in all probability cover not only the valley floor near the gulf, but also "all the high hills" including those around Haran.

Tanner himself notes the possibility of walking out of the reach of the flood. I do not understand why he does not give it adequate consideration — unless it is too obvious. People directly in the path of the waters breaking over the banks of a raging river might be washed to their destruction, but the great loss of energy as the water spreads out over so vast a plain gives ample time for the more vigorous people living farther from the banks to scramble easily to safety. Although the foothills are 100 miles away, any person in reasonable health can walk it in three days. Tanner brings to the discussion no evidence that the people of Noah's time did not walk to the hills regularly, when there was no flood to escape — to say nothing of when it was imperative.

Tanner makes this big deal about how an acceptable reading of *harim* is "hills" but completely ignores that fact that there is no other word in Hebrew for "mountains." The word does not stand alone in the text; it is qualified. Low *harim* might properly be translated "hills," but the high *harim* of this text can only be referring to mountains. Mountains at least as high as Ararat, a very high mountain in what is now modern Turkey, and of which the author of the story is very much aware — because he tells us that the ark came to rest in the *harim* of Ararat. Surely Tanner did not consider that factual detail to be inconsequential?

So where did the 15 cubits come from? If everything is covered, how could Noah or the others in the ark even know how deep the water might be? The best knowledge they could have would be from the observation that the 30-cubit-high ark sank halfway into the water, and never scraped bottom the whole five months. The obvious conclusion for them is that the water covered the highest hills/mountains by *at least* 15 cubits.

There are other considerations that may have figured in the ancient translators' choice of words, but obviously did not enter into Tanner's thinking. If the Flood were a local river rise, then anything floating on it would be washed out to sea as it subsided, but certainly not float the ark upstream to one of the highest mountains around.

If the (local) Flood is neither an exceptional rise in the river, nor coastal flooding from a melting ice sheet, then we seem to have run out of natural causes and must adduce a *supernatural* cause. As distasteful as Tanner might find such a supernatural cause, the only alternative is to discard some part of the actual flood story (not just our modern interpretations) as historically erroneous. I trust Tanner holds Scripture in higher regard than that. However, once you accept the possibility of a supernatural flood of sufficient dimensions to cover as much of the Tigris-Euphrates river valley as might then be populated by humans, for at least five months, there remains little reason to reject the only *slightly* more miraculous global flood.

Thus we see that of all the possible renderings of "15 cubits" and *harim* in this story, only the traditional interpretation stands up to close scrutiny — except possibly in the eyes of those with a prior commitment to the rejection of a global flood.

It is just such a prior commitment that suggests the only explanation I can imagine for the silly aside on the olive leaf, which also (I presume) leads to Tanner's title. Of course leaves die when they are covered with water! But fresh leaves grow again very nicely in the mud left after water recedes. Is Tanner trying to tell us that an olive pit cannot sprout in the three months between when the ark came to rest in the foothills of Ararat (note that *harim* here is not qualified, so Tanner's preferred reading "hills" is quite reasonable), and the dove brought back the twig? The trees are not still green; new tree sprouts are green again. God's abundant blessing had returned to the earth scarred by his wrath. That is the whole point of the olive leaf in the Genesis story.

I do not claim that a global flood story is without its difficulties. But if you take the story at face value, then start to ask about the scientific implications of it, there are some fascinating conclusions. Where did all that water come from? Where did it go? How high were those high mountains when they were covered? Why shouldn't we take Psalm 104:6-9 as indicative of the answers to some of these questions? Donald Patten's *The Biblical Flood and the Ice Epoch* (1966) makes a good case for a natural explanation of essentially the whole story (except for getting all the animals to come into the ark, which he does not address).

So why the ark? It is very much theological, as Tanner notes. But it is not just a message of grace; it also communicates the uniqueness of salvation in God's provision. There are no hills to run to: they have been covered with water. There is no salvation in any other, for there is no other Name under heaven given to men by which we must be saved.

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Frances C. Folischuk Fin/List Manager 10/25/95

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including multiple damages and civil penalties).

