15 ANSWERS TO JOHN RENNIE AND *SCIENTIFIC AMERICAN'S* NONSENSE

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[**NOTE FROM APOLOGETICS PRESS:** Our monthly journal on Christian evidences, *Reason & Revelation*, normally is published according to a pre-arranged syllabus. Article topics are selected months in advance, and appear in a pre-determined order. The September 2002 issue, however, represented an exception. And we felt that an explanation was in order for our subscribers, and those who visit our Web site.

During the months preceding September 2002, the controversy in the United States over the teaching of creation and/or evolution became increasingly public, and increasingly hard-fought. As state legislatures, boards of education, and others in positions of authority have ventured into the fray by expressing their willingness to consider options to the teaching of organic evolution as the sole explanation for the origin of the Universe and life in that Universe, the battle over what should, or should not, be taught in public schools heightened considerably.

As of July 2002, however, evolutionists took that battle to an entirely different level. In that month's issue of *Scientific American*, editor in chief John Rennie published what he intended to be a stinging rebuke of creationism, titled "15 Answers to Creationist Nonsense." With a variant of vitriol and dogmatism rarely seen in the scientific arena, Mr. Rennie leveled a sustained attack on both creationism and creationists that echoed throughout the halls of academia—and far beyond. A few short weeks later, *U.S. News & World Report* followed suit by devoting its front cover (and a lengthy accompanying article—"The New Reality of Evolution"—by staff writer Thomas Hayden) to an in-depth defense of the "factuality" of evolution. Neither journal left any doubt about its intent, which was to caricature the concept of creationism so effectively, and to defend the concept of evolution so astutely, that the average reader would go away thinking, "Only the intellectually challenged would dare doubt the scientific validity of evolution; and only an idiot would dare defend belief in creation."

Enough is enough! No amount of pejorative terminology on the part of editors and journalists is going to make the scientific evidence supporting creation somehow "disappear." And no amount of intellectual snobbery on the part of materialistic scientists is going to make the woefully weak case for evolution somehow "stronger." A significant segment of our work at Apologetics Press is devoted to the proclamation of biblical and scientific truth. And a similarly significant segment is devoted to the defense of that truth.

We therefore produced a special issue of *Reason & Revelation*—"Creationists Fight Back!"—that was intended to do both. The misinformation presented by the editors of *Scientific American* and *U.S. News & World Report*, as well as the erroneous conclusions that misinformation was intended to convey, need to be exposed and refuted. And the truth of the matter needs to be heard.

Our responses to these two journals, which originally appeared in the September 2002 issue of *Reason & Revelation*, were, by necessity, **abbreviated** due to severe space limitations. This article is the **unabbreviated** edition of our response to the *Scientific American* article. The unabbreviated version of our response to the *U.S. News & World Report* article ("Creationists Fight Back: A Review of *U.S. News & World Report's* Cover Story on Evolution") also is available on the "Docs' Dissections" portion of the Apologetics Press Web site. We invite your close attention to both.]

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INTRODUCTION

The Council for Media Integrity was established June 20, 1996, and is comprised of a network of distinguished international scientists, academicians, and members of the media whose job is to serve as a "watchdog" regarding a balanced portrayal by various media outlets concerning matters related to science (see "Council for Media Integrity"). The purpose of this organization is to monitor the media for unfounded scientific claims and/or misinformation. While this association may sound like a legitimate group of noble individuals concerned about scientific truth, the fact is, it is nothing more than a group of people committed to furthering evolutionary theory and propagating media bias. One of the members of that committee is John Rennie, who, since 1994, has served as editor of *Scientific American*. In the July 2002, issue of that journal, Mr. Rennie—who is supposed to be monitoring unfounded claims and misinformation about science—penned an article titled "15 Ways to Expose Creationist Nonsense" (2002). The title alone speaks volumes concerning Mr. Rennie's biased views about creationism. His belligerent attitude of scientific elitism can be seen quite clearly in an editor's letter that appeared at the beginning of the issue, stating: "Readers of *Scientific American* are well placed to expose ignorance and combat antiscientific thought. We hope that this article, and a new resource center for defending evolution at www.sciam.com, will assist them in doing so" (see "Bad Science and False Facts," 287[1]:10). Rennie previously had observed that he works primarily as a journalist, not a scientist (see "*Scientific American*: The Legacy Continues for 150 Years")—and it does not take long to realize that this self-professed "journalist" is **long** on verbiage, but **short** on facts!

While Rennie's article has been refuted and discredited by several creationists (see Hoesch, 2002; Oktar, 2002; Sarfati, 2002a), we felt our readers deserved to hear our response to this "nonsense." We invite you to consider the following observations regarding Mr. Rennie's article. Now, more than ever, we want our readers to be exposed to the truth regarding this matter. Furthermore, we want evolutionists to know that we **can** (and **will**!), answer their arguments—point by point. The time has now come for their "nonsense" to be exposed! Below, in bold type, are the "nonsensical" arguments that Mr. Rennie suggests creationists make. Our response follows.

1. [Creationists suggest that] evolution is only a theory. It is not a fact or a scientific law.

Rennie argued that while "laypeople" may use the term theory as something that falls "in the middle of a hierarchy of certainty—above a mere hypothesis but below a law," the truth is that "scientists do not use the terms that way" (2002, 287[1]:79). To support his argument, he then offered the following definition of a scientific theory from the National Academy of Sciences: "A scientific theory is a well-substantiated explanation of some aspect of the natural world that can incorporate facts, laws, inferences, and tested hypotheses." [Keep in mind that the NAS is the same group that, in 1998, mailed its 140-page indoctrination manual, Teaching about Evolution and the *Nature of Science*, to every science teacher in America.]

We recognize that the definition of "theory" is itself "evolving." What once was considered a standard textbook definition no longer is viewed as paying sufficient homage to evolutionary theory. Thus, while pro-evolution organizations such as the National Academy of Sciences may not define a theory the way most people do, we ask you to consider the definition given **by** scientists **for** scientists. For example, in her widely used *Dictionary of*

Modern Biology, Norah Rudin defined a theory as: "similar to a hypothesis but usually wider in scope. Explanatory theories for sets of phenomena are developed by observation and experimentation" (1997, p. 367). *Stedman's Medical Dictionary* defines a theory as: "a reasoned explanation of the manner in which something occurs, **lacking absolute proof**" (McDonough, 1994, p. 1023, emp. added). This definition is only slightly better than the one found in the *Merriam-Webster Dictionary*, which says that a theory is an "abstract thought" (p. 749), and uses words like "hypothesis" and "conjecture" as synonyms.

It is these kinds of definitions of a "lack of proof" that has brought about the need for a radically different definition of the word "theory" in the evolutionists' camp. Evolutionists realize the necessity of changing the status of evolution from a theory to that of a fact in order to sell their theory to the general populace. They therefore expend great effort to convince people to stop speaking of the "theory" of evolution, and to speak instead of the "fact" of evolution.

But in order to accomplish this, they must redefine the word "fact" as it is used in science. And redefine they have! John Rennie is hardly the first to attempt such a redefinition. As long ago as 1965, George Gaylord Simpson and W.S. Beck attempted such a redefinition in their biology text, *Life: An Introduction to Biology*, and ended their "redefining" section by claiming that theories ultimately

> ...may be just as certain—merit just as much confidence—as what are popularly called "facts." Belief that the sun will rise tomorrow is the confident application of a generalization. The theory that life has evolved is founded on much more evidence than supports the generalization that the sun rises every day. In the vernacular, we are justified in calling both "facts" (1965, p. 16).

Twenty-two years later, in the January 1987 issue of the popular-science magazine *Discover*, Stephen Jay Gould of Harvard authored a lengthy article titled "Darwinism Defined: The Difference Between Fact and Theory." In this particular article, Gould expressed his extreme agitation at the inability of certain people (who should know better, he said) to properly address evolution by its rightful designation—as a **fact**, not a theory. The specific cause (this time) for his discomfiture was an article in the September 30, 1986 issue of the *New York Times* by syndicated columnist Irving Kristol ("Room for Darwinism and the Bible"). Dr. Gould acknowledged both his dismay and dissatisfaction at the apparent inability of people like Mr. Kristol to distinguish (to use his own words) "the central distinction between secure fact and healthy debate about theory" (1987a, 8[1]:64). Dr. Gould then explained himself when he noted:

> Facts are the world's data; theories are explanations proposed to interpret and coordinate facts. The fact of evolution is as well established as anything in science (as secure as the revolution of the earth about the sun), though absolute certainty has no place in our lexicon. Theories, or statements about the causes of documented evolutionary change, are now in a period of intense debate—a good mark of science in its healthiest state. Facts don't disappear while scientists debate theories (p. 64, parenthetical comment in orig.).

Later, Gould wrote that "...evolution is also a fact of nature, and so do we teach it as well, just as our geological colleagues describe the structure of silicate minerals, and astronomers the elliptical orbits of the planets" (p. 65).

What could be clearer? Dr. Gould wanted everyone to know that evolution is a fact. **How** evolution occurred may be considered by some to be merely a "theory"; **that** evolution has occurred is a fact not open for further discussion. Gould even commented: "I don't want to sound like a shrill dogmatist shouting 'rally 'round the flag boys,' but biologists have reached a consensus...about the fact of evolution" (p. 69). [In a guest editorial in the

August 23, 1999 issue of *Time* magazine, Dr. Gould boasted that "evolution is as well documented as any phenomenon in science, as strongly as the earth's revolution around the sun rather than vice versa. In this sense, we can call evolution a 'fact'" (154[8]:59).] Gould was upset because there are those who refuse to acknowledge evolution as a fact. According to him, "evolution is a fact, like apples falling out of trees" (as quoted in Adler, 1980, 96[18]:95).

Twelve years after Dr. Gould's *Discover* article was published, evolutionist Robert Pennock employed the same plan of attack in his book, *Tower of Babel: The Evidence Against the New Creationism*.

> Biologists take Darwin's thesis of the history of descent with modification from common ancestors to be a fact. The key evolutionary mechanisms of variation by mutation and recombination, genetic inheritance, natural selection, random drift, and so on are also known to be **factual**. Many broad features of the evolutionary pathways are also accepted as fact. All these core conclusions are based on such overwhelming observational and experimental evidence, both indirect and direct, that it is highly unlikely that they could ever be overturned. These are all parts of evolutionary theory and they are also all facts. **There are other evolutionary hypotheses that have not yet garnered sufficient evidence and whose "facthood" is still in question**, especially ones having to do with particular pathways of descent or with the relative importance of natural selection versus drift, for example, as the cause of some particular biological feature. **It is also accepted that the theory of evolutionary processes is incomplete, that many details of the mechanisms have yet to be worked out**, and that there could be as yet unknown processes working in tandem with the known mechanisms that are important in generating the patterns of order and disorder that characterize the biological world. As research uncovers more about these processes, we can expect that new findings will supplement and refine evolutionary theory but not undermine the factual elements that the evidence has already established (1999, p. 177, emp. added).

And so, we are told, the "fact" of evolution is well established, even though there are "other evolutionary hypotheses" yet to be worked out. This is an odd turn of events. Why so?

A **fact** normally is defined as an actual occurrence or something that has real existence. A **theory** is a plausible principle or body of principles—supported by at least some facts—intended to explain various phenomena. With those standard-usage definitions in mind, consider the following in regard to evolutionary "theory."

Charles Darwin, in his *Origin of Species*, stated: "Long before the reader has arrived at this part of my work, a crowd of difficulties will have occurred to him. Some of them are so serious that to this day I can hardly reflect on them without being in some degree staggered" (1859, p. 158). Theodosius Dobzhansky, the late, eminent geneticist of the Rockefeller University, stated in his book, *The Biological Basis of Human Freedom*: "Evolution as a historical fact was proved beyond reasonable doubt not later than in the closing decades of the nineteenth century." Yet two pages later he stated: "There is no doubt that both the historical and the causal aspects of the evolutionary process are **far from completely known**.... The causes which have brought about the development of the human species **can be only dimly discerned**" (1956, pp. 6,8-9, emp. added). Notice Dobzhansky's admission that both the historical (what Gould refers to as the "fact" of evolution) and the causal (what Gould refers to as the "theory" of evolution) are "far from completely known."

In other words, on the one hand evolution is declared to be a fact, yet on the other hand its defenders readily acknowledge that the process is "far from completely known," has causes that are "only dimly discerned," and difficulties that are "staggering." Evolutionist W. LeGros Clark wrote: "What was the ultimate origin of man?... Unfortunately, any answers which can at present be given to these questions are based on indirect evidence and thus **are largely conjectural**" (1955, p. 174, emp. added). Kerkut, as an evolutionist, stated:

> ...I believe that the theory of Evolution as presented by orthodox evolutionists is in many ways a satisfying explanation of some of the evidence. At the same time I think that the attempt to explain all living forms in terms of evolution from a unique source...is premature and **not satisfactorily supported by present-day evidence**.... [T]he supporting evidence remains to be discovered.... We can, if we like, believe that such an evolutionary system has taken place, but I for one do not think that "it has been proven beyond all reasonable doubt." ...It is very depressing to find that many subjects are being encased in scientific dogmatism (1960, pp. vii, viii, emp. added).

After listing and discussing the seven **non-provable assumptions** upon which evolution is based, Dr. Kerkut then observed: "The first point that I should like to make is that these seven assumptions by their nature **are not capable of experimental verification**" (p. 7, emp. added).

This stinging rebuke of the alleged factuality of evolution is not an isolated instance. W.R. Thompson, while serving as Director of the Commonwealth Institute of Biological Control in Canada, penned the "Introduction" to the 1956 edition of Darwin's *Origin of Species*, in which he wrote:

> Darwin did not show in the *Origin* that species had originated by natural selection; he merely showed, on the basis of certain facts and assumptions, how this **might** have happened, and as he had convinced himself he was able to convince others.... On the other hand, it does appear to me that Darwin in the *Origin* was not able to produce palaeontological evidence sufficient to prove his views but that **the evidence he did produce was adverse to them**; and I may note that the position is not notably different today. The modern Darwinian palaeontologists are obliged, just like their predecessors and like Darwin, to **water down the facts** with subsidiary hypotheses which, however plausible, are in the nature of things unverifiable (pp. xii, xix, emp. added).

As Charles Darwin's brother, Erasmus, put it in a letter to Charles on November 23, 1859 (one day before the publication of *The Origin of Species*: "Concerning species, in fact the *a priori* reasoning is so entirely satisfactory to me that if the facts won't fit, why so much the worse for the facts, in my feeling" (as quoted in Francis Darwin, 1888, 2:29).

Evolutionists dogmatically assert that evolution is a fact, yet admit that it: (a) is based upon **non-provable assumptions** that are "not capable of experimental verification"; (b) bases its conclusions upon answers that are "largely conjectural"; (c) is faced with evidence "adverse" to the available facts; (d) is built upon "watered down" facts; and (e) has both historical and causal aspects that "are far from completely known." Little wonder Dr. Kerkut stated concerning the theory of evolution: "The evidence that supports it is not sufficiently strong to allow us to consider it anything more than a working hypothesis" (1960, p. 157). What a far cry from the assessments of Gould, Rennie, and their colleagues in the modern evolutionary camp.

