

## SCIENTIFIC AND RELIGIOUS ASPECTS OF THE ORIGINS DEBATE<sup>1</sup>

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How did it all begin? Since 1800 science and technology have learned much. The answer often advertised today as "scientific" may be called the "Blind Watchmaker" solution:<sup>3</sup> all has arisen by purely natural processes; there is no guiding mind behind the universe; the only purposes (at least in this part of the universe) are human purposes; the traditional religions are wishful thinking or harmful delusions.

This view has had a profound effect not only in science, but in literature, art, and music and consequently in education, the media, politics, and finally history. Most of our modern problems have been aggravated by the spread of belief in a Blind-Watchmaker universe.

### **The Rise of Evolution**

This worldview owes much of its influence to Charles Darwin, who provided scientific respectability for the idea that God is not necessary to explain how things came to be. Darwin did not invent this idea, and his belief in its truth only grew on him gradually.<sup>4</sup>

But Darwin was able to show that the diversity of living things in various places on earth today (chimpanzees in Africa, llamas in South America, kangaroos in Australia, and especially the very limited variety of life on remote ocean islands) does not fit the common idea that God created the same sorts of animals everywhere on earth.<sup>5</sup> And the progression of living things in the fossil record (no life in the earliest strata, simple life higher up, becoming more and more like modern kinds as one looks at more recent layers) seemed to conflict with the idea that God created all types of life at one time.<sup>6</sup>

In the generation before Darwin, geologists had found a rock record pointing to long ages of life on earth, opening up a perspective much more extensive than the few thousand years most thought the Bible allowed.<sup>7</sup>

Darwin's distinctive proposal, however, was an analogy familiar to most of his readers (selective breeding).<sup>8</sup> Just as farmers can produce great diversity among their plants and animals by choosing some features for further development, so Darwin argued (nature did something similar). In each generation of living things, small variations were accidentally produced. But nature, having no mind or will to select these according to any plan, effectively favored those variations which produced more survivors. Darwin labelled his model "natural selection," in distinction from the breeders' "artificial selection"; more popularly, it came to be known as "survival of the fittest." The mindlessness of this process in the Darwinian view has been captured by Richard Dawkins' recent phrase "the Blind Watchmaker."<sup>9</sup>

Darwin's proposal was quickly accepted in scientific circles despite considerable opposition. Within a generation, most biologists accepted some form of evolution, though many would not

credit natural selection with all the changes. From biology, evolutionary ideas spread into other academic fields. By the beginning of this century the idea was becoming popular that religion, too, could be explained by evolutionary processes. Even the Old Testament came to be viewed by many as evolving from primitive ideas and folktales ingeniously combined by editors, but now discovered and dissected by the patient detective work of literary scholars. This approach is now widely advocated in New Testament circles also.<sup>10</sup>

### **Reactions in Christendom**

Religious responses to Darwin have been quite diverse, ranging from atheism to fundamentalism.

**Atheism.** Atheism did not get its start with evolution. The French Revolution had its share of atheists; there were some among the ancient Greeks, Indians and Chinese; and the Bible indicates that even in David's time some thought there was no God.<sup>11</sup> Nevertheless, the impact of Darwin for atheism on Christendom was immense. Radical socialists lionized Darwin, so great was their appreciation for the help evolution provided in giving scientific credibility to atheism.<sup>12</sup> And many others found in evolution a reason for abandoning Christianity. The Blind-Watchmaker version of evolution has been a powerful recruiter for atheism and agnosticism.

**Theological Liberalism.** The major Protestant departure from orthodox Christianity is partly due to evolution, as the theory grew to dominate secular culture and was integrated into various forms of theological liberalism.<sup>13</sup> The truth of Scripture was rejected while Christianity was reinterpreted in various ways. These ideas spread in the mainline denominations from seminary and college to pulpit and pew, producing results ranging from atheism with its Blind-Watchmaker evolution to milder forms of liberalism holding theistic evolution.<sup>14</sup> Similar phenomena occurred in Roman Catholicism and, to a lesser extent, Eastern Orthodoxy.<sup>15</sup>

Within evangelical Christendom, where (by definition) the Bible is accepted as a real revelation from God, reactions have been somewhat different.<sup>16</sup>

**Theistic Evolution.** A small minority of evangelicals (but typically many of those with scientific training) have felt that the biological and geological evidence for evolution is overwhelming. These have adopted some form of theistic evolution, in which God worked providentially through natural laws and long ages to produce the diversity of living things we see today. Being evangelicals, the inspiration of Scripture is retained, though not always its inerrancy.

Some of these have taken Genesis chapters two and three to be parables, denying there was a literal Adam and Eve and claiming a whole population of apes gradually evolved into humans. In this view, sin is a natural result of developing moral machinery and our making bad choices. We might call this variety "No-Adam theistic evolution."<sup>17</sup>

Others take Genesis 2 and 3 more literally, believing that God remodelled a particular ape-man

to become Adam by putting a soul within him, and made Eve from his side. This pair turned away from God as narrated in Scripture. We might call this view "Adam theistic evolution."<sup>18</sup> Both of these views can be found outside evangelicalism also.

**Old-Earth Creation.** A larger minority of evangelicals have felt that geological and astronomical evidence for an old earth and universe is overwhelming (and consistent with biblical teaching), but that there are serious scientific problems for any type of so-called macro-evolution C the natural development of all living things from one or a few simple life-forms. These evangelicals have a variety of ways of interpreting the Genesis account: some see a gap between Gen 1:1 and 1:2,<sup>19</sup> others see gaps between each of the Genesis days,<sup>20</sup> and still others have the days lasting for ages.<sup>21</sup> Typically old-earth creationists see God intervening miraculously to create the universe, life, each basic kind of living things (including mankind), and possibly at other points if providential guidance of natural processes would be unable to produce the desired results.

**Young-Earth Creation.** The majority of evangelicals, apparently, have felt that the Genesis account, simply interpreted, points to a creation only a few thousand years ago, in the space of six literal days.<sup>22</sup> The date of creation has been variously estimated, from six thousand to ten thousand years ago, with some suggesting even older values.<sup>23</sup> The amount of variation that is thought to have occurred since creation also varies. Some hold that all species were created at the beginning; others that only the basic kinds were created, and that all the varieties of cats (say) C lions, pumas, housecats C have developed since creation or even since the Flood.<sup>24</sup>

Needless to say, young-earth creationists have viewed much of modern science with great suspicion, some even claiming that science began to go wrong with Copernicus when the earth was removed from the center of the universe.<sup>25</sup> A number of young-earth creationists have developed various forms of creation-science, most claiming that the geologic strata can be explained by Noah's flood,<sup>26</sup> some that quantum physics and relativity theory are wrong,<sup>27</sup> and one at least that the whole universe is only a few light-years in diameter, billions of times smaller than scientists think.<sup>28</sup>

In less than two centuries a profound change has occurred in the relations between science and evangelical Christianity. Early in the 19th century, most orthodox Christians viewed science as on their side and atheists as profoundly anti-scientific (though atheists would have objected strongly to this). Today, many evangelicals see science and atheism as on the same side against Christianity, and atheists would heartily agree.