Instructions to Publishers

1. Complete and file one copy of this form with your postmaster on or before October 1, annually. Keep a copy of the completed form for your records.
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Failure to file or publish a statement of ownership may lead to suspension of second-class authorization.

PS Form 3526, October 1994 (Reverse)

HOW DO I JOIN THE ASA?

Anyone interested in the objectives of the Affiliation may have a part in the ASA.

Full, voting membership is open to all persons with at least a bachelor's degree in science who can give assent to our statement of faith. Science is interpreted broadly to include anthropology, archeology, economics, engineering, history, mathematics, medicine, psychology, and sociology as well as the generally recognized science disciplines. Philosophers and theologians who are interested in science are very welcome.

Associate membership is available to interested nonscientists who can give assent to our statement of faith. Associates receive all member benefits and publications and take part in all the affairs of the ASA except voting and holding office.

Full-time students may join as Student Members (science majors) with voting privileges or as Student Associates (non-science majors) with no voting privileges. Spouses, who also wish to join, qualify for a redued rate. Full-time overseas missionaries are entitled to complimentary Associate membership in the ASA.

An individual wishing to participate in the ASA without joining as a member or giving assent to our statement of faith, may become a Friend of the ASA. Friends receive all member benefits and publications and take part in all the affairs of the ASA except voting and holding office.

Membership Categories and Rates

Category	Rate
Full Member	$55
Friend of the ASA	$55
Associate Member	$45
Student Member	$20
Student Associate	$20
Spouse	$10

Subscriptions to our journal, *Perspectives on Science & Christian Faith,* are available at $30/year (individuals), $45/year (institutions) and $20/year (students). The journal comes automatically with your membership.

MEMBERSHIP/FRIEND OF ASA APPLICATION/SUBSCRIPTION FORM

(Subscribers complete items 1 & 2 only)

American Scientific Affiliation, P.O. Box 668, Ipswich, MA 01938-0668

1) Name (please print) _____ Date _____

2) Home address _____

_____ Zip _____

Office address _____

_____ Zip _____

Please leave blank any numbers you do not wish published.

Home phone _____ Office phone _____

Fax _____ e-mail _____

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

3) Sex _____

4) If married, spouse's name _____

6) Academic Preparation

Institution Degree Year Major

_____

_____

_____

_____

Major field of study _____

Area of concentration within the field (2 word limit) _____

Briefly describe what your present or expected vocation is _____

_____

_____

_____

Please complete back of this form ☞

AS A MEMBER YOU RECEIVE:

Publications. As a member, you receive ASA's quarterly journal, *Perspectives on Science & Christian Faith*, and bimonthly Newsletter. The journal has become the outstanding forum for discussion of key issues at the interface of science and Christian thought. It also contains news of current trends in science and reviews of important books on science/faith issues. The Newsletter brings you news of the scientific work and Christian witness of ASA members, reports of ASA activities, and other items of current interest. It also carries notices of ASA members seeking employment and of positions open to Christians trained in science.

Books. ASA titles such as *Teaching Science in a Climate of Controversy* and the *Membership Directory* are sent to all new members when available. From time to time other books and resources are available for purchase through the home office.

One book which can be purchased is *Contemporary Issues on Science and Christian Faith: An Annotated Bibliography*, which offers an expansive book list, as well as a Speaker's Bureau listing, book service information and other science/faith resources.

Fellowship. The spiritual and intellectual stimulation of ASA meetings is a distinctive feature of ASA membership highly valued by those who participate. An Annual Meeting, which usually includes three days of symposia, papers, field trips, and worship together, is held each year (since 1946) in late July or early August. For the convenience of members, the location moves across the country on a regular cycle. Local and regional meetings are held throughout the country each year. Members keep in contact with each other through the Newsletter, Internet, and at ASA get-togethers at national scientific meetings.

Church Affiliation _____

How did you learn about the ASA? _____

If you are an active overseas missionary, please give the name and address of your mission board or organization to qualify for complimentary membership.