Someone might object, however, that the quotations we have employed (from evolutionists such as Dobzhansky, Clark, and others) to document the nonverifiability of evolution are from the 1950s and 1960s. Much scientific research on evolution has occurred in the decades that followed, and thus it might be considered unfair to rely on such "dated" critiques of a concept like evolution that changes so rapidly and that has been studied so intensely.

Keep reading. We began with quotations from the 1950s and 1960s intentionally, in order to document that the situation over the past four decades has not improved. By the 1970s, for example, little to nothing had changed. At the height of his professional career, Pierre-Paul Grassé was considered by many to be France's greatest living zoologist. In fact, Dobzhansky wrote of him: "Now one can disagree with Grassé, but not ignore him. He is the most distinguished of French zoologists, the editor of the 28 volumes of *Traité de Zoologie*, author of numerous

original investigations, and ex-president of the Academie des Sciences. His knowledge of the living world is encyclopedic" (1975, 29:376). In 1977, Grassé wrote in *The Evolution of Living Organisms*:

> Today our duty is to destroy the myth of evolution, considered as a simple, understood, and explained phenomenon which keeps rapidly unfolding before us. Biologists must be encouraged to think about the weaknesses and extrapolations that theoreticians put forward or lay down as established truths. The deceit is sometimes unconscious, but not always, since some people, owing to their sectarianism, purposely overlook reality and refuse to acknowledge the inadequacies and falsity of their beliefs.
>
> Their success among certain biologists, philosophers, and sociologists notwithstanding, **the explanatory doctrines of biological evolution do not stand up to an objective, in-depth criticism**. They prove to be either in conflict with reality or else incapable of solving the major problems involved (pp. 8,202, emp. added).

Three years later, in 1980, British physicist H.S. Lipson produced a thought-provoking piece in the May issue of *Physics Bulletin* (a refereed science journal). In his article, "A Physicist Looks at Evolution," Dr. Lipson commented first on his interest in life's origin and, second, on his non-association with creationists. He then noted: "In fact, evolution became in a sense a scientific religion; almost all scientists have accepted it and many are prepared to 'bend' their observations to fit with it." Lipson went on to ask how well evolution has withstood the years of scientific testing, and suggested that "to my mind, the theory does not stand up at all." Lipson concluded: "I think, however, that we must go further than this and admit that the only acceptable explanation is **creation**." Like other evolutionists who have voiced similar views, Dr. Lipson hardly was ecstatic about his conclusion—a fact he made clear when he wrote: "I know that this is anathema to physicists, as indeed it is to me, but we must not reject a theory that we do not like if the experimental evidence supports it" (31:138, emp. in orig.). What a unique idea—actually accepting the experimental evidence rather than employing bombast and vitriol in an attempt to coerce people into believing evolution!

Just a little over a year afterward, on November 5, 1981, the late Colin Patterson (one of the world's foremost fossil experts who at the time was serving as senior paleontologist of the British Museum of Natural History in London and editor of the professional journal published by the museum) delivered a public address to his evolutionist colleagues at the American Museum of Natural History in New York City. In his speech, Dr. Patterson astonished those colleagues when he stated that he had been "kicking around" non-evolutionary, or "anti-evolutionary," ideas for about eighteen months. As he went on to describe it:

> One morning I woke up and something had happened in the night, and it struck me that I had been working on this stuff for twenty years and there was not one thing I knew about it. That's quite a shock to learn that one can be misled so long. Either there was something wrong with me, or there was something wrong with evolution theory (1981).

Dr. Patterson said he knew there was nothing wrong with him, so he started asking various individuals and groups a simple question: "Can you tell me anything you know about evolution, any one thing that is true? I tried that question on the geology staff at the Field Museum of Natural History, and the only answer I got was silence." He tried it on the Evolutionary Morphology Seminar at the University of Chicago, a prestigious body of evolutionists, and all he got there "was silence for a long time and eventually one person said, 'I do know one thing—it ought not to be taught in high school.'" Patterson then remarked: "It does seem that the level of knowledge about evolution is remarkably shallow. We know it ought not to be taught in high school, and that's all we know about it."

Patterson went on to say: "Then I woke up and realized that all my life I had been duped into taking evolution as revealed truth in some way." But more important, he termed evolution an "anti-theory" that produced "anti-knowledge." He also suggested that "the explanatory value of the hypothesis is nil," and that evolution theory is "a void that has the function of knowledge but conveys none." To use Patterson's wording, "I feel that the effects of hypotheses of common ancestry in systematics has not been merely boring, not just a lack of knowledge, I think it has been positively anti-knowledge" (1981; cf. Bethell, 1985).

Dr. Patterson made it clear, as we wish to do here, that he had no fondness for the creationist position. Yet he did refer to his stance as "anti-evolutionary," which was quite a change for a man who had authored several books (the last of which was titled simply Evolution) in the field that he later acknowledged was capable of producing only "anti-knowledge."

Colin Patterson was not the only one expressing such views, however. For more than two decades, distinguished British astronomer Sir Fred Hoyle stressed the serious problems—once again, especially from the fields of thermodynamics—with various theories regarding the naturalistic origin of life on the Earth. The same year that Dr. Patterson traveled to America to speak, Dr. Hoyle wrote:

> I don't know how long it is going to be before astronomers generally recognize that the combinatorial arrangement of not even one among the many thousands of biopolymers on which life depends could have been arrived at by natural processes here on the Earth. Astronomers will have a little difficulty in understanding this because they will be assured by biologists that it is not so, the biologists having been assured in their turn by others that it is not so. The "others" are a group of persons who believe, quite openly, in mathematical miracles. They advocate the belief that tucked away in nature, outside of normal physics, there is a law which performs miracles (provided the miracles are in the aid of biology). This curious situation sits oddly on a profession that for long has been dedicated to coming up with logical explanations of biblical miracles.... It is quite otherwise, however, with the modern miracle workers who are always to be found living in the twilight fringes of thermodynamics (1981a, 92:526, parenthetical comment in orig.).

Hoyle, and Chandra Wickramasinghe (professor of astronomy and applied mathematics at the University College, Cardiff, Wales), went even further. Using probability figures applied to cosmic time (not just geologic time here on the Earth), their conclusion was:

> Once we see, however, that the probability of life originating at random is so utterly minuscule as to make the random concept absurd, it becomes sensible to think that the favourable properties of physics on which life depends, are in every respect deliberate.... It is therefore almost inevitable that our own measure of intelligence must reflect in a valid way the higher intelligences...even to the extreme idealized limit of **God** (1981, pp. 141,144, emp. in orig.).

Hoyle and Wickramasinghe suggested, however, that this "higher intelligence" did not necessarily have to be, as far as they were concerned, what most people would call "God," but simply a being with an intelligence "to the limit of God." They, personally, opted for "directed panspermia," a view which suggests that life was "planted" on the Earth via genetic material that originated from a "higher intelligence" somewhere in the Universe. One year later, in 1982, Dr. Hoyle wrote:

> A common sense interpretation of the facts suggests that **a superintellect** has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature. The numbers one calculates from the facts seem to me so overwhelming as to put this conclusion almost beyond question (20:16, emp. added).

Three years after that, in 1985, molecular biologist Michael Denton authored *Evolution: A Theory in Crisis*, in which he stated:

> In this book, I have adopted the radical approach. By presenting a systematic critique of the current Darwinian model, ranging from paleontology to molecular biology, I have tried to show why I believe that the problems are too severe and too intractable to offer any hope of resolution in terms of the orthodox Darwinian framework, and that consequently the conservative view is no longer tenable.
>
> The intuitive feeling that pure chance could never have achieved the degree of complexity and ingenuity so ubiquitous in nature has been a continuing source of scepticism ever since the publication of the Origin; and throughout the past century there has always existed a significant minority of first-rate biologists who have never been able to bring themselves to accept the validity of Darwinian claims. In fact, the number of biologists who have expressed some degree of disillusionment is practically endless.
>
> The anti-evolutionary thesis argued in this book, the idea that life might be fundamentally a discontinuous phenomenon, runs counter to the whole thrust of modern biological thought.... Put simply, no one has ever observed the interconnecting continuum of functional forms linking all known past and present species of life. The concept of the continuity of nature has existed in the mind of man, **never** in the facts of nature (pp. 16,327,353, emp. in orig.).

In 1987, two years after Denton's book was published, Swedish biologist Søren Løvtrup wrote in an even stronger vein:

> After this step-wise elimination, only one possibility remains: **the Darwinian theory of natural selection**, whether or not coupled with Mendelism, **is false**. I have already shown that the arguments advanced by the early champions were not very compelling, and that there are now considerable numbers of empirical facts which do not fit with the theory. Hence, **to all intents and purposes the theory has been falsified**, so why has it not been abandoned? I think the answer is that current evolutionists follow Darwin's example—they refuse to accept falsifying evidence (p. 352, emp. added).

The next year, in 1988, physicist George Greenstein wrote:

> As we survey all the evidence, the thought insistently arises that some supernatural agency—or, rather, Agency—must be involved. Is it possible that suddenly, without intending to, we have stumbled upon scientific proof of the existence of a Supreme Being? Was it God who stepped in and so providentially crafted the cosmos for our benefit? (1988, p. 27).

In 1992, Arno Penzias (who fourteen years earlier had shared the 1978 Nobel Prize in physics with Robert W. Wilson for their discovery of the so-called "background radiation" left over from the Big Bang) declared:

> Astronomy leads us to a unique event, a universe which was created out of nothing, one with the very delicate balance needed to provide exactly the conditions required to permit life, and one which has an underlying (one might say "supernatural") plan [p. 83, parenthetical comment in orig.].

In his 1994 book, *The Physics of Immortality*, Frank Tipler (who co-authored with John D. Barrow the massive 1986 volume, *The Anthropic Cosmological Principle*) wrote:

> When I began my career as a cosmologist some twenty years ago, I was a convinced atheist. I never in my wildest dreams imagined that one day I would be writing a book purporting to show that the central claims of Judeo-Christian theology are in fact true, that these claims are straightforward deductions of the laws of physics as we now understand them. I have been forced into these conclusions by the inexorable logic of my own special branch of physics (Preface).

Then, in 1998, evolutionist Michael Denton shocked everyone with his book, *Nature's Destiny*, when he admitted:

> Because this book presents a teleological interpretation of the cosmos which has obvious theological implications, it is important to emphasize at the outset that the argument presented here is entirely consistent with the basic naturalistic assumption of modern science—that the cosmos is a **seamless unity which can be comprehended ultimately in its entirety by human reason and in which all phenomena, including life and evolution and the origin of man, are ultimately explicable in terms of natural processes**....
>
> Although this is obviously a book with many theological implications, my initial intention was not specifically to develop an argument for design; however, as I researched more deeply into the topic and as the manuscript went through successive drafts, it became increasingly clear that the laws of nature were fine-tuned on earth to a remarkable degree and that the emerging picture provided powerful and self-evident support for the traditional anthropocentric teleological view of the cosmos. Thus, by the time the final draft was finished, the book had become in effect an essay in natural theology in the spirit and tradition of William Paley's *Natural Theology*….

> Whether one accepts or rejects the design hypothesis…there is no avoiding the conclusion that the world **looks** as if it has been tailored for life; it **appears to have been designed**. All reality **appears** to be a vast, coherent, teleological whole with life and mankind as its purpose and goal (pp. xvii-xviii,xi-xii, 387, emp. in orig.).

Such quotations could be multiplied almost endlessly. Even a cursory examination documents that there is much more that is "unknown" than "known" in the evolutionary scenario, and that life "appears to have been designed" by some "supernatural Agency" Who served as a "superintellect" to monkey with the physics, biology, chemistry, etc. Furthermore, consider what has **not** been proved about evolution.

First, evolution cannot be established as "factual" unless something nonliving can give rise to something living—that is to say, spontaneous generation must have occurred. Evolution, in its entirety, is based on this principle. But what evidence is there that the concept of spontaneous generation is, in fact, correct? What evidence is there that life arose from nonlife? In their biology textbook, *Life: An Introduction to Biology*, evolutionists Simpson and Beck begrudgingly admitted that the spontaneous generation of life "does not occur in any known case" (1965, p. 261). Twelve years later, in his book, Until the Sun Dies, Robert Jastrow, the founder and former director of the Goddard Institute for Space Studies at NASA, summarized the situation as follows:

> According to this story, every tree, every blade of grass, and every creature in the sea and on the land evolved out of one parent strand of molecular matter drifting lazily in a warm pool. What concrete evidence supports that remarkable theory of the origin of life? There is none (1977, p. 60).

Four years after that, in 1981, Sir Fred Hoyle complained in *Nature* magazine:

> The likelihood of the spontaneous formation of life from inanimate matter is one to a number with 40,000 noughts after it.... It is big enough to bury Darwin and the whole theory of evolution. There was no primeval soup, neither on this planet nor on any other, and **if the beginnings of life were not random, they must therefore have been the product of purposeful intelligence** (1981b, 294:148, emp. added).

A decade later, in 1991, Hoyle and Wickramasinghe published in *New Scientist* an article with a catchy title ("Where Microbes Boldly Went") but a dismal message—dismal, that is, for evolutionists who are forced by their theory to believe in the concept of biochemical evolution that allegedly produced the first life on Earth by chance processes.

> Precious little in the way of biochemical evolution could have happened on the Earth. It is easy to show that the two thousand or so enzymes that span the whole of life could not have evolved on the Earth. If one counts the number of trial assemblies of amino acids that are needed to give rise to the enzymes, the probability of their discovery by random shufflings turns out to be less than 1 in $10^{40,000}$ (91:415).

Those "40,000 noughts" with which Dr. Hoyle was struggling in 1981 still were a thorn in his side ten years later. And the situation has not improved in the years since. One of the "scientific heavyweights" in evolutionary origin-of-life studies is Leslie Orgel, who has spent most of his professional career attempting to uncover the secrets of how life began on this planet. In the October 1994 issue of *Scientific American*, Dr. Orgel authored an article titled "The Origin of Life on Earth" in which he admitted:

> It is extremely improbable that proteins and nucleic acids, both of which are structurally complex, arose spontaneously in the same place at the same time. Yet it also seems impossible to have one without the other. **And so, at first glance, one might have to conclude that life could never, in fact, have originated by chemical means**....
>
> We proposed that RNA might well have come first and established what is now called the RNA world.... This scenario could have occurred, we noted, **if prebiotic** RNA had two properties not evident today: a capacity to replicate without the help of proteins and an ability to catalyze every step of protein synthesis....

> The precise events giving rise to the RNA world remain unclear. As we have seen, investigators have proposed many hypotheses, but evidence in favor of each of them is fragmentary at best. **The full details of how the RNA world, and life, emerged may not be revealed in the near future** (271:78,83, emp. added).

It is not enough, of course, "just" to establish the possibility of spontaneous generation/biochemical evolution. Evolutionists also must explain the origin of the dazzlingly complex DNA/RNA genetic code that is the basis of every living organism. But, just as their fanciful-but-failed scenarios for the explanation of the naturalistic origin of life have left them lacking any substantive answers, so their theories regarding the origin of the genetic code have failed just as miserably. One eminent evolutionist, Sir John Maddox, confessed as much in a curiously titled but revealing article, "The Genesis Code by Numbers," published in *Nature* (the scientific journal for which he served as editor for twenty-five years).