In this paper, we suggest this assessment is badly mistaken, partly because of errors by both scientists and theologians. In the following sections let us look first at scientific problems for the Blind-Watchmaker form of evolution, problems on which all varieties of evangelicals should be able to agree. If these problems really exist, this information needs to be widely disseminated, because it undermines the claims of secularists to be realists, and raise serious questions about where secularism is taking society C questions which are also being raised from other quarters as people consider what has been happening to our culture in recent years.<sup>29</sup>

Second, let us look at problems shared by both Blind-Watchmaker and theistic forms of evolution, problems on which both young-earth and old-earth creationists should be able to agree. If these problems were widely recognized, they could perhaps help theological liberals see the weakness of their own position, and decrease the losses that continue to occur among evangelicals, where doubts raised about biblical reliability still draw many young students into various forms of theological liberalism.

Third we will look at some problems facing young-earth creationism, problems on which nearly all geologists and astronomers agree. These problems constitute an enormous stumbling block to Christian faith for those trained in the sciences, keeping many such people from seriously considering the claims of Christ and the Bible.

Lastly, we will suggest that an old-earth creation alternative has substantial advantages over other views on origins, even though it is not without its own problems.

### **Problems for "Blind-Watchmaker" Evolution**

**Origin of life.** Darwin himself wrote little on the question of how life might have originated. He did speculate that perhaps the necessary organic material could have self-assembled in a warm pond somewhere.<sup>30</sup>

Another century of biochemistry has not gone much beyond this, except to call for a whole ocean of organic "soup" formed by ultraviolet radiation and an atmosphere without oxygen. Even then, a number of warm ponds would have been necessary (each with different chemical environments and shielded from the sun) to concentrate the soup and form the various amino acids, sugars and nucleic acids needed. These would later have to be carefully mixed in the right sequences, proportions, concentrations and acidities to give the desired result.<sup>31</sup>

The problem is that even the simplest life is not simple. The more we study the origin of life, the more complex life seems to be. Carl Sagan calculated that the simplest form of bacteria has an information content equivalent to one hundred million pages of the *Encyclopaedia Britannica*.<sup>32</sup> For a Blind Watchmaker to build something of this sort purely by chance is like a tornado assembling an airplane from a junk yard!<sup>33</sup>

Knowing this, evolutionists have speculated that the first life was far simpler than anything existing today C simple enough to have come together by chance. Such primeval life must then have evolved into the more complex life detectable in the fossil record, meanwhile eating up all traces of its ancestry.<sup>34</sup> But attempts to estimate the complexity of the simplest possible life-forms using computer simulations of self-reproducing automatons do not suggest that these would have formed by chance in a universe that is only some billions of years old and as large as ours is.<sup>35</sup>

Yet imprints in rock strata have been found that look like fossils of simple algae. Some of these

appear to be older than three billion years, almost as soon as the earth would have cooled off enough to support life!<sup>36</sup> This leaves little time for life to have developed on earth, so some have speculated that life was seeded on the earth from outside.<sup>37</sup> In a Blind-Watchmaker scenario, God is not available for this task, which must be left to spores drifting through space or their descendants sending spaceships. Obviously this does not solve the problem of how that life got started elsewhere, for which the universe does not appear to have the probabilistic resources.<sup>38</sup>

**The Darwinian Mechanism.** Leaving aside this question, the main scientific attraction of Darwin's proposal was his concept of natural selection working upon existing variety among living things to produce better and better organisms. This can be pictured in such a way that it appears to be obviously true, and several early readers of *Origin of Species* marvelled that no one had noticed it before.

Clearly, much variety exists among living plants and animals C color, shape, wing-length, etc. In a particular environment, some of these variations are more likely to survive or prosper than others, and those with the favored variations will eventually come to dominate the population. Thus Darwin (and his followers) felt that it was inevitable that any group of plants or animals would improve in its ability to function in a given environment or become extinct. And since life in the fossil record was once much simpler than now, all this complexity must have developed naturally by the random formation of new varieties and the natural selection among these varieties of those best suited to survive. How could such a simple model be wrong? And if not, what do we need God for?

The analogy to breeding might well be faulty, however. It is not obvious that purposeless selection is analogous to purposeful; that non-intelligent selection is analogous to intelligent; nor that the former can produce limitless development just because the latter produces limited! And the experience of plant and animal breeders has consistently shown that there are limits within which a plant or animal can be changed. Dogs have been bred over the centuries which are as small as cats or as large as ponies, but not as small as mice or as large as elephants. But perhaps this is just a problem that the dog population does not contain the right mutations. Perhaps if we had thousands or millions of years instead of hundreds, or if we artificially induced more mutations, this could be overcome. Perhaps. But scientists have now worked for most of this century breeding bacteria and fruit flies, both of which have far shorter reproduction times and thus many more generations in just a few years. They have also greatly increased the speed of mutation by exposing their specimens to radiation. Yet even so, they have found no tendency for these organisms to keep changing indefinitely in a given direction, but rather barriers beyond which change does not occur. There seem to be fixed limits beyond which the specimens cannot function.<sup>39</sup>

The same seems to be true in the fossil record. Although Darwinian theory would predict the gradual accumulation of small changes as the source of all large differences among living things, it has been known since before Darwin's time that the major life-forms appear in the fossil record suddenly, without smooth transitions from previous forms. Darwin (and most evolutionists) have explained this as due to gaps in the fossil record rather than lack of actual transitions.<sup>40</sup> But

as our knowledge of the fossil record has improved, these gaps have shown no tendency to go away.<sup>41</sup> Sudden appearance of new forms is characteristic of the fossil record.

In the 1930s, a new version of evolution was developed (a synthesis with genetics, called the "new synthesis" or "Neo-Darwinism") in which all important changes took place in small isolated groups of a given organism.<sup>42</sup> Since these would be less likely to show up in the fossil record, this was supposed to account for sudden appearances. In the 1970s, another model was proposed (called "punctuated equilibria") to account for the fact that species of living things typically show little evidence of change over their history, not only showing up suddenly in the fossil record, but remaining about the same until the present or whenever they became extinct.<sup>43</sup> Although this latter model fits the fossil record better than the old Darwinism or the New Synthesis, it is hard to fit with genetic models of how evolution should work!<sup>44</sup> These features in the fossil record C sudden appearance and stability (or stasis) C are not what one would expect from mutation and natural selection.