Name _____

Street _____

City _____ State _____ Zip _____

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

Statement of Faith

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

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

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

I have enclosed (Please check one):

____ $55, Full Member ____ $55, Friend of the ASA ____ $45, Associate Member

____ $20, Student Member ____ $20, Student Associate ____ $10, Spouse

Please mail to: American Scientific Affiliation, P.O. Box 668, Ipswich, MA 01938-0668

Opportunities for Service. The ASA sponsors and encourages individual and group efforts to serve both the Christian community and the scientific community. Major efforts are made to clear up misunderstandings of one group by the other, but speaking and writing are not the only forms of ASA ministry. We seek opportunities to witness as a body of people with a grasp of biblical truth wherever that witness is needed.

Affiliations and Commissions. Each member is asked to choose a primary and secondary affiliation or commission from the list below. Affiliations are autonomous but usually meet in conjunction with the ASA Annual Meeting. Commissions help plan Annual Meetings, report to the membership through the Newsletter, and have a chair with four to five other members as a steering committee. Each of the commissions is asked to relate its discipline toward science.

a. Affiliations

Affiliation of Christian Biologists
Affiliation of Christian Geologists

b. Commissions

Bioethics	Industrial
Communications	Philosophy and Theology
Creation	Physical Sciences
Global Resources and Environment	Science Education
History of Science	Social Sciences

The ASA is a member of The Evangelical Council for Financial Accountability.

WHAT EXACTLY IS THE AMERICAN SCIENTIFIC AFFILIATION?

The American Scientific Affiliation (ASA) is a fellowship of men and women of science and disciplines that can relate to science who share a common fidelity to the Word of God and a commitment to integrity in the practice of science. ASA was founded in 1941 and has grown significantly since that time. The stated purposes of the ASA are "to investigate any area relating Christian faith and science" and "to make known the results of such investigations for comment and criticism by the Christian community and by the scientific community."

Science has brought about enormous changes in our world. Christians have often reacted as though science threatened the very foundations of Christian faith. ASA's unique mission is to integrate, communicate, and facilitate properly researched science and biblical theology in service to the Church and the scientific community. ASA members have confidence that such integration is not only possible but necessary to an adequate understanding of God and His creation. Our total allegiance is to our Creator. We acknowledge our debt to Him for the whole natural order and for the development of science as a way of knowing that order in detail. We also acknowledge our debt to Him for the Scriptures, which give us "the wisdom that leads to salvation through faith in Jesus Christ." We believe that honest and open study of God's dual revelation, in nature and in the Bible, must eventually lead to understanding of its inherent harmony.

The ASA is also committed to the equally important task of providing advice and direction to the Church and society in how best to use the results of science and technology while preserving the integrity of God's creation. It is the only organization where scientists, social scientists, philosophers, and theologians can interact together and help shape Christian views of science. The vision of the ASA is to have science and theology interacting and affecting one another in a positive light.

American Scientific Affiliation
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fax: (508) 356-4375
e-mail: asa@newl.com

The American Scientific Affiliation

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

Canadian Scientific & Christian Affiliation

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

Local Sections

of the ASA and the CSCA have been organized to hold meetings and provide an interchange of ideas at the regional level. Membership application forms, publications, and other information may be obtained by writing to: American Scientific Affiliation, P.O. Box 668, Ipswich, MA 01938-0668, USA or Canadian Scientific & Christian Affiliation, P.O. Box 386, Fergus, ONT N1M 3E2, CANADA.

Chicago–Wheaton	D.C.-Baltimore	Guelph, ONT	Indiana–Ohio	Los Angeles
New York–New Jersey	North Central	Oregon	Pittsburgh	Rocky Mountain
San Diego	San Francisco Bay	Southwest (AZ)	Washington	Toronto, ONT

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A keyword-based on-line **subject index** is available on 5 1/4" or 3 1/2" computer disks for most IBM compatible computers with a hard disk or two floppy disk drives. It includes all software and instructions, and can be ordered from the ASA Ipswich office for $20.

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

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

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