> It was already clear that the genetic code is not merely an abstraction but the embodiment of life's mechanisms; the consecutive triplets of nucleotides in DNA (called codons) are inherited but they also guide the construction of proteins. **So it is disappointing that the origin of the genetic code is still as obscure as the origin of life itself** (1994, 367:111, emp. added, parenthetical item in orig.).

Second, not only is the inability of **how** to get life started a serious stumbling block for evolutionists, but now the **where** of this supposed happening has been called into question as well. Hoyle and Wickramasinghe have argued that life fell to Earth from space after having evolved from the warm, wet nucleus of a comet (see Gribbin, 1981; Hoyle and Wickramasinghe, 1981). Sir Francis Crick, co-discoverer of the DNA molecule, has suggested that life actually was sent here from other planets (1981). Meanwhile, back on Earth, Sidney Fox and colleagues have proposed that life began on the side of a primitive volcano on our primeval planet when a number of dry amino acids "somehow" formed there at exactly the right temperature, for exactly the right length of time, to form exactly the right molecules necessary for living systems (1977). Evolutionists are fond of saying (remember Gould?) that there is no controversy over the **fact** of evolution; it is only the "how" about which they disagree. **Not true. They cannot even agree on the "where!"**

Of course, some evolutionists will attempt to argue that such matters are not properly discussed as a part of the evolutionary process, and that evolution *per se* only applies to biological change. Dobzhansky, however, settled that issue when he stated:

> Evolution comprises all the stages of development of the universe: the cosmic, biological, and human or cultural developments. Attempts to restrict the concept of evolution to biology are gratuitous. Life is a product of the evolution of inorganic matter, and man is a product of the evolution of life (1967, 55:409).

Third, in his January 1987 *Discover* article, Dr. Gould, discussed some of the "data" that establish evolution as a "fact" (his statement was that "facts are the world's data"). An examination of these data **disproves** the very thing that Gould was attempting to prove—the "factuality" of evolution. He commented:

> We have direct evidence of small-scale changes in controlled laboratory experiments of the past hundred years (on bacteria, on almost every measurable property of the fruit fly *Drosophila*), or observed in nature (color changes in moth wings, development of metal tolerance in plants growing near industrial waste heaps) or produced during a few thousand years of human breeding and agriculture (1987a, 8[1]:65, parenthetical items in orig.).

Dr. Gould thus wants us to believe that such changes **prove** evolution to be a fact. Yet notice what the professor conspicuously omitted. He failed to tell the reader what he stated publicly during a speech at Hobart College, February 14, 1980, when he said:

> A mutation doesn't produce major new raw material. You don't make new species by mutating the species.... That's a common idea people have; that evolution is due to random mutations. A mutation is **not** the cause of evolutionary change (as quoted in Sunderland, 1984, p. 106, emp. in orig.).

On the one hand, Gould wants us to believe that bacteria and fruit flies have experienced "small-scale changes" via genetic mutations, and thus serve as excellent examples of the "fact" of evolution. But on the other hand, he tells us that mutations ("small-scale changes") do not cause evolution. Which is it?

Further, notice that in his assessment, Gould made the same mistake that Darwin made 128 years earlier—extrapolating far beyond the available evidence. Darwin looked at finches' beaks, and from small changes he extrapolated to state that evolution from one group to another had occurred. Gould looked at changes in fruit flies or bacteria and did exactly the same thing, all the while failing to tell the reader that the bacteria never changed into anything else, and the fruit flies always remained fruit flies. If the "data" are the "facts," and if the "data" actually **disprove** evolution, how is it then that evolution can be called, in any sense of the word, a "fact"?

The standard-usage dictionary definition of a fact is something that is "an actual occurrence," something that has "actual existence." Can any process be called "an actual occurrence" when the knowledge of how, when, where, what, and why is missing? Were someone to suggest that a certain skyscraper had merely "happened," but that the how, when, where, what, and why were complete unknowns, would you be likely to call it a fact, or an "unproven assertion"? To ask is to answer. Gould, Futuyma, Simpson, and other evolutionists may ask us to believe that their unproven hypothesis somehow has garnered to itself the status of a "fact," but if they do, they will have to come up with something based on evidence to substantiate their wishful thinking. Merely trying to alter, for their own purposes, the definition of fact will not suffice.

Pardon us for our incredulity, but when evolutionists offer up a completely inadequate explanation for life's origin in the first place, an equally insufficient mechanism for the evolution of that life once it "somehow" got started via naturalistic processes, and a fossil record full of "missing links" to document its supposed course through time, we will continue to relegate their "fact" to the status of a theory (or better yet, a hypothesis). Adulterating the definition of the word fact is a poor attempt by Gould, Rennie, and others to lend credence to a theory that lacks any factual merit whatsoever. If this is the best evolutionists have to offer as support for their claim of evolution's factuality, it should be obvious to even the most casual observer that such a claim is completely vacuous. Little wonder, then, that evolutionist Michael Denton wrote concerning Darwin:

> His general theory that all life on earth had originated and evolved by a gradual successive accumulation of fortuitous mutations, **is still, as it was in Darwin's time, a highly speculative hypothesis entirely without direct factual support and very far from that self-evident axiom some of its more aggressive advocates would have us believe** (1985, p. 77, emp. added).

2. [Creationists suggest that] natural selection is based on circular reasoning: the fittest are those who survive, and those who survive are deemed the fittest.

First, we have "late-breaking" news for Mr. Rennie. It is not just creationists who have stated that natural selection is a tautology based on circular reasoning. His evolutionary cohorts (rightly or wrongly) have been saying the same thing for years. T.H. Morgan, the eminent geneticist and pioneer of fruit-fly research, seems to have been the first to spot the problem. He wrote early in this century: "For it may be little more than a truism to state that the individuals that are best adapted to survive have a better chance of surviving than those not so well adapted to survive" (as quoted in Bethell, 1976).

Evolutionist Francis Hitching observed that "Darwinism, as Darwin wrote it, could be simply but **nonsensically** stated: survivors survive. Which is certainly a tautology; and tells us nothing about how species originate, as even Darwin's supporters admit" (1982, p. 84, emp. added). [Mr. Rennie, it appears that creationists aren't the only ones who make "nonsensical" statements!] Dr. Hitching even went further to note that "a tautology (or truism) is a self-evident, circular statement empty of meaning, such as 'Darwin was a man,' or 'biology is studied by biologists.' The trouble with natural selection (and survival of the fittest) is that it seems to fall into this category" (p. 84, parenthetical items in orig.).

Some well-known evolutionists have been trying for years to get their own colleagues to acknowledge that natural selection is a tautology. Somehow, natural selection is supposed to ensure the "survival of the fittest," but the only pragmatic way to define the "fittest" is (you guessed it!) "those that survive." At a professional symposium on Neo-Darwinism, geneticist C.H. Waddington of Edinburgh University opined:

> The theory of neo-Darwinism is a theory of the evolution of the changing of the population in respect to leaving offspring and not in respect to anything else. Nothing else is mentioned in the mathematical theory of neo-Darwinism. It is smuggled in, and everybody has in the back of his mind that the animals that leave the largest number of offspring are going to be those best adapted also for eating peculiar vegetation, or something of this sort; but this is not explicit in the theory. All that is explicit is that they will leave more offspring. **There, you do come to what is, in effect, a vacuous statement: Natural selection is that some things leave more offspring than others; and you ask, which leave more offspring than others; and it is those that leave more offspring; and there is nothing more to it than that**. The whole guts of evolution—which is, how do you come to have horses and tigers and things—is outside the mathematical theory (as quoted in Moorhead and Kaplan, 1967, p. 14, emp. added).

Waddington is not alone in his assessment of the serious problems facing evolution as a result of natural selection having been shown to be a circular argument. G.A. Peseley joined the ranks of those criticizing natural selection as evolution's mechanism when he stated:

> One of the most frequent objections against the theory of natural selection is that it is a sophisticated tautology. Most evolutionary biologists seem unconcerned about the charge and make only a token effort to explain the tautology away. The remainder, such as Professors Waddington and Simpson, will simply concede the fact. For them, natural selection is a tautology which states a heretofore unrecognized relation: the fittest—defined as those who will leave the most offspring—will leave the most offspring.
>
> What is most unsettling is that some evolutionary biologists have no qualms about proposing tautologies as explanations. One would immediately reject any lexicographer who tried to define a word by the same word, or a thinker who merely restated his proposition, or any other instance of gross redundancy; yet no one seems scandalized that men of science should be satisfied with a major principle which is no more than a tautology (1982, 38:74).

Arthur Koestler, vitalist philosopher and author, incisively described the tautology of natural selection in these words:

> Once upon a time, it all looked so simple. Nature rewarded the fit with the carrot of survival and punished the unfit with the stick of extinction. The trouble only started when it came to defining fitness.... Thus natural selection looks after the survival and reproduction of the fittest, and the fittest are those which have the highest rate of reproduction.... We are caught in a circular argument which completely begs the question of what makes evolution evolve (1978, p. 170).

Yet, as Harvard-trained lawyer Norman MacBeth observed: "In the meantime, the educated public continues to believe that Darwin has provided all the relevant answers by the magic formula of random mutations plus natural selection—quite unaware of the fact that random mutations turned out to be irrelevant and natural selection a tautology" (1982, 2:18). James E. Lloyd, editor of the *Florida Entomologist*, condemned evolution with faint praise (while simultaneously attempting to prop up its alleged factuality) when he wrote:

> **Natural selection, though it may be tautological and philosophically a poor theory** in the various ways it is usually stated (e.g., "survival of the fittest"), **and perhaps not even capable of being falsified**, is nevertheless profound and axiomatic. It provides the most useful insight for problem solving that biological science has, and is the heart and soul of behavioral ecology (1982, 65:1, emp. added).

The problem for natural selection, however, does not end there. In fact, it gets even more serious. As Gould observed: "The essence of Darwinism lies in a single phrase: natural selection is the creative force of evolutionary change. No one denies that selection will play a negative role in eliminating the unfit. Darwinian theories require that it create the fit as well" (1977b, p. 28). Unfortunately, **creating the fit is the one thing natural selection cannot do**. As the famous Dutch botanist Hugo deVries put it: "Natural selection may explain the **survival** of the fittest, but it cannot explain the **arrival** of the fittest" (1905, pp. 825-826). Colin Patterson placed the matter in its proper focus when he commented that "…most of the current argument in neo-Darwinism is about this question: how a species originates. And it is there that natural selection seems to be fading out, and chance mechanisms of one sort or another are being invoked" (1982).

Scientific American's Rennie, like a skilled magician, spoke of **macro**evolutionary processes, and then with the same slight-of-hand trick that Gould used in his 1987 *Discover* article, proceeded to offer as "proof" examples of **micro**evolution. With impressive, full-color illustrations, Rennie used the tired old argument of "Darwin's finches" as a demonstration of natural selection, citing specifically the well-known scientific studies of Peter Grant from Princeton University who, with his wife, observed changes in finches' beaks on the Galapagos Islands. If this is the best the evolutionists have to offer, then their theory is in worse trouble than they realize.

Creationists never have objected to the idea of natural selection as a mechanism for eliminating the unfit, non-adapted organisms. As a matter of fact, creationists long before Darwin were advocating natural selection as a conservation principle. Few people are aware, apparently, that natural selection was not Charles Darwin's discovery. A **creationist** zoologist/chemist by the name of Edward Blyth (1810-1873) wrote about it in the years between 1835 and 1837, well before Darwin. Some evolutionists, like the late Loren Eiseley (Benjamin Franklin Professor of Anthropology and History of Science at the University of Pennsylvania), even have gone so far as to question the incredible similarity between Blyth's essays and those of Charles Darwin (1959), hinting at plagiarism on Darwin's part. Eiseley wrote that "the leading tenets of Darwin's work—the struggle for existence, variation, natural selection, and sexual selection—are all fully expressed" in a paper written by Blyth in 1835 (1979, p. 55). That fact has not been lost on creationists. Ian Taylor, in his book, *In the Minds of Men*, discussed Darwin's reading of Patrick Matthew's 1831 essay, *Naval Timber and Arboriculture*, which in its appendix contained the phrase "this natural process of selection"—a phrase that Darwin changed slightly to "natural means of selection" and incorporated into his very first essay, published in 1842 (1984, p. 125).

As a screening device for eliminating the unfit, natural selection represents the Creator's plan for preventing harmful mutations from affecting and even destroying the entire species. Further, to employ an old adage, that which says too much says nothing at all. The long neck of the giraffe and the short neck of the hippopotamus are both explicable by natural selection, as are both the dull coloration of the peppered moth and the brilliant colors of the bird of paradise. Natural selection "explains" everything, and therefore really explains nothing. It cannot create new

genera, families, phyla, etc. It cannot explain adaptation. The fact that an organism **is** adapted to its environment tells us absolutely nothing about how it came to be adapted. Any organisms not so adapted would not have survived, but this constitutes no proof that the adaptations were produced by evolution. Yet Gould has admitted that natural selection must be able to "create the fit" if it is to be deemed successful in an evolutionary scenario. This, it cannot do. And it certainly cannot explain the vast complexity of life around us. Tautologous arguments are not equipped with the power to "explain" such, much less "create" such.

3. [Creationists suggest that] evolution is unscientific because it is not testable or falsifiable. It makes claims about events that were not observed and can never be re-created.

There's an old saying that "people who live in glass houses shouldn't throw rocks." Once again, Mr. Rennie needs to consider the evolutionists' "glass houses" before he begins hurling verbal rocks at the creationists'. The truth is, it is not just creationists with whom Mr. Rennie has a disagreement on this point. Knowledgeable, well-respected evolutionists have gone on record as stating that the General Theory of Evolution is neither testable nor falsifiable. For a concept to qualify as a scientific theory, it must be supported by events, processes, or properties that can be **observed**, and the theory must be useful in predicting the outcome of future natural phenomena or laboratory experiments. In addition, the theory must be capable of falsification. That is, it must be possible to conceive of some experiment, the failure of which would disprove the theory. It is on the basis of such criteria that most evolutionists insist that the concept of creation be denied respectability as a potential **scientific** explanation of origins. Creation, so goes the claim, has not been witnessed by human observers, cannot be tested experimentally, and as a theory is nonfalsifiable. Notice, however, that the General Theory of Evolution likewise fails to meet all three of these criteria. No one observed the origin of the Universe or the origin of life. Similarly, no one has observed the conversion of a fish into an amphibian or an ape-like creature into a man. Paul Ehrlich and L.C. Birch, both evolutionists, stated:

> Our theory of evolution has become...one which cannot be refuted by any possible observations. Every conceivable observation can be fitted into it. It is thus "outside empirical science" but not necessarily false. No one can think of ways in which to test it. Ideas, either without basis or based on a few laboratory experiments carried out in extremely simplified systems have attained currency far beyond their validity. They have become part of an evolutionary dogma accepted by most of us as part of our training (1967, 214:349).