Attempts have been made to model mutation and natural selection by means of computer simulations.<sup>45</sup> For example, a few letters of the alphabet or a given sentence are subjected to random changes, either replacements or additions of other letters. Those results which spell English words or make sense in English are retained as survivors; the rest are viewed as becoming extinct. Here, too, the results are not favorable to the idea that Darwin's mechanism will explain the diversity of present-day life. Instead, mutation tends to destroy meaning in the information systems which serve as models for living things rather than creating new meanings for natural selection to work on.<sup>46</sup>

**Design in Inanimate Nature.** A third problem for the Blind-Watchmaker model of evolution arises from the apparent evidence of design outside biology, which has become more obvious in recent years.<sup>47</sup> Physicists have noted that the four basic forces known to exist in nature are delicately balanced so that life can exist. If the value of the various constants that mark the strength of these forces were ever so slightly different than they are, life would not exist anywhere in our universe. If gravity were slightly stronger or weaker, the universe would never have formed stars or planets. If the strong nuclear force were slightly stronger, there would be no hydrogen in the universe; if slightly weaker, nothing but hydrogen. Comparable problems arise if the values of the electromagnetic force and the weak interaction were different.<sup>48</sup>

The usual Blind-Watchmaker reaction to these problems is to deny that any sort of design or Designer is involved here. It is admitted that if these (and many other) constants were not just right, there would be no life in the universe. But if there were no life in the universe, we wouldn't be here to observe the universe! So any universe with observers must have such apparent design even if there is no Designer. This response is true, but only in the same sense that if your mother and father had never met, you wouldn't be here, either! It is no explanation in the scientific sense of providing an adequate cause for the phenomena observed.

In brief, the Blind-Watchmaker version of evolution suffers from the problem of explaining the rise of organization: the inanimate universe looks much more orderly than one would ante-

cedently expect; and the organized complexity and diversity of living things look more like life is the result of a Designer than that it happened by chance, even chance working within the constraints of natural selection.<sup>49</sup>

### **Problems for Theistic Evolution**

Let us turn to theistic evolution. But rather than beginning with its problems, let us note some of its advantages.

**Advantages over B-W Evolution.** Theistic forms of evolution solve a huge problem facing Blind-Watchmaker evolution. In a theistic model, there is a Mind behind the universe, designing just the form of physical laws necessary to support life, so that a near-infinity of universes are not necessary in order to hit on one that has the right stuff. The Designer also can guide the course of physical events which actually take place in this universe so that life can arise and diversify on a scale and within time-periods that would be impossible in a universe without mind. This difference between Blind-Watchmaker evolution and theistic evolution is like that between the time necessary for a typist to type "Now is the time for all good men to come to the aid of their party" and waiting for a chimpanzee to do the same!<sup>50</sup> Theistic evolution thus solves the major problem that besets mindless universes in producing the kind of life that actually exists in our own universe.

**Shared problems with B-W Evolution.** But theistic evolution has its own problems, and not all of these relate to interpreting Genesis. As we mentioned under Blind-Watchmaker evolution, the fossil record is characterized by gaps between all the major biological types. It is as though each of the major kinds of plants and animals appeared on earth suddenly, rather than slowly developing from the organisms that were there already. This is not what one would expect if God were working only by guiding natural processes to produce the diversity of living things.

But perhaps God worked by producing quick transitions in the relevant plant or animal for each of these gaps. If we postulate that God introduced just the right (say) 75 mutations in a reptile so that its children would be birds,<sup>51</sup> we could easily negotiate any chasm in the fossil record. Such a model would be theistic all right, but would it be evolution? Jesus might easily have changed water into wine by introducing a mere 75 "mutations" in the water molecules, but this would be as much of a miracle as if he had annihilated some of the water molecules and created the relevant molecules for wine in their place. Such a model is better labelled a form of old-earth creationism rather than theistic evolution.

Of course, when we speak of these new plants or animals appearing "suddenly" in the fossil record, we should not think the record is detailed enough to show that one day there were no birds and the next day there were. The transition time might be many thousands of years. But the lack of transitional fossils is still a serious problem for the idea that the change was merely a guided sequence of natural events, not to mention the problem have having all the intermediates be functional. To get (say) 75 mutations together in a population that is minuscule compared with the whole reptile population, and to do this again and again for each of the major gaps in the

biological classification scheme, is divine intervention of such a sort as makes Peter's finding the coin in the fish's mouth seem trivial! No wonder Blind-Watchmaker evolutionists consider theistic evolution a disguised form of creationism!<sup>52</sup>

In addition to this, the "shape" or "pattern" of the fossil record is wrong for both theistic and Blind-Watchmaker evolution. According to both, evolution has proceeded by small changes gradually producing big effects. In this sort of scheme, an organism ought first to diversify into various varieties, which then diverge into species, then into the higher biological subdivisions (genera, families, orders, classes and phyla), producing an expanding "cone" of diverse life. In fact, virtually all the phyla appear suddenly at the Cambrian "explosion," and all future diversity occurs within these basic body plans that showed up at that time.<sup>53</sup>

**Problems for Bible-believing theistic evolutionists.** Theistic evolutionists who do not accept Scripture don't bother trying to harmonize with it. (But neither do they have any warrant for calling upon its authority for knowledge about God and life.) But those theistic evolutionists who do accept Scripture as reliable revelation from the Creator must also deal with problems the Bible raises for their view.

For no-Adam theistic evolutionists, we must ask, "Are Genesis chapters 2-3 really only parables?" How do we know this? The author tells us nothing that would indicate this. What contextual clues indicate that this is the case? If our clues come from science rather than Scripture, what are these clues and how do they show us that it is theistic evolution rather than old-earth creation that is correct? How do we learn from either Scripture or science that there never was a historic Adam? If there never was such an Adam, then the fall of humanity must have taken place in a rather different way than pictured in the Genesis account. If this account is strongly parabolic, why not the accounts regarding God's solution to human sin? Maybe the materials about Jesus aren't historical either.<sup>54</sup> You see the implications of this line of thinking. We should examine our reasons for going this way very carefully before we set out.

For Adam theistic evolutionists, we ask, "Was Adam really a remodelled ape-man?" If so, why didn't the Genesis account make this clearer? Surely, it would have been easy to say that Adam was made from another animal, even if the first readers had no specific word for an ape. Why does the author of Genesis 2 say that when God breathed into the nostrils of the first man, he became a *living being*? Though the phrase is sometimes used to speak of the human soul, in the context of Genesis 1-2 it is used for non-human sea life and land life, including the animals named by Adam.<sup>55</sup> So according to Genesis 2, it wasn't until God breathed upon Adam that he became a living (or breathing) being, not the sort of description that suggests Adam was previously a living ape.