In a symposium at the Wistar Institute in Philadelphia on the mathematical probabilities of evolution actually having occurred, one of the participants, Murray Eden, in speaking about the falsifiability of evolution, said:

> This cannot be done in evolution, taking it in its broad sense, and this is really all I meant when I called it tautologous in the first place. It can, indeed, explain anything. You may be ingenious or not in proposing a mechanism which looks plausible to human beings and mechanisms which are consistent with other mechanisms which you have discovered, but it is still an unfalsifiable theory (1967, p. 71).

Let's face it: neither creation nor evolution is testable, in the sense of being observable experimentally. Mr. Rennie even admitted that "the historical nature of macroevolutionary study involves **inference** from fossils and DNA **rather than direct observation**" (2002, 287[1]:80, emp. added). The **evidence** is the same for both creationists and evolutionists. The **inferences** drawn from that evidence, however, are not. David Hull, the well-known philosopher of science, wrote as early as 1965:

> [S]cience is not as empirical as many scientists seem to think it is. Unobserved and even unobservable entities play an important part in it. Science is not just the making of observations. It is the making of inferences on the basis of observations within the framework of a theory (16[61]:1-18).

Data (a.k.a., "the facts") do not explain themselves; rather, they must be explained. And herein lies an important point that often is overlooked in the creation/evolution controversy. Rarely is it the **data** that are in dispute; it is the **interpretation** placed on the data that is in dispute. Unfortunately, in today's scientific paradigm (especially where evolution is concerned), theories rule over data. In his 2000 book, *Science and Its Limits*, philosopher Del Ratzsch noted that this primacy of theories over data has had enormous implications for the practice of science, the end result being that the ultimate "court of appeal" has moved away from the actual data and toward the "informed consensus" of scientists. As he put it:

> Pieces of observational data are extremely important…. [T]here is still room for disagreement among scientists over relative weights of values, over exactly when to deal with recalcitrant data, and over theory and evidence. But such disagreements often take place within the context of a broad background agreement concerning the major presuppositions of the discipline in question. **This broad background of agreement is usually neither at issue nor at risk. It has a protected status**…. Thus, objective empirical data have substantial and sometimes decisive influence on individual theories, but they have a more muted impact on the larger-scale structure of the scientific picture of reality (p. 71, emp. added).

In other words, when it comes to the "large-scale structure of the scientific picture of reality" (as in, for example, where the paradigm of evolution is concerned), do not look for the actual data to make much of a difference. In such an instance, they have a "more muted impact."

Both creation and evolution can be examined as scientific models. It is poor science, and even poorer education, to restrict instruction solely to the evolution model. When evolutionists like Mr. Rennie attempt to depict evolution as the **only** legitimate scientific model, they no longer are speaking in the context of scientific truth. Either they do not know what the data actually reveal, or they deliberately are attempting to deceive. Evolution fails to answer far more questions than it purports to answer, and the creation model certainly has as much (and often more) to offer as an alternative model. It is not within the domain of science to **prove** any concept regarding ultimate origins. The best one can hope for in this area is an adequate model to explain the circumstantial evidence (what Mr. Rennie refers to as "the inferences") at hand. When one observes the undeniable design of every living thing, the complexity of the Universe itself, and the intricate nature of life, the creation model becomes quite attractive. It at least possesses a potential explanation for such attributes. The evolution model does not, but instead asks us to believe that design, inherent complexity, and intricacy are all the result of chance processes operating over eons of time.

John Rennie continued his attack on "creationist nonsense" by contrasting macroevolution with microevolution. And, as Rennie correctly noted, "…even most creationists acknowledge that microevolution has been upheld by tests in the laboratory…" (287[1]:78). Of course we do. No argument there. We see the same variations in the plant and animal kingdoms that evolutionists see. Bacteria **can** become resistant to antibiotics. Yet they still are nothing but bacteria. Beaks of finches in the Galapagos Islands **do** change. But the finches themselves have not "progressed" in any particular direction, and, to this day, they still are reproducing only other finches—not ostriches, lemurs monkeys, gorillas, or apes. Macroevolution—changing from one kind of animal to another—has been **inferred**, but **never** documented.

To support the sacrosanct theory of evolution, Rennie marched out the ever-popular hominid fossils as evidence of evolutionary progression that he suggested **can** be documented scientifically. This "evidence," however, is hardly all it's cracked up to be. First, the fossils represent (again!) only raw data. They do not speak for themselves, but must be interpreted. And as any seasoned (and honest) paleontologist can attest, sometimes the **interpretations** get in the way of the **facts**. One example comes pressingly to mind.

In the April 1979 issue of *National Geographic*, Mary Leakey reported finding fossil footprint trails at Laetoli, Tanzania. The strata above the footprints were dated at 3.6 million years, while the strata below them were dated at 3.8. As Marvin Lubenow noted: "These footprint trails rank as one of the great fossil discoveries of the twentieth century" (1992, p. 173). Why is this the case? Not only did Dr. Leakey discover three distinct trails containing sixty-nine prints, but, as she explained in her autobiography (*Disclosing the Past*), **she also found footprints that depicted one individual actually walking in the steps of another!—something that only humans have the intelligence (or inclination) to do**. In that autobiography, she wrote:

> The Laetoli Beds might not have included any foot bones among the hominid remains they had yielded to our search, but they had given us instead one of the most graphic alternative kinds of evidence for bipedalism one could dream of discovering. **The essentially human nature and the modern appearance of the footprints were quite extraordinary**.
>
> As the 1978 excavations proceeded, we noted a curious feature. In one of the two trails, some of the individual prints seemed unusually large, and **it looked to several of us as if these might be double prints**, though by no amount of practical experiment in the modern dust could we find a way in which one individual could create such a double print….
>
> **The prints in one of the trails did indeed turn out to be double**, as Louise [Robbins, an anthropologist—BT/BH] and I and several others had expected, and at last we understood the reason, namely that *three* hominids had been present….
>
> I will simply summarize here by saying that we appear to have prints left three and a half million years ago, by three individuals of different stature: **it is tempting to see them as a man, a woman and a child** (1984, pp. 177,178, emp. added, italics in orig.).

In her *National Geographic* article, Dr. Leakey admitted that the footprints were "remarkably similar to those of modern man" (1979, 155:446).

The specialist who carried out the most extensive study to date of the Laetoli footprints (at the invitation of Mary Leakey herself) is Russell Tuttle of the University of Chicago. He noted in his research reports that the individuals who made the tracks were barefoot and probably walked habitually unshod. As part of his investigation, he observed 70 Machiguenga Indians in the rugged mountains of Peru—people who habitually walk unshod. After analyzing the Indians' footprints and examining the available Laetoli fossilized toe bones, Dr. Tuttle concluded that the ape-like feet of *A. afarensis* simply could not have made the Laetoli tracks (see Bower, 1989, 135:251). In fact, in an article on the Laetoli footprints in the March 1990 issue of *Natural History*, he wrote: "In discernible features, the Laetoli G prints are indistinguishable from those of habitually barefoot *Homo sapiens*" (p. 64). He then went on to admit: "**If the G footprints were not known to be so old, we would readily conclude that they were made by a member of our genus, *Homo***" (p. 64, emp. added). Evolutionists, therefore, **in spite of the evidence**, have ascribed the footprints to australopithecines.

Interestingly, Mary Leakey originally labeled the Laetoli footprints as "*Homo* species indeterminate," indicating that she was willing to place them in the genus of man, but was unable to decide upon a species designation. It is clear, of course, **why** she was unwilling to call them what they clearly are—*Homo sapiens*. If she had placed humans as far back as 3.7 million years, that would have destroyed every evolutionary lineage in existence—and any that could be envisioned in the foreseeable future. And so, rather than accept the data at face value, evolutionists scrambled to "explain them away" by labeling what were obvious human footprints as having been made by australopithecines. Paleontologist Niles Eldredge once commented: "We have been looking at the fossil record as a general test of the notion that life has evolved: **to falsify that general idea, we would have to show that forms of life we considered more advanced appear earlier than the simpler form**s" (1982, p. 46). In light of the evidence provided by the Laetoli footprints, could we not say, then, that, according to the evolutionists themselves, "the general idea" of evolution has been "falsified"? Indeed we could! [For a detailed discussion of the Laetoli footprints, see Lubenow, 1992, pp. 173-176.]

Second, even the evolutionists themselves have considerable difficulty trying to "interpret" the various finds. At an annual meeting of the American Association for the Advancement of Science some years ago, anthropologists from all over the world descended on New York City to view hominid fossils exhibited by the American Museum of Natural History. Reporting on this exhibit, *Science News* had this to say:

> One sometimes wonders if orangutans, chimps and gorillas ever sit around the tree, contemplating which is the closest relative of man. (And would they want to be?) Maybe they even chuckle at human scientists' machinations as they race to draw the definitive map of evolution on earth. If placed on top of one another, all these competing versions of our evolutionary highways would make the Los Angeles freeway system look like County Road 41 in Elkhart, Indiana (see "Whose Ape Is It, Anyway?," 1984, 125:361, parenthetical comment in orig.).

The public generally has no idea just how scarce, and how fragmentary (literally!), the "evidence" for human evolution actually is. Harvard professor Richard Lewontin lamented this very fact when he stated:

> When we consider the remote past, before the origin of the actual species *Homo sapiens*, we are faced with a fragmentary and disconnected fossil record. Despite the excited and optimistic claims that have been made by some paleontologists, **no fossil hominid species can be established as our direct ancestor**…. (1995, p. 163, emp. added).

How, then, in light of such candid and forceful admissions, can evolutionary scientists possibly defend the idea of ape/hominid/human evolution as a "scientifically proven fact"? As one evolutionist put it: "There are not enough fossil records to answer **when, where,** and **how** *H. Sapiens* emerged" (Takahata, 1995, 26:343-372, emp. added.). So, we do not even have enough fossils to know when, where, and how human evolution took place, yet according to Mr. Rennie, this somehow provides "proof" for macroevolution?

Truth be told, more than 6,000 so-called hominid fossils now exist. Most such fossils can be placed into one of two groups: apes or humans. A few fossils do have odd characteristics or show abnormal bone structure. But does that mean humans evolved? No. It simply means that we have variations in bone structure—variations you can see all around you. Some heads are large; others are small. Some jawbones look angled; some look square. Some noses are pointed; some are flat. Does that indicate we still are "evolving"? Or does it mean that there are occasional differences in humans?

Remember this simple exercise the next time you see a picture of one of those ape-like creatures displayed prominently across the front cover of a reputable news magazine. Look at a skeleton (any one will do) and try to draw the person that used to exist with that bony framework. What color was the hair? Was it curly, or straight? Was the person a male or a female? Did he or she have chubby cheeks, or thin? These are difficult (if not impossible!) questions to answer when we are given only a few bones with which to work. The reconstructions you see as the end-product of an artist's handiwork are not based **merely on the fossil evidence, but also on what evolutionists believe these creatures "should" have looked like.** And what about those pictures that we so frequently see gracing the covers of newsmagazines and science journals? As Boyce Rensberger admitted:

> Unfortunately, the vast majority of artist's conceptions are based more on imagination than on evidence. But a handful of expert natural-history artists begin with the fossil bones of a hominid and work from there…. Much of the reconstruction, however, is guesswork. Bones say nothing about the fleshy parts of the nose, lips, or ears. Artists must create something between an ape and a human being; the older the specimen is said to be, the more apelike they make it.... Hairiness is a matter of pure conjecture. The guesswork approach often leads to errors (1981).

Errors indeed!

In trying to strengthen his argument for fossil hominids, Mr. Rennie made the following statement. "But one should not—and does not—find modern human fossils embedded in strata from the Jurassic Period (65 million years ago)" (287[1]:80, parenthetical item in orig.). [While we do not subscribe to the old-Earth timeline given by evolutionists, we do know, however—unlike Mr. Rennie—that evolutionists date the so-called Jurassic Period at 208–144 million years ago, not 65 million.] We are curious, Mr. Rennie, why you did not share with your readers the following information from Francis Barnes, an evolutionist and specialist in rock art of the southwest. Dr. Barnes reported the following information in the June 3, 1971 *Moab [Utah] Times-Independent* under the title of "Mine Operation Uncovers Puzzling Remains of Ancient Man":

> Lin Ottinger, Moab back-country tour guide and amateur geologist and archaeologist, made a find early last week that could possibly upset all current theories concerning the age of mankind on this planet. While searching for mineral specimens south of Moab, Ottinger found traces of human remains in a geological stratum that is approximately 100 million years old…. He carefully uncovered enough of what later proved to be the parts of two human skeletons.
>
> Dr. [J.P.] Marwitt [professor of anthropology, University of Utah—BT/BH] pronounced the discovery "highly interesting and unusual" for several reasons. As the bones were uncovered, it soon became obvious that they were "in place" and had not washed in or fallen down from higher strata…. The rock and soil that had been above the remains had been continuous before the dozer work, with no caves or major faults or crevices visible. Thus, before the mine exploration work, the human remains had been completely covered by about fifteen (15) feet of material, including five or six feet of solid rock…. Due to some local shifting and faulting, it was uncertain, without further investigation, whether the find is in the lower Dakota, or still older upper Morrison formation.
>
> Of course, despite evidence that these human remains are "in place" in a formation 100 million years old, the probability is very low that they are actually that old. The bones appeared to be relatively modern in configuration, that is, of *Homo sapiens* rather than one of his ancient, semi-animal predecessors (1971).

In an article in the February 1975 issue of *Desert* magazine, Dr. Barnes offered further clarification of this unusual find.

> In addition, the dark organic stains found around the bones indicated that the bones had been complete bodies when deposited in the ancient sandstone.
>
> …Mine metallurgist Keith Barrett of the Big Indian Copper Mine that owned the discovery site, recalled that the rock and sandy soil that had been removed by dozer from above the bones had been solid with no visible caves or crevices. He also remembered that at least 15 feet of material had been removed, including five or six feet of solid rock. This provided strong, but not conclusive, evidence that the remains were as old as the stratum in which they were found.

> And that stratum was at least 100 million years old. Due to considerable local faulting and shifting, the site could either be in the lower Dakota or the still older upper Morrison formation.
>
> Somehow, the university scientists never got around to age-dating the mystery bones. Dr. Marwitt seemed to lose interest in the matter, then transferred to an eastern university. No one else took over the investigation….
>
> We may never know exactly how human bones came to be in place in rock formations more than 100 million years old. It is highly improbable that the bones are, indeed, this old. Yet, who knows?...
>
> Part of the mystery, of course, is why the University of Utah scientists chose not to age-date the mystery bones and clear up at least the question of their actual age (pp. 38-39).

No, Dr. Barnes, it is "no mystery" that evolutionists decided not to date the bones. Since they already "know" that evolution is true, human bones appearing in supposedly 100-million-year-old strata is, well, unthinkable! Better to ignore them than to study and date them. Too much riding on the belief that evolution **must** be true: reputations, research grants, etc. But Mr. Rennie, what was it you said about "no modern human fossils" being embedded in 100-million-year-old strata? You might want to heed Paul Harvey's advice and tell folks "the rest of the story."

Actually, this type of "nonsense" should come as no surprise to those familiar with how evolutionists handle "out of place" fossils. The proposed timeline and fossil lineage for our alleged descent is so muddled and contorted that evolutionists themselves often have difficultly knowing which branches are viable versus which are merely dead-ends. This is evinced quite clearly by the discovery of *Sahelanthropus tchadensis*, announced in the July 11, 2002 issue of *Nature* (see Brunet, et al., 2002). This creature is purported to show a mixture of "primitive" and "evolved" characteristics such as an ape-like brain size and skull shape, combined with a more human-like face and teeth. It also sported a remarkably large brow ridge, more like that of younger human species—and yet is supposed to be **older** than all other fossil hominids. As *The New York Times* reported in its August 6, 2002 on-line edition under the title of "Skulls Found in Africa and Europe Challenge Theories of Human Origins":

> Two ancient skulls, one from central Africa and the other from the Black Sea republic of George, have shaken the family tree to its roots, sending scientists scrambling to see if their favorite theories are among the fallen fruit. Probably so, according to paleontologists, who may have to make major revisions in the human genealogy and rethink some of their ideas…. At each turn, the family tree, once drawn straight as a ponderosa pine, has had to be reconfigured with more branches leading here and there and, in some cases, apparently nowhere….
>
> In announcing the discovery in the July 11 issue of the journal *Nature*, Dr. Brunet's group said the fossils—a cranium, two lower jaw fragments and several teeth—promised to "illuminate the earliest chapter in human evolutionary history." The age, face, and geography of the new specimen were all surprises…. The most puzzling aspect of the new skull is that it seems to belong to two widely separated periods…. "A hominid of this age," Dr. [Bernard] Wood [a paleontologist of George Washington University] wrote in *Nature*, "should certainly not have the face of a hominid less than one-third of its geological age" (see Wilford, 2002, bracketed items added).

So are we now to believe that some fossil hominids experienced "devolution"? One scientist assessed *S. tchadensis* as follows:

> The discovery consisted of a single, partial skull, albeit distorted, broken and recemented after burial, with no bones below the neck. It has excessively heavy brow ridges, a sagittal crest, and an ape-sized brain. The living creature would have been chimp size, but its (now distorted) face was (probably) flatter than most chimps and its teeth showed wear patterns more typical of hominids than chimps….
>
> Unfortunately there is no direct way to date the new specimen. The six-seven million year age came from nearby mammal, reptile, and fish fossils, similar specimens of which are found in Kenya, several hundred miles to the south, and have been dated to six-seven million years old….

> Summarizing the facts, we have one partial, broken, distorted, and recemented skull and a few teeth, which at best, point to a transition between chimp and the chimp-like *Australopithecus*, coupled with a poorly established date (Morris, 2002, 31[9]:1,2, parenthetical items in orig.).

Reading this kind of assessment brings to mind Mark Twain's comment in *Life on the Mississippi*: "There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact" (1883, p. 156).

Exactly what, then, does Mr. Rennie's parade of hominids actually show? Jeremy Rifkin summed it up well when he wrote:

> What the "record" shows is nearly a century of fudging and finagling by scientists attempting to force various fossil morsels and fragments to conform with Darwin's notions, all to no avail. **Today the millions of fossils stand as very visible, ever-present reminders of the paltriness of the arguments and the overall shabbiness of the theory that marches under the banner of evolution** (1983, p. 125, emp. added).

For a thorough examination of the fossil record as it applies to human evolution, we invite you (and Mr. Rennie!) to read our review, "Human Evolution and the 'Record of the Rocks' " (Harrub, Thompson, and Lyons, 2002).

4. [Creationists suggest that] increasingly, scientists doubt the truth of evolution.

Yes, there is an increasing number of scientists who "doubt the truth of evolution." As best we can tell, they appear to fall into two main groups. The first consists of what might be called "agnostic evolutionists." While still willing to profess belief in evolution, they nevertheless find themselves "bothered" by its multitudinous failings. And their number is growing—for good reason.

The fact is, the Universe is "fine-tuned" in such a way that it is impossible to suggest logically that it simply "popped into existence out of nothing" (as the chaotic inflationary theory suggests) and then went from the chaos associated with the inflationary Big Bang model (as if the Universe were a giant firecracker!) to the sublime order that it presently exhibits. In their book, *On the Moral Nature of the Universe*, Nancey Murphy and George F.R. Ellis noted:

> The symmetries and delicate balances we observe in the universe require an extraordinary coherence of conditions and cooperation of laws and effects, suggesting that in some sense they have been **purposely designed**. That is, **they give evidence of intention**, realized both in the setting of the laws of physics and in the choice of boundary conditions for the universe (1996, p. 57, emp. added).

The idea that the Universe and its laws "have been purposely designed" has surfaced much more frequently in the past several years. In his book, *Superforce: The Search for a Grand Unified Theory of Nature*, Australian astrophysicist Paul Davies made this amazing statement:

> If nature is so "clever" as to exploit mechanisms that amaze us with their ingenuity, **is that not persuasive evidence for the existence of intelligent design behind the universe**? If the world's finest minds can unravel only with difficulty the deeper workings of nature, how could it be supposed that those workings are merely a mindless accident, a product of blind chance? (1984, pp. 235-236, emp. added).

Four years later, in his text, *The Cosmic Blueprint: New Discoveries in Nature's Creative Ability to Order the Universe*, Davies went even further when he wrote:

> There is for me powerful evidence that there is something going on behind it all.... **It seems as though somebody has fine-tuned nature's numbers to make the Universe.... The impression of design is overwhelming** (1988, p. 203, emp. added).

Another four years later, in 1992, Davies authored *The Mind of God*, in which he remarked:

> I cannot believe that our existence in this universe is a mere quirk of fate, an accident of history, an incidental blip in the great cosmic drama.… Through conscious beings the universe has generated self-awareness. This can be no trivial detail, no minor by-product of mindless, purposeless forces. **We are truly meant to be here** (1992a, p. 232, emp. added).

That statement, "We are truly meant to be here," was the type of sentiment expressed by two scientists, John Barrow and Frank Tipler, in their 1986 book, *The Anthropic Cosmological Principle*, which discussed the possibility that the Universe seems to have been "tailor-made" for man.

In 1995, NASA astronomer John O'Keefe stated in an interview: "We are, by astronomical standards, a pampered, cosseted, cherished group of creatures.... If the Universe had not been made with the most exacting precision we could never have come into existence. It is my view that these circumstances indicate the universe was created for man to live in" (as quoted in Heeren, 1995, p. 200).

In his discussion of the Big Bang inflationary model, Michael J. Murray discussed the idea of the origin of the Universe and the complexity that would be required to pull off such an event.

> ...[I]n all current worked-out proposals for what this "universe generator" could be—such as the oscillating big bang and the vacuum fluctuation models explained above—the "generator" itself is governed by a complex set of physical laws that allow it to produce the universes. It stands to reason, therefore, that if these laws were slightly different the generator probably would not be able to produce any universes that could sustain life. After all, even my bread machine has to be made just right to work properly, and it only produces loaves of bread, not universes!
>
> ...[T]he universe generator must not only select the parameters of physics at random, but must actually randomly create or select the very laws of physics themselves. This makes this hypothesis seem even more far-fetched since it is difficult to see what possible physical mechanism could select or create such laws. The reason the "many-universes generator" must randomly select the laws of physics is that, just as the right values for the parameters of physics are needed for life to occur, the right set of laws is also needed. If, for instance, certain laws of physics were missing, life would be impossible. For example, without the law of inertia, which guarantees that particles do not shoot off at high speeds, life would probably not be possible. Another example is the law of gravity; if masses did not attract each other, there would be no planets or stars, and once again it seems that life would be impossible (1999, pp. 61-62).

As early as 1959 (in his book, *Religion and the Scientists*), Sir Fred Hoyle addressed the fine-tuning of the nuclear resonances responsible for the oxygen and carbon synthesis in stars when he observed:

> I do not believe that any scientists who examined the evidence would fail to draw the inference that **the laws of nuclear physics have been deliberately designed** with regard to the consequences they produce inside stars. If this is so, then my apparently random quirks have become part of a deep-laid scheme. If not, then we are back again at a **monstrous sequence of accidents** (as quoted in Barrow and Tipler, 1986, p. 22, emp. added).

When we (to use Hoyle's words) "examine the evidence," what do we find? Murray answered:

> Almost **everything about the basic structure of the universe**—for example, the fundamental laws and parameters of physics and the initial distribution of matter and energy—**is balanced on a razor's edge** for life to occur.... Scientists call this extraordinary balancing of the parameters of physics and the initial conditions of the universe the "fine-tuning of the cosmos" (p. 48, emp. added).

Little wonder there is a group of "agnostic evolutionists" worried about the future of evolutionary thought. If we were them, we would be worried, too!

The second group of scientists consists of those who believe that there is ample evidence of an "Intelligent Designer." In fact, this new breed of scientists has many of the evolutionary kingpins so worried that these "evolutionary heavyweights" are doing everything possible to discredit any and all efforts at documenting such design. For instance, in reporting on the growth of the Discovery Institute (a Seattle-based organization staffed with reputable scientists who believe there is ample evidence of design throughout the Universe), Steve Benen wrote:

> Legitimate scientists reject the validity of intelligent design concepts, however, and are unimpressed with Institute activists' credentials. "They're trying to make it appear like they're scientists who just disagree with other scientists," said Lawrence Krauss, professor at Case Western Reserve University. "A number of them have scientific credentials, which helps, but in no sense are they proceeding as scientists" (2002).

Rennie employed the argument that if more scientists doubted evolution, it would be revealed in scientific journals. He then commented that "few antievolution manuscripts are even submitted" (2002, 287[1]:80). Mr. Rennie is right. But **why** is he right?

We **know** why, and would like to draw Mr. Rennie's attention to a document from an editor on the staff of *Science* (one of the professional journals that Mr. Rennie himself mentioned). In July 1985, D. Russell Humphreys, a respected physicist from the prestigious Sandia National Laboratories in Albuquerque, New Mexico, who is involved with the laboratory's particle beam fusion project concerning thermonuclear fusion energy research (and who also happens to be a creationist), wrote to inquire why creationists could not even seem to get a letter published in *Science*, much less an article. On August 30, 1985, Christine Gilbert, the Letters Editor at *Science*, wrote Dr. Humphreys a letter on the journal's official stationery. "Dear Dr. Humphreys: Thank you for your letter of 30 July. It is true that we are not likely to publish letters supporting creationism. This is because we decide what to publish on the basis of scientific content." [To examine the complete context of all of Dr. Humphreys' correspondence with *Science*, including Christine Gilbert's response, see Robert Gentry's book, *Creation's Tiny Mystery* (1988, pp. 192-194).]

If scientific journals will not even publish a **letter** from creationists, what makes Mr. Rennie think they would give any thought whatsoever to an actual research **manuscript** from creationists? Sharon Begley commented on this "dirty little secret" in a September 14, 1992 *Newsweek* article titled "Is Science Censored?" In that article, she wrote:

> Despite its objective face, **science is as shot through with ideology as any political campaign**, and now that dirty secret is coming out. The party line is that papers submitted to journals are rejected only for reasons of substance—the methodology is suspect, the data don't support the conclusions, the journal has better papers to use. But lately scientists have been privately fuming over rejections they blame on censorship (p. 63, emp. added).

"Censorship?" No kidding! But why?

The idea of strict objectivity in intellectual circles is a myth. While most scholars like to think of themselves as broad-minded, unprejudiced paragons of virtue, the fact is that they, too, on occasion, suffer from bouts of bias, bigotry, and presuppositionalism. Nobel laureate James Watson remarked rather bluntly: "In contrast to the popular conception supported by newspapers and mothers of scientists, **a goodly number of scientists are not only narrow-minded and dull, but also just stupid**" (1968, p. 14, emp. added). And Dr. Watson wasn't talking about creationists! Phillip Abelson, one-time editor of *Science*, wrote: "One of the most astonishing characteristics of scientists is that some of them are plain, old-fashioned bigots. Their zeal has a fanatical, egocentric quality characterized by disdain and intolerance for anyone or any value not associated with a special area of intellectual activity" (1964, 144:373).

In a stern letter to creationist Robert Gentry of the Oak Ridge National Laboratories (who is arguably the world expert on pleochroic polonium haloes), Frank Press, president of the National Academy of Sciences, stated:

> This is double talk, and merely closing ranks against creationists. This is the old trick of claiming "there is no doubt that evolution occurred; the only disagreement is about the mechanism."
>
> But modern evolutionary theory is **all about** providing a plausible mechanism for explaining life's complexity without God. If the disputes undermine favored mechanisms, then the materialist apologetic crumbles. The supporters of various evolutionary camps score mortal blows against the mechanisms proposed by rival camps, so it's perfectly reasonable for creationists to point this out.
>
> For example, with the origin of birds, there are two main theories: that birds evolved "ground up" from running dinosaurs (the **cursorial** theory), and that they evolved "trees-down" from small reptiles (the **arboreal** theory). Both sides produce devastating arguments against the other side. The evidence indicates that the critics are **both** right—birds did not evolve either from running dinos or from tree-living mini-crocodiles. In fact, birds did not evolve from non-birds at all!
>
> Similarly, supporters of "jerky" evolution (**saltationism** and its relative, **punctuated equilibria**) point out that the fossil record does not show gradualism, and that the hypothetical transitional forms would be disadvantageous. But supporters of gradual evolution point out that large, information-increasing change is so improbable that one would need to invoke a secular miracle. Creationists agree with both: punctuational evolution can't happen, and gradual evolution can't happen—in fact, particles-to-people evolution can't happen at all! (2002a, emp. in orig.).

Scientific American's Rennie went on to complain, however:

> Unfortunately, dishonest creationists have shown a willingness to take scientists' comments out of context to exaggerate and distort the disagreements. Anyone acquainted with the works of paleontologist Stephen Jay Gould of Harvard University knows that in addition to co-authoring the punctuated-equilibrium model, Gould was one of the most eloquent defenders and articulators of evolution. (Punctuated equilibrium explains patterns in the fossil record by suggesting that most evolutionary changes occur within geologically brief intervals—which may nonetheless amount to hundreds of generations.) Yet creationists delight in dissecting out phrases from Gould's voluminous prose to make him sound as though he had doubted evolution, and they present punctuated equilibrium as though it allows new species to materialize overnight or birds to be born from reptile eggs (2002, 287[1]:81).

If we may kindly say so, this is pure rubbish. First, Mr. Rennie has judged the motives of people he does not even know. And where is his proof? His statement is nothing but a mere assertion—pulled "out of the blue" without a shard of evidence to support it. Is it true that on occasion a creationist may inadvertently mis-use a quotation? Yes, just as an evolutionist can mis-use a quotation. While it certainly is not our prerogative to speak for "all creationists," there are two things we can say. First, we, personally, go to great lengths to check each and every quotation we use, and to document it as completely and fully as possible. We strive diligently to "do our home work," because we want our readers to know that we are taking every necessary precaution to ensure that what we say is true and documentable, and that we will not knowingly misrepresent our opponents. While we may make unintentional errors from time to time, we do our best not to. Second, the same can be said of most of the creationist community. As we check (and double-check) quotations that we obtain from others, almost without fail, we find them to be accurate and fully documented. It is a rare instance indeed when we find otherwise—and in practically every one of those it is obvious that the mistake was both minor and unintentional.