Theistic evolution thus faces some serious problems both scientifically and biblically.

### **Problems for Young-Earth Creation**

The major problems facing the view that God created everything just a few thousand years ago



are largely scientific. They can be grouped in two categories: evidence that the earth and universe are much older than this, and problems facing the flood of Noah as an adequate explanation for the geologic strata.

**Evidence for an old earth.** The first of these, and one of the easiest to understand, is the evidence from astronomy that nearly all the visible universe is millions to billions of light-years away from us, and therefore the time necessary for light to reach us from the most distant parts of the universe is billions of years rather than thousands. If (1) these objects really are at the distances they appear to be; if (2) light really does travel at 186,000 miles per second; and if (3) the light rays really left the objects they image, then the universe (at least) is billions of years old. Young-earth creationists have attacked each of these assumptions, but their arguments in each case look like special pleading rather than trying to follow the evidence where it leads. For instance, if we attempt to cram all the stars, galaxies, and quasars into a volume of a few thousand light-years, we wind up with little, dinky stars that cannot hold themselves together or burn.<sup>56</sup> If we argue that the speed of light has changed drastically since creation, we find that all the people and air on earth would have floated away from the planet even as recently as the times of the early patriarchs.<sup>57</sup> If we argue that God created most of the light in the universe already nearly here, and that it never really left the objects it pictures, we involve God in the creation of an enormous amount of fictitious history.<sup>58</sup>

The actual number of fossils in the earth's geologic strata is also much too large to suggest a young earth. If we assume that most of these were laid down in a year by the flood, we wind up with a situation in which organisms must have lived in piles many feet deep early in earth's history!<sup>59</sup>

The most common method scientists use to date ancient rocks and fossils depends on the fact that some atomic elements are unstable and tend to break up by ejecting pieces of their nuclei. These radioactive decay events are not individually predictable, but statistically are very regular, with one half of the mass of a given element decaying to its daughter product within an experimentally known time we call the half-life. Elements with very short half-lives (thousands or millions of years) are not found in nature except under circumstances where they appear to be the product of the decay of some heavier, longer-lived element. Ages for rocks found this way are (with the typical problems and exceptions found in all experimental work) regularly consistent with a geologic history of the earth measured in billions rather than thousands of years.<sup>60</sup>

Likewise, we find buried in the earth or exposed at its surface large masses of igneous rock which show themselves minerally to have once been in a molten state. The time necessary for the larger of such masses to cool to their present temperatures is much longer than a few thousand years.<sup>61</sup>

Very strong evidence for an old earth is found in the correlation of several measurements which give independent, cumulative witness to the age of various geological formations. For instance, geologists now believe the earth's crust is composed of a number of "thin" plates which move

around on top of the mantle, producing volcanoes and earthquakes. These plates are moving at about one inch per year, and therefore would have moved only a fraction of a mile if the earth is just a few thousand years old, but some thousands of miles for an old earth. The shapes of various continents and details of their rock formations show us that these continents were once together and have now moved thousands of miles apart. Young earth creationists thus have to suppose that these continents were once moving miles per year to cover these distances, even though direct measurements by satellites today give the one-inch result. And radioactive decay ages in the igneous rock laid down where these plates are coming apart also fits the inch per year speed. So does the increasing depth of sediment found as one moves away from these rifts. And so does the direction and strength of magnetism left in the hardened igneous rocks so produced. The Scriptural rule regarding the testimony of multiple witnesses should make Christians very cautious about dismissing this evidence.<sup>62</sup>

More could be said.<sup>63</sup> But in a quick sketch this should suffice to show that there really are serious problems with the claim that the earth is only a few thousand years old and that biased, anti-Christian scientists are just twisting the data to make the earth look older.

**Inadequacy of flood geology.** Flood geology is the name commonly given to the theory that nearly all the geologic strata were laid down in the one-year flood of Noah's time rather than over a period of millions or billions of years as most geologists claim.

If the earth really is young, there is the enormous problem of explaining why the earth is covered with miles of rock which give every appearance of being hardened from once-soft sediments. Where did all this sediment come from? Did God create it in place, with all its fossils, just to mislead those who wouldn't believe His Word? Most Christians who have any familiarity with geology are uneasy with the idea that animal bones, fossil clamshells and petrified wood never were living things. Flood geology is an attempt to explain these phenomena more naturally within a young-earth perspective. All these fossils really were living things, but they died and were deposited in the sediments caused by Noah's flood.

Although flood geology often looks impressive to those untrained in geology, a large amount of embarrassing data is available to show that it will not do what it promises to provide a natural explanation for the earth's rock layers.

For one thing, small but significant parts of these layers are made up of types of rock which are laid down by wind in desert areas rather than by water under the sea. It is hard to see how these types of formations could have occurred in the midst of a worldwide flood covering all the high hills, as flood geologists believe. Particularly when such strata are not just found in the topmost layer of rock, where one might suppose some desert conditions as the waters receded, but also buried under even thousands of feet of strata that according to flood geology were laid on top no more than a few days later! The same could be said of river-type strata found throughout the geologic column.<sup>64</sup>

The presence of fine layering in certain strata is another problem. There are a number of places

in the world where there are thousands or even millions of layers consisting of pairs (or triplets) of different types of rock, usually alternating clay-sand layers, or layers of different types of salts. These are easily explained in traditional geology as annual deposits in bodies of water, the clay-sand types as summer/winter deposits in temperate lakes and the salt types in tropical bays where seawater almost completely evaporated each summer before new water washed in. But in flood geology, we have only one year to form such structures, even ignoring what are often thousands of feet of sediment both above and below such strata. In such a case, one must postulate carefully coordinated waves bringing in fine silt from one direction and sand from another and depositing it at the rate of one layer every few seconds over many square miles for a year!<sup>65</sup>

Such layers are not just plain, featureless grains of salt, silt or sand, either. In the tropical cases, one finds birdnests, eggshells, feces and tracks that indicate the area was inhabited by seabirds while the accumulation was going on, a pretty neat trick when the area was under hundreds of feet of water! In the clay-sand cases, one layer will usually have much more pollen and vegetable matter than the other, as we would expect for seasonal deposits on the bottom of a lake that freezes over in winter, but not in a huge flood in which tidal waves are envisioned as sloshing around great masses of sediment.

Not only do we have these features in the rock record, but we also have many examples which show that the lower layers of sediment had hardened into rock before the upper layers were added, not the sort of thing one would expect if everything was done in a one-year flood. There are potholes with vertical sides, something that would never form in loose sediment, but quite common in river bottoms where hard pebbles grind holes in softer (but solid) rock. There are seashells that have been planed off by erosion, indicating that their lower parts were held firmly by solid rock while the upper parts were eroding, rather than sitting in loose sediment where they would merely have washed away.<sup>66</sup>

This, too, is not a complete list of the troubles faced by flood geology;<sup>67</sup> but it is enough to show that we cannot expect to help unbelieving geologists come to Christ by glibly repeating such speculation as though it were the teaching of the Bible.

### **The Old-Earth Creation Alternative**

We turn now to a third evangelical alternative for handling the biblical and scientific data relating to origins. Though not without problems of its own, I believe something of this sort has far more promise than either theistic evolution or young-earth creation for reconciling the data.

**Advantages.** The major advantage of some sort of old-earth creation is that it takes both the text of the Bible and the "text" of nature seriously, that is, as inerrant and relatively straight-forward. This is in contrast to theistic evolution, which tends to see the account of the creation of mankind in Genesis 2 as parabolic (fictitious history), and in contrast to young-earth creation which tends to see light from distant astronomical objects as telling us what they would have been doing if

they had existed so long ago, also fictitious history.

The Bible provides us with warrant to see both Scripture and nature as God's revelation. Theologians speak of nature as God's "general revelation" and of Scripture as his "special revelation," basing their views on Psalm 19 ("The heavens declare the glory of God...") and Romans 1:20 and context (God's divine nature clearly seen through what has been made). Both revelations are inerrant in the sense that God cannot lie. This does not mean that fallible human interpreters cannot draw wrong conclusions from either, nor that at any point in history we will know enough to be able to harmonize them correctly in all matters. It does mean that harmonization is ultimately the right strategy, allowing for the range of speech figures which the Bible can be shown to use elsewhere, and for the fact that humans (including theologians and scientists) often jump to conclusions on the basis of inadequate data.

**Problems.** Any model which opts for harmonization is going to look like compromise and needless complication to purists on either side who take their data "straight" and think their opponents are ignorant or wicked. Harmonization, in fact, does typically produce more complicated models than those constructed to be the simplest possible fitting only Scripture or only nature. We should not be surprised at this. The same thing happens in biblical interpretation when we attempt to harmonize parallel passages, or in science when we try to reconcile data from two different disciplines. The Gospel accounts of the birth of Jesus, for instance, each contain significant material not mentioned in the other. Both Matthew and Luke have Jesus born of a Virgin in Bethlehem, but Matthew recounts the visit of the Magi and the flight to Egypt, whereas Luke narrates the dedication at the temple and the return to Nazareth. Liberal theologians delight to point out the "contradictions" here, but all are easily harmonized as long as one does not require that either account be read in the simplest way possible.<sup>68</sup>

Another problem young-earth creationists especially have with old-earth models is that such models have death before the fall of Adam and Eve. Not human death, but plant and animal death, as the fossil record is certainly a record of dead plants and animals. "This cannot be," they say, "for it was in Adam that death entered the world." The passage usually cited, however, Rom 5:12-21, only specifically speaks of death coming upon mankind. It is not obvious that Paul intends us to understand that plants and animals originally had eternal life. This may not be the traditional understanding of the matter, but tradition has not always been right, either.

## Conclusions

**Priorities among evangelicals.** It would be great if Christians could come to an agreement on origins (particularly if it were the way God actually did it), thus presenting a united front to the world we are trying to reach. But given the diversity of opinion among evangelicals on how to relate the biblical and scientific data, it is unlikely this will happen. Certainly, the history of Christianity in solving disagreements over baptism, worship, church government, future things, pacifism, Bible versions, and tongues does not provide much encouragement here. I fear that this disagreement, like those, will be with us until the Lord returns.

Even so, it is desirable that we keep our eyes on the chief business for which Christ established his church: to make disciples for Jesus and to teach them obedience to His commands. We need to handle the origins question, like these others, in such a way as to attract people to the Gospel rather than repelling them. But unbelievers can be repelled not only by divisions between Christians, but also by the belief that Christianity is merely wishful thinking and not intellectually honest.

In this regard, we need to do what we can to end the control militant secularists have over the agenda regarding public discussion of origins. To hear most media presentations, one would think that all Bible-believers are snake-handlers, and that only some sort of Blind-Watchmaker evolution can be seriously considered science. We need to become sufficiently familiar with the evidence and questions at issue that we can at least recommend scientifically sound materials to those in our circles of influence. For example, we need to help others see that science already has tools by which to recognize the presence of mind, and is not therefore at a total loss to detect the activity of God in nature.<sup>69</sup>

Those Christians who are convinced that the Bible teaches a young earth will want to defend this in serving the Lord. Those of us who are convinced that this is not how God created, and that young-earth creationism is a formidable stumbling block to many in coming to Christ, will want people to realize that this is not the only Christian alternative. All of us should recognize that we may be wrong in our views of origins and our interpretations of nature and Scripture, and we should be open to evaluate both our own arguments and those of others. We must not let our presuppositions so control us that we are not open to the actual evidence regarding origins.

One of Satan's best tactics in opposing the truth is confusion. We must not let him get away with this by shifting back and forth on meanings of "evolution" and getting Christians to spend most of their efforts attacking each other. Christians could agree on countering the Blind Watchmaker approach, and we ought to devote a considerable fraction of our efforts in this direction, for the sake of believers and unbelievers alike.<sup>70</sup>

### References:

1. A shortened version of a paper presented at the National Conference of the Christian Legal Society, October 16, 1993.
2. Director, Interdisciplinary Biblical Research Institute (PO Box 423, Hatfield, PA 19440); Professor of New Testament, Biblical Theological Seminary (200 N. Main St., Hatfield, PA 19440).
3. Richard Dawkins, *The Blind Watchmaker* (New York: Norton, 1986). This usage has been popularized by Phillip E. Johnson, especially in his paper "The Religion of the Blind Watchmaker," *Perspectives on Science and Christian Faith* 45 (March, 1993): 46-48. Dawkins agrees that biological organisms are very complex and appear to be designed, but argues that this apparent

design is an illusion produced by the mindless Darwinian mechanism.

4. Darwin's movement into agnosticism is sketched in David Herbert, *Darwin's Religious Views: From Creationist to Evolutionist* (London, Ontario: Hersil Publications, 1990); see also Francis Darwin, ed., *The Autobiography of Charles Darwin and Selected Letters* (1892; reprint New York: Dover, 1958), ch. 3, "Religion"; Adrian Desmond and James Moore, *Darwin: The Life of a Tormented Evolutionist* (New York: Warner Books, 1992).