Third, however, we would like to point out that "the sauce that is good for the goose likewise is good for the gander." The same charge—quoting out of context—on occasion may be leveled against evolutionists. Consider the following, for example. In the November 21, 1980 issue of *Science*, evolutionist Roger Lewin wrote an article ("Evolution Theory Under Fire") about a conference attended by a number of prominent evolutionists, one of whom was renowned geneticist Francisco J. Ayala. In reporting on the conference in general, and one of Dr. Ayala's remarks specifically, Dr. Lewin wrote:

> Thus went the verbal jostling, with the mood swinging perceptibly in favor of recognizing stasis as being a real phenomenon. Gabriel Dover, a geneticist from Cambridge University, England, felt atrongly enough to call species stasis "The single most important feature of macroevolution." In a generous admission Francisco Ayala, a major figure in

> propounding the Modern Synthesis in the United States, said: "**We would not have predicted stasis from population genetics, but I am now convinced from what the paleontologists say that small changes do not accumulate**" (210:884, emp. added).

That last sentence was included in a number of creationist publications and Web sites, due to Dr. Ayala's apparent admission that evolutionists "would not have predicted stasis from population genetics," and that "small changes do not accumulate." As it turns out, however, it was evolutionist Lewin who "got it wrong." Another evolutionist, Richard Arrowsmith, sent an e-mail to Dr. Ayala, inquiring about this seemingly incongruent statement. Here is Dr. Ayala's reply (reproduced from Arrowsmith's Web site at: http://home.austarnet.com.au/stear/another_creationist_out_of_context_quote.htm):

> Dear Dr. Arrowsmith:
>
> I don't know how Roger Lewin could have gotten in his notes the quotation he attributes to me. I presented a paper/lecture and spoke at various times from the floor, but I could not possibly have said (at least as a complete sentence) what Lewin attributes to me. In fact, I don't know what it means. How could small changes **not** accumulate! In any case, virtually all my evolutionary research papers evidence that small (genetic) changes do accumulate.
>
> The paper that I presented at the conference reported by Lewin is virtually the same that I presented in 1982 in Cambridge, at a conference commemorating the 200 [sic] anniversary of Darwin's death. It deals with the claims of "punctuated equilibrium" and how microevolutionary change relates to macroevolution. (I provide experimental results showing how one can obtain in the laboratory, as a result of the accumulation of small genetic changes, morphological changes of the magnitude observed by paleontologists and presented as evidence of punctuated equilibrium.) The paper was published as part of the conference proceedings: Ayala, F.J. 1983. Microevolution and macroevolution, In: D.S. Bendall, ed., *Evolution from Molecules to Men* (Cambridge University Press), pp. 387-402.

Interestingly, Arrowsmith's Web site is titled: "Another **Creationist** Misquote," as if it were the creationists who somehow were responsible for the erroneous information. **Now** who's being "dishonest," Mr. Rennie?

Lastly, Mr. Rennie accused creationists of frequently misquoting Stephen Jay Gould by "dissecting out phrases from Gould's voluminous prose to make him sound as though he had doubted evolution." This is an unconscionable accusation. Everyone—creationists and evolutionists alike—knows that the late Stephen Jay Gould was one of the foremost evolutionists of the twentieth century. Anyone even vaguely familiar with the creation/evolution controversy understands that. At the same time, however, people who have read Gould's "voluminous prose" also are aware of the fact that, at times, Gould was his own worst enemy. In an effort to defend at all costs his beloved concept of "punctuated equilibrium" (invented with the assistance of Niles Eldredge), Gould frequently made comments such as these:

> (1) The extreme rarity of transitional forms in the fossil record persists as the trade secret of paleontology. We fancy ourselves as the only true students of life's history, yet to preserve our favored account of evolution by natural selection, we view our data as so bad that we never see the very process we profess to study (1977a, 86[5]:14).
>
> (2) All paleontologists know that the fossil record contains precious little in the way of intermediate forms; transitions between major groups are characteristically abrupt (1977b, 86[6]:24).
>
> (3) Contrary to popular myths, Darwin and Lyell were not the heroes of true science.... Paleontologists have paid an exorbitant price for Darwin's argument. We fancy ourselves as the only true students of life's history, yet to preserve our favored account of evolution by natural selection, we view our data as so bad that we never see the very process we profess to study (1977a, 86[5]:12,14).
>
> (4) The history of most fossil species includes to features particularly inconsistent with gradualism:
>
> 1. **Stasis**. Most species exhibit no directional change during their tenure on earth. They appear in the fossil record looking much the same as when they disappear; morphological change is usually limited and directionless.
> 2. **Sudden appearance**. In any local area, a species does not arise gradually by the steady transformation of its ancestors; it appears all at once and "fully formed" (1980, p. 182).

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> 2. **Sudden appearance**. In any local area, a species does not arise gradually by the steady transformation of its ancestors; it appears all at once and "fully formed" (1980, p. 182).
>
> (5) Indeed, if we do not invoke discontinuous change by small alteration in rates of development, I do not see how most major evolutionary transitions can be accomplished at all. Few systems are more resistant to basic change than the strongly differentiated adults of "higher" animal groups. How could we ever convert a rhinoceros or a mosquito into something fundamentally different? Yet transitions between major groups must have occurred in the history of life (1977b, 86[6]:30, emp. in orig.).

Regardless of whether Gould's admirers (such as Rennie) like it or not, the simple fact is that Gould's statements frequently confirmed exactly what creationists always have believed. Gould became (inadvertently, to be sure) one of the best "hostile witnesses" that creationists could have hoped to call to the stand. As he strove to show the weaknesses of Neo-Darwinian gradualism, he simultaneously showed the weaknesses of evolution as a whole. And that is the very point creationist writers have made via his quotations.

Most creationists have presented Gould's ideas in a clear and correct fashion—ideas, by the way, that are not the exclusive property of evolutionists. Additionally, even some evolutionists believe that Gould has no one but himself to blame because of his all-too-frequent, and seemingly incredible (from an evolutionary viewpoint), statements. For example, geneticist Richard Goldschmidt became famous via his 1940 book—*The Material Basis for Evolution*—for promoting the ridiculous concept of "hopeful monsters," which did indeed suggest something very much like a bird hatching from a reptile egg. Thirty-seven years later, in 1977, Dr. Gould authored an article in the June/July issue of *Natural History* titled "The Return of Hopeful Monsters," in which he wrote: "As a Darwinian, I wish to defend Goldschmidt's postulate that macroevolution is not simply microevolution extrapolated and that major structural transitions can occur rapidly without a smooth series of intermediate stages.... I do, however,

predict that during the next decade Goldschmidt will be largely vindicated in the world of evolutionary biology" (1977b, 86[6]:24,22). Exactly what were creationists to think when Gould himself then set out to "vindicate" Goldschmidt (albeit not under the name of "hopeful monsters," but instead under the more impressive—and much more scientifically scintillating—name of "punctuated equilibrium")? Pardon us for pointing out the obvious!

Mr. Rennie—it's one thing to make the accusation of "out-of-context quotations." It's another thing to prove it. To accuse is not to convict. You'll have to do better.

6. [Creationists suggest that] if humans descended from monkeys, why are there still monkeys?

Under this heading, Mr. Rennie wrote: "This surprisingly common argument reflects several levels of ignorance about evolution. The first mistake is that evolution does not teach that humans descended from monkeys; it states that both have a common ancestor" (2002, 287[1]:81). The late evolutionary geneticist and Nobel laureate, Hermann J. Muller, writing in the May 1957 issue of *Scientific Monthly*, blistered his evolutionary colleagues for making such a ridiculous assertion rather than simply accepting the fact that monkeys gave rise to apes, which then gave rise to humans.

> It is fashionable in some circles to refer slurringly to the inference that apes were ancestral to man, and to insinuate that it is more proper to say that men and apes, perhaps even men, apes, and monkeys, diverged long ago from a stem form that was more primitive than any of these. This is mere wistful thinking on the part of those who resent too vivid a visualization of their lowly origin and their present-day poor relations (84[5]:250).

Seven years later, "Mr. Evolution" himself—George Gaylord Simpson of Harvard—was equally outspoken against what he viewed as such a cowardly approach to the discussion of human evolution.

> On this subject, by the way, there has been too much pussyfooting. Apologists emphasize that man cannot be descendant of any living ape—a statement that is obvious to the verge of imbecility—and go on to state or imply that man is not really descended from an ape or monkey at all, but from an earlier common ancestor. **In fact, that earlier ancestor would certainly be called an ape or monkey in popular speech by anyone who saw it**. **Since the terms ape and monkey are defined by popular usage, man's ancestors were apes or monkeys** (or successively both). It is pusillanimous [cowardly—BT/BH] if not dishonest for an informed investigator to say otherwise (1964, p. 12, emp. added, parenthetical item in orig.).

What was that, Dr. Simpson? Man's "ancestor would certainly be called an ape or monkey in popular speech by anyone who saw it"? And "since the terms ape and monkey are defined by popular usage, man's ancestors were apes or monkeys"? Furthermore, an "informed investigator" (like, for example, John Rennie of *Scientific American*?) would be "dishonest" to suggest otherwise? Need we say more?

Mr. Rennie then complained:

> The deeper error is that this objection is tantamount to asking: "If children descended from adults, why are there still adults?" New species evolve by splintering off from established ones, when populations of organisms become isolated from the main branch of their family and acquire sufficient differences to remain forever distinct. The parent species may survive indefinitely thereafter, or it may become extinct (287[1]:81).

This is not an error on the part of creationists; it is an error on the part of evolutionists! By making such a statement, it is obvious that Mr. Rennie does not understand how evolution is supposed to work, or the concept he is struggling (and failing) to defend. His argument is a stereotypical "apples to oranges" comparison. Marvin Lubenow, author of the classic text, *Bones of Contention*, and a man who has studied the fossil record for more than a quarter of a century, had this to say regarding this type of ridiculous assertion.

> When a creationist emphasizes that according to evolution, descendants can't be living as contemporaries with their ancestors, the evolutionist declares in a rather surprised tone, "Why, that's like saying that a parent has to die just because a child is born!" Many times I have seen audiences apparently satisfied with that analogy. But it is a very false one**. In evolution, one species (or a portion of it) allegedly *turns into* a second, better-adapted species through mutation and natural selection. However, in the context of human reproduction, I do not *turn into* my children;** I continue on as a totally independent entity. Furthermore, in evolution, a certain portion of a species ***turns into*** a more advanced species because that portion of the species allegedly possesses certain favorable mutations, which the rest of the species does not possess. Thus **the newer, more advanced group comes into direct competition with the older unchanged group and eventually eliminates it through death**…. The analogy used by evolutionists is without logic, and the problem of contemporaneousness remains (1992, p. 129, emp. added).

Lubenow is absolutely correct. The argument used by evolutionists (like Rennie) is "without logic." And yes, the "problem of contemporaneousness" does indeed remain. The fact that Mr. Rennie does not understand the problem does not somehow alleviate it. Ignorance is no excuse. Pardon us for saying so, but if Mr. Rennie is not going to study the subject before he puts pen to paper, then he should avoid writing on the subject altogether.

7. [Creationists suggest that] evolution cannot explain how life first appeared on the earth.

Mr. Rennie tried to quietly whitewash this as an arbitrary matter. He did admit that "**the origin of life remains very much a mystery**" (talk about understatement!), yet in the same breath suggested:

> …[B]iochemists have learned about how primitive nucleic acids, amino acids and other building blocks of life could have formed and organized themselves into self-replicating, self-sustaining units, laying the foundation for cellular biochemistry. Astrochemical analyses hint that quantities of these compounds might have originated in space and fallen to earth in comets, a scenario that may solve the problem of how those constituents arose under the conditions that prevailed when our planet was young (2002, 287[1]:81).

What should be our response to all this? Evolution postulates that life arose from nonliving matter as a result of a purely naturalistic, completely mechanistic, and equally mysterious process on a prebiotic Earth. This process—which parades under such names as abiogenesis, chemical evolution, biopoiesis, or spontaneous generation—is one of the foundational concepts of organic evolution. When British evolutionist G.A. Kerkut published his classic book, *The Implications of Evolution*, he listed the seven **nonprovable assumptions** upon which evolution is based. At the very top of that list was: "The first assumption is that non-living things gave rise to living material, i.e., spontaneous generation occurred" (1960, p. 6).

A naturalistic origin of life is absolutely essential to the beginning, and thus the continuation, of evolution. Some evolutionists, realizing all too well the fact brought to light by Mr. Rennie—viz., "the origin of life remains very much a mystery"—have therefore struggled to distance themselves and their beloved theory from its earliest moorings. One such evolutionist was Stephen Jay Gould, who wrote:

> **Evolution is not the study of life's ultimate origin as a path toward discerning its deepest meaning. Evolution, in fact, is not the study of origins at all**. **Even the more restricted (and scientifically permissible) question of life's origin on our earth lies outside its domain.** (This interesting problem, I suspect, falls primarily within the purview of chemistry and the physics of self-organizing systems.) Evolution studies the pathways and mechanisms of organic change **following** the origin of life (1987b, 96[10]:18, parenthetical comments in orig., emp. added).

This, admittedly, was a valiant (though doomed) attempt by Gould to distance himself from the problem presented by the obvious fact that **if something cannot live, it obviously cannot evolve**. What were the naturalistic origins of life on Earth? How did something nonliving give rise to something living? It is, says Mr. Rennie, "very much a mystery."

Geneticist Theodosius Dobzhansky recognized the inherent fallacy in the type of illogical argument Gould was trying so desperately to defend. He wrote:

> Evolution comprises all the states of development of the universe; the cosmic, biological, and human or cultural developments. **Attempts to restrict the concept of evolution to biology are gratuitous. Life is a product of the evolution of inorganic matter, and man is a product of the evolution of life** (1967, 155:409, emp. added).

Life is indeed a "product of the evolution of inorganic matter." And no amount of wishful thinking on the part of Dr. Gould or Mr. Rennie will alter that fact. And we suspect Mr. Rennie knows that quite well.

Rennie also stated that "astrochemical analyses hint that quantities of these compounds [necessary for spontaneous generation—BT/BH] might have originated in space and fallen to earth in comets." This is becoming an all-too-familiar argument in the evolutionary camp these days. Evolutionists realize the immense difficulty of getting life started on Earth via naturalistic processes, as we documented under point number one in this review. Therefore, many of those same evolutionists have turned to outer space for the salvation of their troubled theory.