5. Charles Darwin, *The Origin of Species* (1859; 6th ed., 1872; reprint New York: Collier, 1937), chs. 12-13.

6. Darwin, *Origin of Species*, ch. 11.

7. Davis A. Young, *Christianity and the Age of the Earth* (Grand Rapids: Zondervan, 1982); Charles Coulston Gillispie, *Genesis and Geology* (New York: Harper and Row, 1959).

8. Darwin, *Origin of Species*, ch. 1.

9. Dawkins, *Blind Watchmaker*.

10. Julius Wellhausen, *Prolegomena to the History of Ancient Israel* (1878; reprint New York: Meridian, 1957); S. R. Driver, *An Introduction to the Literature of the Old Testament* (1897; reprint New York: Meridian, 1956). Robert W. Funk, Roy W. Hoover and the Jesus Seminar, *The Five Gospels: The Search for the Authentic Words of Jesus* (New York: Polebridge and Macmillan, 1993); note the comment on page 1 about Darwin and the Scopes Trial.

11. G. A. Jones, "Atheism," *The Encyclopedia of Religion* (New York: Macmillan, 1987) 1:479-490; Psalm 14:1.

12. Desmond and Moore, *Tormented Evolutionist*, pp. 538-543, 601-602, 626-628, 643-645.

13. Adolf von Harnack, *What is Christianity?* (1900; reprint New York: Harper and Row, 1957); J. Gresham Machen, *Christianity and Liberalism* (Grand Rapids: Eerdmans, 1923); William Hordern, *A Layman's Guide to Protestant Theology*, rev. ed. (New York: Macmillan, 1962).

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15. Alec R. Vidler, *The Modernist Movement in the Roman Church* (Cambridge: University Press, 1934); Thomas M. Loome, *Liberal Catholicism, Reform Catholicism, Modernism* (Mainz: Matthias-Grünwald, 1979); see also the four articles on evolution and evolutionism in the *New Catholic Encyclopedia* (1967), 5:671-696; Nicolas Zernov, *Eastern Christendom* (London:

Weidenfeld and Nicolson, 1961), pp. 203-204; Sergius Bulgakov, *The Orthodox Church* (New York: Morehouse, c1935), p. 100; Athenagoras Kokkinakis, *An Interorthodox Theological Debate* (Leighton Buzzard, Beds., UK: Faith Press, 1973), pp. 92-98.

16. See, e.g., the different views espoused in Ronald Youngblood, ed., *Genesis Debate* 2nd ed. (Grand Rapids: Baker, 1990); also the bibliography by Tom McIver, *Anti-Evolution* (Jefferson, NC: McFarland, 1988; reprint Baltimore: Johns Hopkins, 1992), though not all of the authors listed here are evangelical.

17. My terminology; see, Richard H. Bube, "Biblical Evolutionism?" *Journal of the American Scientific Affiliation* 23 (1971): 140-144. Howard Van Till's concept of "functional integrity" seems to imply this sort of human evolution; see his remarks in *The Fourth Day* (Grand Rapids: Eerdmans, 1986), ch. 12, pp. 249-271; "God and Evolution: An Exchange," *First Things* (June/July 1993): 32-41; and the remarks of John Stek and Van Till in *Portraits of Creation* (Grand Rapids: Eerdmans, 1990), pp. 261, 272-277.

18. Also my terminology; e.g., David L. Dye, *Faith and the Physical World* (Grand Rapids: Eerdmans, 1966), 136-150; James M. Houston, "The Origin of Man," *Journal of the American Scientific Affiliation* 34 (1982): 1-5.

19. Arthur C. Custance, *Without Form and Void* (Grand Rapids: Zondervan, 1974); J. Vernon McGee, *Genesis: Volume I* (Pasadena, CA: Through the Bible Books, 1980); John R. Schroeder, *Answers from Genesis* (Pasadena, CA: Ambassador College, 1973); A. G. Tilney, *Without Form and Void* (Hayling Isl., Hants., U.K.: Evolution Protest Movement, 1970); Don Wardell, *God Created* (Winona Lake, IN: privately publ., 1984); notes on Genesis 1 in old *Scofield Reference Bible* (New York: Oxford, 1917), pp. 3-6.

20. See Dallas E. Cain, "Creation and Capron's Explanatory Interpretation (c 1902): A Literature Search," *IBRI Research Report* 27 (1986) for a survey of a number of authors advocating different varieties of this view; three recent examples are: Robert J. Dunzweiler, "A Proposed Creationist Alternative to Evolutionism," *IBRI Research Report* 12 (1983); Alan Hayward, *Creation and Evolution: the Facts and the Fallacies* (London: Triangle/SPCK, 1985); Robert C. Newman and Herman J. Eckelmann, Jr. *Genesis One and the Origin of the Earth* (InterVarsity, 1977; reprint Hatfield, PA: IBRI, 1989).

21. Irwin Ginsburgh, *First Man, Then Adam! A Scientific Interpretation of the Book of Genesis* (New York: Simon and Schuster, 1975); Hershel H. Hobbs, *The Origin of All Things: Studies in Genesis* (Waco, TX: Word, 1975); Russell W. Maatman, *The Bible, Natural Science, and Evolution* (Grand Rapids: Reformed Fellowship, 1970); Cora A. Reno, *Evolution on Trial* (Chicago: Moody, 1970); Francis A. Schaeffer, *Genesis in Space and Time* (Downers Grove, IL: Inter-Varsity, 1972); Davis A. Young, *Creation and the Flood: An Alternative to Flood Geology and Theistic Evolution* (Grand Rapids: Baker, 1977).

22. According to James Moore, "The Creationist Cosmos of Protestant Fundamentalism" (in *Fundamentalisms and Society*, ed. by Martin E. Marty and R. Scott Appleby [Chicago: University of Chicago, 1993], p. 46), about one quarter of the U. S. population believes in young-earth creation. According to *Religion in America* (1990), about 31% believe the Bible is God's word and to be taken literally, about 55% believe it is without error (both on p. 50) and about 33% claim to be "born again" (p. 41). It would thus appear that among evangelicals, the young-earth position is dominant.

23. For various views in the young-earth camp regarding the age of the earth, see Ronald L. Numbers, *The Creationists* (New York: Knopf, 1992): 6000-7000 yrs, Lammerts (pp. 224, 235); 9-10,000 yrs, Morris (p. 235); c 13,000 yrs, Cook (p. 313); Byron Nelson held to about 100,000 years in 1940, but by 1948 had suggested the earth might be as old as a million years (pp. 115-116). Seventh-Day Adventists have typically held to a young earth (or solar system) but sometimes allowed for an old universe (pp. 134-136, 203).

24. For various views among young-earth creationists regarding the amount of change in living things since creation, see Numbers, *The Creationists*: basic fixity of species: Byron Nelson (p. 109), L. Allen Higley (p. 114), George M. Price (pp. 114, 127, with some waffling, pp. 83-85); considerable development since creation or since Flood: Dudley J. Whitney (p. 109), Harold W. Clark (pp. 114, 124), Frank L. Marsh (pp. 129-133), H. Douglas Dean (p. 235: God created only 7 or 8 basic types), Henry M. Morris (p. 235). Walter E. Lammerts (pp. 220, 235) holds to absolute fixity except that God rearranged some DNA after the Flood to adapt animals to new environments.

25. Geerhardus Bouw, *With Every Wind of Doctrine: Biblical, Historical and Scientific Perspectives on Geocentricity* (Cleveland: Tychonian Society, 1984); Merrill A. Cohen, "Heliocentrism vs. Geocentrism: Defiance or Defense of the Gospel?" (Paper presented at the Eastern Regional meeting of the Evangelical Theological Society, April 2, 1993); R. G. Elmendorf, *How to Scientifically Trap, Test and Falsify Evolution* (Bairdford, PA: Bible-Science Association of Western Pennsylvania, 1978); Marshall and Sandra Hall, *The Connection Between Evolution Theory and the Going Together of the True Church* (Lakeland, FL: P/R, 1977); James Hanson, *A New Interest in Geocentricity* (Minneapolis: Bible-Science Association, 1979); Edward F. Hills, *Space Age Science*, 2nd ed. (Des Moines, IA: Creation Research Press, 1979); Walter van der Kamp, *The Heart of the Matter* (8611 Armstrong Ave., Burnaby, B.C., Canada, 1967).

26. George McCready Price, *The Fundamentals of Geology* (Mt. View, CA: Pacific Press, 1913); Price, *The Modern Flood Theory of Geology* (New York: Revell, 1935); Alfred M. Rehwinkel, *The Flood* (St. Louis: Concordia, 1951); John C. Whitcomb, Jr. and Henry M. Morris, *The Genesis Flood* (Philadelphia: Presbyterian and Reformed, 1961).

27. Josemaria Gonzalez Barredo, *The Subquantum Ultramathematical Definition of Distance, Space and Time* (Washington, DC: MIAS Press, 1984); Thomas G. Barnes, *Physics of the Future* (El Cajon, CA: Institute for Creation Research, 1983); Charles W. Lucas, Jr., *Soli Deo Gloria* (Temple Hills, MD: Church Computer Services, 1985). Not all who reject relativity or quantum mechanics



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28. Harold Camping, "What is the Size of the Universe?" (Oakland, CA: Family Radio, 1981).

29. E.g., Francis A. Schaeffer, *How Should We Then Live?* (Westchester, IL: Crossway, 1983); Allan Bloom, *The Closing of the American Mind* (New York: Simon and Schuster, 1987); Karl Minninger, *Whatever Became of Sin?* (New York: Bantam, 1988); Herbert Schlossberg, *Idols for Destruction* (Nashville: Thomas Nelson, 1983); Charles M. Colson and Jack Eckerd, *Why America Doesn't Work* (Dallas: Word, 1991).

30. Francis Darwin, *Life and Letters of Charles Darwin* (New York: Appelton, 1901), 2:202-203 note.

31. See the (intentionally) humorous remarks by evolutionist Robert Shapiro, *Origins: A Skeptic's Guide to the Creation of Life on Earth* (New York: Summit, 1986); also Charles B. Thaxton, Walter L. Bradley and Roger L. Olsen, *The Mystery of Life's Origin: Reassessing Current Theories* (New York: Philosophical Library, 1984; reprint Dallas, TX: Lewis & Stanley, 1993).

32. Carl Sagan, "Life," *Encyclopaedia Britannica* (1993), 22:966. The whole article (pp. 964-981) gives a nice survey of modern neo-Darwinian evolution, theorizing on the origin of life, and prospects of finding life elsewhere in the universe, from a Blind-Watchmaker point of view.

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36. Hoyle and Wickramasinghe, *Evolution from Space*, ch. 5, esp. pp. 74-76; Kevin A. Maher and David J. Stevenson, "Impact Frustration of the Origin of Life," *Nature* 331 (1988): 612-614; Norman H. Sleep et al, "Annihilation of Ecosystems by Large Asteroid Impacts on the Early Earth," *Nature* 342 (1989): 139-142.

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39. Wendell R. Bird, *The Origin of Species Revisited: The Theories of Evolution and of Abrupt Appearance*, 2 vols. (New York: Philosophical Library, 1986, 1989), 1:84-89, 155-178.

40. Gaps in fossil record: Darwin, *Origin of Species*, ch. 10; George Gaylord Simpson, *The Major Features of Evolution* (New York: Simon and Schuster, 1953), pp. 360: "In spite of these examples [splitting and gradual divergence in a few genera, subfamilies and families], it remains true, as every paleontologist knows, that most new species, genera, and families, and that nearly all new categories above the level of families appear in the [fossil] record suddenly and are not led up to by known, gradual, completely continuous transitional sequences."; Steven J. Gould, *Natural History* 86, no. 5 (1977): 14: "The extreme rarity of transitional fossils in the fossil record persists as the trade secret of paleontology."; Steven M. Stanley, *Macroevolution: Patterns and Process* (San Francisco: Freeman, 1979), p. 82: "...despite the detailed study of the Pleistocene mammals of Europe, not a single valid example is known of phyletic (gradual) transition from one genus to another."

41. David Raup, "Conflicts Between Darwin and Paleontology," *Field Museum Bulletin* 30, no. 1 (1979): 25: "Well, here we are now, about 120 years after Darwin... ironically, we have even fewer examples of evolutionary transitions than we had in Darwin's time. By this I mean that some of the classic cases... have had to be discarded or modified."

42. Bowler, *Evolution*, pp. 296-300; Julian S. Huxley, *Evolution: the Modern Synthesis*, new ed. (London: Chatto and Windus, 1963); Theodosius Dobzhansky, et al., *Evolution* (San Francisco: Freeman, 1977); George Gaylord Simpson, *Tempo and Mode in Evolution* (New York: Columbia University, 1944).

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45. Dawkins, *Blind Watchmaker*, discusses some computer programs which allegedly simulate evolution, but these are fraught with problems; see next note.