In an article with the intriguing title, "Cosmic Chemistry Gets Creative," in the May 19, 2001 issue of *Science News*, Jessica Gorman noted that some scientists "…speculate that precursors to life might have arrived on an asteroid, meteorite, comet, or even interplanetary dust" (159:317). Yet such a scenario is not without its own set of built-in problems, as Gorman went on to note:

> The next question is: Could those chemicals have traveled from their out-of-this-world venues to Earth's surface? No one knows if the delicate chemicals could have survived the intense heat and pressure of an arrival via comet or meteorite. Nor does anyone know how an asteroid, meteorite, or comet impact might have altered Earth's atmosphere locally, perhaps making it more friendly to life…. It may be that the best clues to life's first molecules remain out in space. Researchers can theorize with computers about impacts, simulate them in the laboratory, and test meteorites that have fallen to Earth. But they've yet to get their hands on untained, extraterrestrial samples of space stuff (159:317).

Stanley Miller, who with Harold Urey performed the famous origin-of-life experiments in the early 1950s, has advocated the exact opposite view—that life must have evolved here on Earth, rather than in space, because space solves none of the problem associated with origin-of-life theories and, instead, adds the destructive rays associated with the long trip from outer space (1996). Additional problems with such a scenario have to do with the extreme cold, the great distances involved in outer space travel, and the heat and shock of entry. Russell Grigg has pointed out two additional obstacles, which are significant in their own right.

> 1. The need to achieve escape velocity. For a rock (or a spacecraft) to break free from the pull of gravity of its mother planet, it must achieve a speed called the escape velocity. For earth this is 11.2 km per second…(25,000 mph). As volcanoes do not eject materials at these speeds, scientists postulate that rocks are blasted from planets into space through giant asteroid collisions.
>
> 2. The tyranny of distance. The **nearest** star to Earth is Proxima Centauri. It is 4.3 light years away…. If a planet was orbiting Proxima Centauri and a rock was blasted from it at the speed of earth's escape velocity, the object would take 115,000 years to get here. Any rock coming from an Earth-sized planet at the comparatively close distance of 40 light years away (or $1/2500^{th}$ of the diameter of the Milky Way) would take over a million years to get here (2000, 22[4]:42, emp. in orig.).

All other stars, and any planets possibly associated with them, are even farther away. The temperature during such hypothetical trips would be near absolute zero, and constant bombardment by cosmic rays would worsen the situation. Are the problems somehow lessened by the suggestion that "just" the "raw materials" such as amino acids might have made the trip successfully? No, they are not. In his 2002 book, *How Life Began*, Thomas F. Heinze addressed this very point.

> At this time, any appeal to life having started somewhere else is another way of saying, "Once upon a time, far far away!" Some who now recognize this fact claim that rather than life coming from outer space, only the raw materials, from which life could be made, came. Some even cite a slightly higher ratio of left-handed amino acids on a few meteorites. When you read their statements, remember that living things do not just require that more than half of their amino acids be left-handed. They must **all** be left-handed. In addition, the correct raw materials have been purchased in chemical supply stores, and put together in laboratories. They don't form life. **If all left-handed amino acids could be found in space, they would be stuck with the same problems that caused people to look to space in the first place: Amino acids would return to half left- and half-right handed**. Other materials necessary for life would break down, and for reasons we have already examined, no DNA, RNA, lipids, or proteins would form (p. 131, emp. added).

When all is said and done, the evolutionist finds himself right back where he started. The naturalistic beginnings of life on Earth are impossible, and the naturalistic beginnings of life in outer space are impossible. What's left?

Furthermore, perhaps this would be a good time to remind Mr. Rennie of the fundamental law of biology—the law of biogenesis. This law was set forth many years ago to dictate what both theory and experimental evidence showed to be true among living organisms—that life comes only from preceding life, and perpetuates itself by reproducing only its own kind or type. As David Kirk correctly remarked:

> By the end of the nineteenth century there was general agreement that life cannot arise from the nonliving under conditions that now exist upon our planet. The dictum "All life from preexisting life" became the dogma of modern biology, from which no reasonable man could be expected to dissent (1975, p. 7).

The experiments that formed the ultimate basis of this law were first carried out by such men as Francesco Redi (1688) and Lazarro Spallanzani (1799) in Italy, Louis Pasteur (1860) in France, and Rudolph Virchow (1858) in Germany. It was Virchow who documented that cells do not arise from amorphous matter, but instead come only from preexisting cells. The *Encyclopaedia Britannica* stated concerning Virchow that "His aphorism '*omnis cellula e cellula*' (every cell arises from a preexisting cell) ranks with Pasteur's '*omne vivum e vivo*' (every living thing arises from a preexisting living thing) among the most revolutionary generalizations of biology" (see Ackerknect, 1973, p. 35).

Down through the centuries, countless thousands of scientists in various disciplines have established the law of biogenesis as just that—a scientific **law** stating that life comes only from preexisting life and that of its kind. Interestingly, the law of biogenesis was firmly established in science long before the contrivance of modern evolutionary theories. Also of considerable interest is the fact that students are consistently taught in high school and college biology classes the tremendous impact of, for example, Pasteur's work on the false concept of spontaneous generation. Students are given, in great detail, the historical scenario of how Pasteur triumphed over "mythology" and provided science "its finest hour" as he discredited the then-popular concept of spontaneous generation. Then, with almost the next breath, those same students are informed by their professor that evolution is supposed to have started via spontaneous generation.

This point may have escaped some students, but it has not been lost on evolutionary scholars, who confess to having some difficulty with the problem posed by the law of biogenesis. Simpson and Beck, in their biology textbook, *Life: An Introduction to Biology*, stated that "...there is no serious doubt that biogenesis is the rule, that life comes only from other life, that a cell, the unit of life, is **always and exclusively** the product or offspring of another cell" (1965, p 144, emp. added). Martin A. Moe, writing in the December 1981 issue of *Science Digest*, put it in these difficult-to-misunderstand words:

> A century of sensational discoveries in the biological sciences has taught us that **life arises only from life**, that the nucleus governs the cell through the molecular mechanisms of deoxyribonucleic acid (DNA) and that the amount of DNA and its structure determine not only the nature of the species but also the characteristics of individuals (p. 36, emp. added).

Creationists certainly agree. R.L. Wysong, in his book, *The Creation-Evolution Controversy*, commented:

> The creationist is quick to remind evolutionists that biopoiesis and evolution describe events that stand in stark naked contradiction to an established law. The law of biogenesis says life arises only from preexisting life, biopoiesis says life sprang from dead chemicals; evolution states that life forms give rise to new, improved and different life forms, the law of biogenesis says that kinds only reproduce their own kinds. Evolutionists are not oblivious to this law. They simply question it. They say that spontaneous generation was disproved under the conditions of the experimental models of Pasteur, Redi, and Spallanzani. This, they contend, does not preclude the spontaneous formation of life under different conditions. To this, the creationist replies that even given the artificial conditions and intelligent maneuverings of biopoiesis experiments, life has still not "spontaneously generated." ...Until such a time as life is observed to spontaneously generate, the creationist insists the law of biogenesis stands! (1976, pp. 182,185).

Moore and Slusher, in their text, *Biology: A Search for Order in Complexity*, observed: "Historically the point of view that **life comes only from life** has been so well established through the facts revealed by experiment that it is called the Law of Biogenesis." In a footnote, the authors stated further: "Some scientists call this a **superlaw**, or a law about laws. Regardless of terminology, biogenesis has the highest rank in these levels of generalization" (1974, p. 74, emp. in orig.).

Has the law of biogenesis somehow been disproved? On the contrary, every piece of available scientific evidence still supports the basic concept that life arises only from preexisting life. Is biogenesis no longer an "actual regularity in nature"? On the contrary, every piece of available scientific information we possess shows that it is, in fact, just that—an actual regularity in nature. Has biogenesis somehow ceased being experimentally reproducible? No. Why, then, do evolutionists seemingly ignore this important law? The answer, it would seem, is obvious. If evolutionists accept biogenesis as a law—an actual regularity in nature—how could evolution ever get started? Biogenesis (the **law** of biogenesis) represents the complete undoing of evolutionary theory from the ground floor up. Little wonder, then, that some modern-day evolutionists have ignored the implications of the law of biogenesis.

Regardless of their efforts, and the success or failure with which those efforts eventually meet, one thing is for certain. The "dogma of modern biology, from which no reasonable man could be expected to dissent," is still biogenesis. J.W.N. Sullivan, brilliant scientist of a generation ago, penned these words, which are as applicable today as the day he wrote them.

> The beginning of the evolutionary process raises a question which is yet unanswerable. What was the origin of life on this planet? Until fairly recent times there was a pretty general belief in the occurrence of "spontaneous generation." ...But careful experiments, notably those of Pasteur, showed that this conclusion was due to imperfect observation, and **it became an accepted doctrine that life never arises except from life. So far as the actual evidence goes, this is still the only possible conclusion. But since it is a conclusion that seems to lead back to some supernatural creative act, it is a conclusion that scientific men find very difficult of acceptance** (1933, p. 94, emp. added)**.**

We wonder, Mr. Rennie—are you unwilling to accept that "life never arises except from life" because it "leads back to some supernatural creative act," and because the implication enforces the concept that behind such a "creative act" stands a Creator?

8. [Creationists suggest that] mathematically, it is inconceivable that anything as complex as a protein, let alone a living cell or a human, could spring up by chance.

Once again we ask, why is it that Mr. Rennie concentrates solely on creationists in his accusations, when his own evolutionary colleagues are the ones who have been saying the same thing for so long?

Over the years, investigators have elucidated quite successfully what are known today as the "laws of probability." Building upon the work of such men as Blaise Pascal, the famous French mathematician and scientist, others forged the principles that are employed today on a daily basis in almost every scientific discipline. George Gamow was one such individual (1961). Emile Borel was another. Dr. Borel, one of the world's foremost experts on mathematical probability, formulated what scientists and mathematicians alike refer to as the basic "law of probability," which we would like to discuss here.

Borel's law of probability states that the occurrence of any event, where the chances are beyond one in one followed by 50 zeroes, is an event that we can state with certainty never will happen, no matter how much time is allotted and no matter how many conceivable opportunities could exist for the event to take place (1962, chapters 1 & 3; see also 1965, p. 62). Dr. Borel, ever the practical mathematician, commented that "the principles on which the calculus of probabilities is based are extremely simple and as intuitive as the reasonings which lead an accountant through his operations" (1962, p. 1). While the non-mathematicians among us might not agree, we nevertheless have an interest in the principles involved—and for good reason. As King and Read stated in their excellent work, *Pathways to Probability*:

> We are inclined to agree with P.S. Laplace who said: "We see...that the theory of probabilities is at bottom only common sense reduced to calculation; it makes us appreciate with exactitude what reasonable minds feel by a sort of instinct, often without being able to account for it" (1963, p. 130).

With this in mind, it is interesting to note from the scientific literature some of the probability estimates regarding the formation of life by purely mechanistic processes. For example, Dr. Morowitz himself estimated that the probability for the chance formation of the smallest, simplest form of living organism known is one chance in $1x10^{340,000,000}$ [that is one chance out of 1 followed by 340 million zeroes] (1968, p. 99). The size of this figure is truly staggering, since there are supposed to be only approximately 10^{80} elementary particles (electrons and protons) in the whole Universe (Sagan, 1997, 22:967).

The late Carl Sagan estimated that the chance of life evolving on any given single planet, like the Earth, is one chance in $1x10^{2,000,000,000}$ [that is one chance out of 1 followed by 2 billion zeroes] (1973, p. 46). This figure is so large that it would take 6,000 books of 300 pages each just to write the number! A number this large is so infinitely beyond one followed by 50 zeroes (Borel's upper limit for such an event to occur) that it is simply mind-boggling. There is, then according to Borel's law of probability, **absolutely no chance** that life could have "evolved spontaneously" on the Earth.

Consider, further, these facts (after Morris and Parker, 1987, pp. 269-273). If we assume the Universe to be 5 billion light years in radius, and assume that it is crammed with tiny particles the size of electrons, it has been estimated that conceivably 10^{130} particles could exist in the Universe. Every structure, every process, every system, every "event" in the Universe must consist of these particles, in various combinations and interchanges. If, to be

extremely generous, we assume that each particle can take part in 10_{20} (that is a hundred billion billion) events **each second**, and then allow 10_{20} seconds of cosmic history (this would correspond to 3,000 billion years or 100-200 times the current maximum estimate of the age of the Universe), then the greatest conceivable number of separate events that could take place in all of space and time would be:

$$10^{130} \times 10^{20} \times 10^{20} = 10^{170} \text{ events}$$

Why is this the case? Allow Dr. Gamow to explain: "Here we have the rule of 'multiplication of probabilities,' which states that if you want several different things, you may determine the mathematical probability of getting them by multiplying the mathematical probabilities of getting the several individual ones" (1961, p. 208). Or, as Irving Adler has suggested: "Break the experiment down into a sequence of small steps. Count the number of possible outcomes in each step. Then multiply these numbers" (1963, pp. 58-59). In order for life to appear, one of these events (or some combination of them) must bring a number of these particles together in a system with enough order (or stored information) to enable it to make a copy of (reproduce) itself. And this system must come into being by mere chance.

The problem is, however, that any living cell or any new organ to be added to any existing animal—even the simplest imaginable replicating system—would have to contain far more stored information than represented even by such a gigantic number as 10^{170}. In fact, Marcel E. Golay, a leading information scientist, calculated the odds against such a system organizing itself as 10^{450} to 1 (1961, 33:23). Frank Salisbury set the figure at 10^{415} to 1 (1969, 1971). If we take Dr. Golay's figure, the odds against any accidental ordering of particles into a replicating system are at least 10^{450} to 1. This is true even if it is spread out over a span of time and a series of connected events. Golay calculated the figure on the assumption that it was accomplished by a series of 1,500 **successive** events, each with a generously high probability of ½ (note that $2^{1,500} = 10^{450}$). The probability would have been **even lower** if it had to be accomplished in a **single chance event**! It is very generous, therefore, to conclude that the probability of the simplest conceivable replicating system arising by chance just once in the Universe, in all time, is:

$$\frac{10^{170}}{10^{450}} = \frac{1}{10^{280}}$$

When the probability of the occurrence of any event is smaller than one out of the number of events that could ever possibly occur—that is, as discussed above, less than 1/170—then the probability of its occurrence is considered by mathematicians to be zero. Consequently, it can be concluded that the **chance** origin of life is utterly impossible. Why so? Gamow, using simple coin tosses as his example, explained the reason for such a principle holding true.

> Thus whereas for 2 or 3, or even 4 tosses, the chances to have heads each time or tails each time are still quite appreciable, in 10 tosses even 90 per cent of heads or tails is very improbable. For a still larger number of tosses, say 100 or 1000, the probability curve becomes as sharp as a needle, and the chances of getting even a small deviation from fifty-fifty distribution becomes practically nil (1961, p. 209).

Coppedge, in speaking to Gamow's point, observed that:

> Probability theory applies mainly to "long runs." If you toss a coin just a few times, the results may vary a lot from the average. As you continue the experiment, however, it levels out to almost absolute predictability. This is called the "law of large numbers." The long run serves to average out the fluctuations that you may get in a short series. These variations are "swamped" by the long-haul average. When a large number of tries is involved, the law of averages can be depended upon quite closely. This rule, once called the "law of great numbers," is of central importance in this field of probability. By the way, in the popular sense, probability theory, the laws of chance, and the science of probability can be considered to be simply different expressions for the same general subject (1973, pp. 47-48).