46. See Murray Eden, "Inadequacies of Neo-Darwinian Evolution as a Scientific Theory," in Paul S. Moorhead and Martin M. Kaplan, eds., *Mathematical Challenges to the Neo-Darwinian Interpretation of Evolution* (1967; reprint New York: Alan R. Liss, 1985), p. 11; Robert C.

Newman, "Computer Simulations of Evolution" (Diskette of computer programs; Hatfield, PA: IBRI, 1990).

47. P. C. W. Davies, *The Accidental Universe* (New York: Cambridge, 1982); John D. Barrow and Frank J. Tipler, *The Anthropic Cosmological Principle* (New York: Oxford, 1986).

48. See detailed discussion in Hugh Ross, *The Creator and the Cosmos: How the Greatest Scientific Discoveries of the Century Reveal God* (Colorado Springs: Navpress, 1993).

49. Some books sketching problems for Blind-Watchmaker evolution: Hayward, *Creation and Evolution*, part I, "The Genuine Scientific Objections to Darwinism"; Percival Davis and Dean H. Kenyon, *Of Pandas and People: The Central Question of Biological Origins* 2nd ed. (Dallas: Haughton, 1993); Howard J. Van Till, Davis A. Young, and Clarence Menninga, *Science Held Hostage* (Downers Grove, IL: Inter-Varsity, 1988), part III, "Science Held Hostage by Naturalism"; Bird, *The Origin of Species Revisited*.

50. Though no professional typist, I just typed the sentence mentioned in ten seconds. To calculate the expectation time for this task to be performed by a chimp, we will assume that the chimp is trained to type at 3 characters per second on a special monkey-proof typewriter (or word processor, if you wish). We will set the keyboard to do all caps, so he/she will not need to hit the shift key simultaneously with the first letter to get started. There are 67 characters in the sentence, counting spaces and the period at the end. If we assume a simplified keyboard of all 26 letters of the English alphabet, plus space and six punctuation marks (.,:;!), we have 33 distinct characters on the keyboard, to which we will assign a key for each. The number of possible ways of typing 67 characters on this special typewriter will be 33 for each of the 67 characters, or 33 times itself 67 times =  $33^{67} = 5.5 \times 10^{101}$ . This is a very large number! Typing at the rate of 3 characters per second, the chimp would be expected to have our desired sentence somewhere in his/her output in  $5.5 \times 10^{101} / 3$  seconds =  $5.9 \times 10^{93}$  years. About  $3 \times 10^{83}$  chimps could be expected to do the job in the 20 billion year history of the universe, but physicists estimate that there are only about  $10^{80}$  elementary particles in the whole place.

51. This number, 75 mutations, is surely much too small, perhaps by several orders of magnitude. Ambrose [quoted in Bird, *Origin of Species Revisited*, 1:88], says there may be 30-40 genes involved in a single wing structure of the fruit fly.

52. E.g., William J. Benetta, ed., "Scientists Decry a Slick New Packaging of Creationism," *Science Teacher* 54 (May 1987): 36-43.

53. See Arthur L. Battson, III, *On the Origin of Stasis by Means of Natural Processes* (Colorado Springs: Access Research Network, 1993), with extensive references, particularly the key paper by Roger Lewin, "A Lopsided Look at Evolution," *Science* 241 (15 July 88): 291-293. The critical thinking skills exercise in the latest edition of Price, Wiester and Hearn, *Teaching Science in a Climate of Controversy* (4th printing, revised [Ipswich, MA: American Scientific Affiliation, 1993],

pp. 49ff) well illustrates this problem.

54. Funk, Hoover and the Jesus Seminar, *The Five Gospels*, head strongly in this direction.

55. Gen 1:20, 21 (sea life); 1:24, 30 (land life); 2:7 (man); 2:19 (animals named by man); 9:4 (not to be eaten with their blood); 9:5 (such animals not to kill humans); 9:10 (covenant re/ flood made with them, too).

56. Robert C. Newman, "The Evidence of Cosmology," in J. W. Montgomery, ed. *Evidence for Faith: Deciding the God Question* (Dallas: Probe/Word, 1991), pp. 73-74; "Light Travel-time: Evidence for an Old Universe," tract (Hatfield, PA: IBRI, 1993).

57. This is discussed in much greater detail in Robert C. Newman, "An Ancient Historical Test of the Setterfield-Norman Hypothesis," *Creation Research Society Quarterly* 28 (Sept 91): 77-78.

58. Newman, "The Evidence of Cosmology," pp. 79-81; "Light Travel-Time."

59. Hayward, *Creation and Evolution*, pp. 125-126; Daniel E. Wonderly, *Neglect of Geologic Data: Sedimentary Strata Compared with Young-Earth Creationist Writings* (Hatfield, PA: IBRI, 1987), ch. 2.

60. Don L. Eicher, *Geologic Time* (Englewood Cliffs, NJ: Prentice-Hall, 1968); Edwin A. Olson, et al, "Geochronology," in *Encyclopaedia Britannica* (1993): 19:748-876. Olson is an evangelical, Professor of Earth Science at Whitworth College, Spokane, WA.

61. Young, *Creation and the Flood*, pp. 177-185; Hayward, *Creation and Evolution*, p. 93.

62. Young, *Creation and the Flood*, pp. 198-210.

63. Hayward, *Creation and Evolution*; Newman and Eckelmann, *Genesis One and the Origin of the Earth*; Dan Wonderly, *God's Time-Records in Ancient Sediments: Evidence of Long Time Spans in Earth's History* (Flint, MI: Crystal Press, 1977; order from IBRI, POB 423, Hatfield, PA 19440); Wonderly, *Neglect of Geologic Data*; Young, *Creation and the Flood*; Young, *Christianity and the Age of the Earth*.

64. See Wonderly, *God's Time-Records*, fig. 26 (dune sands), pp. 194, 230-231; Wonderly, *Neglect of Geologic Data*, chs. 1, 4; see also Young, *Christianity and the Age of the Earth*, index entries under "desert sedimentation" and "river sedimentation."

65. See Wonderly, *God's Time-Records*, chs. 4-6; Wonderly, *Neglect of Geologic Data*, chs. 2-3; Hayward, *Creation and Evolution*, pp. 87-93.

66. Wonderly, *God's Time-Records*, pp. 142-145; Wonderly, *Neglect of Geologic Data*, ch. 1, esp. fig. 3.

67. Hayward, *Creation and Evolution; Wonderly, God's Time-Records and Neglect of Geologic Data*; Young, *Creation and the Flood*.

68. Robert C. Newman, "Synoptic Harmonization: Some Principles from History and from the Book of Acts," *IBRI Research Report* 35 (1987).

69. See, e.g., Davis and Kenyon, *Of Pandas and People*.

70. My thanks to John Wiester and Art Battson for helpful suggestions.