Henry Morris, in the section he authored for *What Is Creation Science?*, wrote:

> The objection is sometimes posed that, even if the probability of a living system is 10^{-280}, every other specific combination of particles might also have a similar probability of occurrence, so that one is just as likely as another. There even may be other combinations than the one with which we are familiar on earth that might turn out to be living. Such a statement overlooks the fact that, in any group of particles, there are many more meaningless combinations than ordered combinations. For example, if a system has four components connected linearly, only two (1-2-3-4, 4-3-2-1) of the 24 possible combinations possess really meaningful order. The ratio rapidly decreases as the number of components increases. The more complex and orderly a system is, the more unique it is among its possible competitors. This objection, therefore misses the point. In the example cited above, only one combination would work. There would be 10^{280} that **would not work** (1987, pp. 272-273, emp. added).

Other writers have made the same point. Wysong, for example, concluded:

> When trying to determine whether the desired results will happen, always consider that the fractions used in probabilities carry two stories with them. One tells you the chance of something happening, and the other tells you the chance that that same event will not happen; i.e., if the odds are one in ten (10%) that a certain event will occur, then likewise the odds are nine to ten (90%) that it will not. Who could reasonably believe that a coin will turn up heads 100 times in succession, when the odds for it happening are:

$$\frac{1}{1{,}000{,}000{,}000{,}000{,}000{,}000{,}000{,}000{,}000{,}000} = (.00000000000000000000000000001\%)$$

and the probability that it won't is:

$$\frac{999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999{,}999}{1{,}000{,}000{,}000{,}000{,}000{,}000{,}000{,}000{,}000{,}000} = (99.999999999999999999999999999\%)$$

> The probability that the event will not happen is what we must believe if we are concerned about being realistic (1976, pp. 80-81).

It is not just the extreme improbability that causes us to doubt the chemical-evolution scenario; the ordered complexity of life causes us to doubt it even more. Comments from evolutionists already have been documented that show there is no known mechanism to account for items like the genetic code, ribosomes, etc. That being true, it is astonishing to read Carl Sagan's section on the origin of life in the *Encyclopaedia Britannica*. In discussing the bacterium *Escherichia coli*, Dr. Sagan noted that this one "simple" organism contains 1×10^{12} (a trillion) bits of data stored in its genes and chromosomes, and then observed that if we were to count every letter on every line on every page of every book in the world's largest library (10 million volumes), we would have approximately a trillion letters. In other words, the amount of data (information) contained in approximately 10 million volumes is contained in the genetic code of the "simple" *E. coli* bacterium! Yet we are asked to believe that this marvelously complex, extremely information-rich organism came about through purely chance processes. R.W. Kaplan, who spent years researching the possibility of the evolutionary origin of life, suggested that the probability of the simplest living organism being formed by chance processes was one chance in 10^{130}. He then stated: "One could conclude from this result that life could not have originated without a donor of information" (1971, p. 319).

Creationists suggest that "donor" was the Creator, and that the evolution model cannot circumvent basic laws of probability. Evolutionist Richard Dawkins once observed: "The more statistically improbable a thing is, the less we can believe that it just happened by blind chance. Superficially **the obvious alternative to chance is an intelligent Designer**" (1982, p. 130, emp. added). It is not "superficial" to teach, as creationists do, that design implies a Designer. Nor is it superficial to advocate that our beautifully ordered world hardly can be the result of "blind chance." Even evolutionists like Dawkins admit (although they do not like having to do so) that the "obvious alternative" to chance is an intelligent Designer—which is the very point creationists have been making for years.

In his *Scientific American* article, Rennie stated:

> Chance plays a part in evolution (for example, in the random mutations that can give rise to new traits), but evolution does not depend on chance to create organisms, proteins or other entities. Quite the opposite: natural selection, the principal known mechanism of evolution, harnesses nonrandom change by preserving "desirable" (adaptive) features and eliminating "undesirable" (nonadaptive) ones. As long as the forces of selection stay constant, natural selection can push evolution in one direction and produce sophisticated structures in surprisingly short times.
>
> As an analogy, consider the 13-letter sequence "TOBEORNOTTOBE." Those hypothetical million monkeys, each pecking out one phrase a second, could take as long as 78,800 years to find it among the 2613 sequences of that length. But in the 1980s Richard Hardison of Glendale College wrote a computer program that generated phrases randomly while preserving the positions of individual letters that happened to be correctly placed (in effect, selecting for phrases more like Hamlet's). On average, the program re-created the phrase in just 336 iterations, less than 90 seconds. Even more amazing, it could reconstruct Shakespeare's entire play in just four and a half days (2002, 287[1]: 81-82, parenthetical items in orig.).

Mr. Rennie was willing to confess that "**chance plays a part in evolution**." But then he went on to suggest that "**evolution does not depend on chance to create organisms**, proteins or other entities" because "**natural selection…harnesses nonrandom change**." Whoa! Even his evolutionist colleagues do not agree with him on this important point. Henry Gee (chief science writer at *Nature*) wrote: "[W]e also have good reason to suspect that to use natural selection to explain long-term trends in the fossil record may not be a valid exercise, because **natural selection is a random, undirected process**, unlikely to work in the same direction for long" (1999, p. 127, emp. added). Creationist Bill Hoesch stated regarding Rennie's claim:

> To claim that natural selection is governed by something other than chance is to suggest it is somehow a **directed** process. What shadowy entity would he propose? "Selective forces" are ultimately subject to either chance or intelligence. Rennie can't have it both ways (2002, emp. in orig.).

No, he cannot. The raw material on which evolution allegedly works happens to be **random** genetic errors (i.e., mutations). As Sarfati noted: "If evolution from goo to you were true, we should expect to find **countless** information-adding mutations. But we have not even found one" (2002a, emp. in orig.). Natural selection is not some kind of "conscious" mechanism that "knows" what it is doing.

Furthermore, let's examine Rennie's idea whereby a computer is instructed to randomly select letters, and than eventually sequences the phrase: "Tobeornottobe." By Rennie's his own admission, this computer simulation required an intelligent programmer (Richard Hardison) who first told the computer how to recognize "correctly placed" letters. In other words, the program places letters into thirteen blank spaces at random. That sounds fair enough. But the computer is pre-programmed to select a letter when it moves into the "correct" (read that as pre-programmed) position. In other words, it "knows" that the first letter is "T" long before "Tobeornottobe" ever oc-

curs. But wait! Evolution does not have the benefit of such intelligent programming—unless Mr. Rennie is ready to accept the fact that an intelligent Designer played a significant role in creation. And, other factors play a part in the "success" of these computer programs. In addressing this matter, Jonathan Sarfati wrote:

> These computer programs have been widely popularized by the atheist Richard Dawkins, but are a lot of bluff. Such simulations as Dawkins, and now Rennie, propose as "simulations" of evolution work towards a known goal, so are far from a parallel to real evolution, which has no foresight, hence a "Blind Watchmaker." The simulations also use "organisms" with high reproductive rates (producing many offspring), high mutation rates, a large probability of a beneficial mutation, and a selection coefficient of 1 (perfect selection) instead of 0.01 (or less) which parallels real life more accurately. The "organisms" have tiny "genomes" with minute information content, so are less prone to error catastrophe, and they are not affected by the chemical and thermodynamic constraints of a real organism.
>
> Also, when it comes to the origin of **first** life, natural selection cannot be invoked, because this requires a self-reproducing entity. Therefore chance **alone** must produce the precise sequences needed, so these simulations do not apply. And a further problem with the alleged chemical soup is reversibility, intensifying the difficulty of obtaining the right sequence by chance (2002a, emp. in orig.).

In discussing the same type of "monkey analogy" that Mr. Rennie employed, Hoyle and Wickramasinghe commented:

> No matter how large the environment one considers, life cannot have had a random beginning. Troops of monkeys thundering away at random on typewriters could not produce the works of Shakespeare, for the practical reason that the whole observable universe is not large enough to contain the necessary monkey hordes, the necessary typewriters, and certainly not the waste paper baskets required for the deposition of wrong attempts. The same is true for living material (1981, p. 148).

Creationist Duane Gish posed the following question along the same lines: "What would be the probability of one unique sequence of 100 amino acids, composed of 20 different amino acids, arising by chance in five billion years?" He, too, then used a "monkey analogy" (again, the same type of monkey analogy to which Mr. Rennie referred).

> A monkey typing 100 letters every second for five billion years would not have the remotest chance of typing a particular sentence of 100 letters even once without spelling errors. In fact, if one billion (10^9) planets the size of the earth were covered eyeball-to-eyeball and elbow-to-elbow with monkeys, and each monkey was seated at a typewriter (requiring about 10 square feet for each monkey, of the approximately 1016 square feet available on each of the 10^9 planets), and each monkey typed a string of 100 letters every second for five billion years (about 10^{17} seconds) the chances are overwhelming that not one of these monkeys would have typed the sentence correctly! Only 10^{41} tries could be made by all these monkeys in that five billion years. There would not be the slightest chance that a single one of the 10^{24} monkeys (a trillion trillion monkeys) would have typed a preselected sentence of 100 letters (such as "The subject of this *Impact* article is the naturalistic origin of life on the earth under assumed primordial conditions") without a spelling error, even once.
>
> Considering an enzyme, then, of 100 amino acids, there would be no possibility whatever that a single molecule could ever have arisen by pure chance on the earth in five billion years (1976, 37:3, parenthetical items in orig.).

And that is exactly our point.

9. [Creationists suggest that] the Second law of Thermodynamics says that systems must become more disordered over time. Living cells therefore could not have evolved from inanimate chemicals, and multicellular life could not have evolved from protozoa.

Mr. Rennie's entire discussion on this point was as follows:

> This argument derives from a misunderstanding of the Second law. If it were valid, mineral crystals and snowflakes would also be impossible, because they, too, are complex structures that form spontaneously from disordered parts.
>
> The Second law actually states that the total entropy of a closed system (one that no energy or matter leaves or enters) cannot decrease. Entropy is a physical concept often casually described as disorder, but it differs significantly from the conversational use of the word.

> More important, however, the Second law permits parts of a system to decrease in entropy as long as other parts experience an offsetting increase. Thus, our planet as a whole can grow more complex because the sun pours heat and light onto it, and the greater entropy associated with the sun's nuclear fusion more than rebalances the scales. Simple organisms can fuel their rise toward complexity by consuming other forms of life and nonliving materials (2002, 287[1]:82).

Amidst the currently raging controversy centering on creation and evolution as the only two possible explanations for the Universe and all life in that Universe, a bitter battle is being waged in regard to the meaning and significance of two of the most fundamental laws known to science—the first and second laws of thermodynamics. For years creationists have presented (in articles, books, lectures, and debates) evidences against the General Theory of Evolution based on those two laws. During much of that time evolutionists, with rare exceptions, simply ignored creationists' arguments. In the few instances where evolutionists bothered to acknowledge the arguments based on thermodynamics, they generally did so only in cursory fashion, most often by simply dismissing creationists' arguments as efforts by those who were "uninformed" or "misguided."

But all of that has changed—as is evident from Mr. Rennie's comments. Evolutionists have heard the "call to battle," and are answering that call. Now both creationists and evolutionists are actively engaged in the most serious kinds of efforts to portray to the general public the relationship that exists between the laws of thermodynamics and their respective origin models. And for good reason. The stakes involved are enormous! If creationists are correct in their statements of the laws of thermodynamics, and in their assessments and interpretations based on those laws, evolution is immediately and automatically ruled out by what those in the scientific community readily acknowledge as "the most secure generalizations known to science"—the laws of thermodynamics. Whereas in the past, evolutionists frequently ignored arguments based on the laws of thermodynamics, now those same evolutionists are reacting with a feverish pitch to creationists' presentations based on those laws. For that reason, and because of the tremendous importance that the laws of thermodynamics do have to the creation/evolution issue, we believe that an examination of these matters is warranted.

Our English word "thermodynamics" derives from two Greek words, *therme*, meaning "heat," and *dynamis*, meaning "power." Thus thermodynamics is the study of heat power. Historically, the subject of thermodynamics arose from the study of heat engines. Currently, the subject of thermodynamics is much broader in scope, and involves the movement of energy and the conversion of one form of energy into another. Thermodynamics, as a field of study, is important for several reasons, not the least of which is that it acts as a "unifying" factor for all of the exact sciences, since energy is required for all natural processes (see Crawford, 1963, p. 1). It is this very fact—that all natural processes require energy—that makes thermodynamics of special interest in the creation/evolution controversy. Consider, for example, Sir Julian Huxley's now-famous definition of evolution:

> Evolution in the extended sense can be defined as a directional and essentially irreversible process occurring in time, which in its course gives rise to an increase of variety and an increasingly high level of organization in its products. Our present knowledge indeed forces us to the view that the whole of reality is evolution—a single process of self-transformation (1955, p. 278).

Sidney Fox, who pioneered much of the work regarding the "origin of life" in evolutionary scenarios, has noted that "evolution, however, has put together the smallest components; it has proceeded from the simple to the complex" (1971, 49[50]:46).

Obviously evolution involves "transformation" or "putting together." And, such natural transformations or "putting together" processes require energy. In fact, such a process of evolution (like the one suggested by Huxley and Fox) would require tremendous quantities of energy, and many energy transformations from one form to another. Simply stated, then, our point is this: the process of evolution requires energy in various forms, and thermodynamics is the study of energy movement and transformation. Thus, the two fields bear a clear relationship. **Scientific laws that govern thermodynamics also must govern evolution.** Creationists and evolutionists alike generally acknowledge this fact. Creationist writers are quick to express agreement on this point (see Williams, 1981, p. 10). Most evolutionists agree that, in principle, thermodynamics does have a relationship to evolution, but some are quick to claim that this relationship may not be quite as distinct as creationists suggest. Willard Young stated: "In fact, thermodynamics is involved in every process of energy transformation. For this reason even biology is governed, in part, by the fundamental principles of thermodynamics, though not in the manner the Creationists would have us believe" (1985, p. 164).

The point, then, is clear. The laws of thermodynamics do regulate all energy-related processes. Evolution (even biological evolution) is dependent upon such energy-related processes. Thus, the laws of thermodynamics must regulate evolution. The question that obviously arises is two-fold: (1) what do the laws of thermodynamics say; and (2) what regulatory processes or restrictions are imposed on evolution as a result of the laws of thermodynamics?

Robert Mayer (1814-1878) was the first scientist to suggest the general principle that ultimately would become the first law of thermodynamics. Mayer observed: "I therefore hope that I may reckon on the reader's assent when I lay down as an axiomatic truth that, just as in the case of matter, so also in the case of force [the then-current term for energy—BT/BH], only a transformation but never a creation takes place" (as quoted in King, 1962, p. 5). Today we often refer to the first law as the "law of conservation of energy (and/or mass)." Put into simple terms, the first law says that naturally speaking, neither energy nor matter can be created or destroyed, but can only be converted from one form to another. The total amount of energy in the Universe remains constant. Scientists freely admit that, as Young put it, "the principle of the conservation of energy is considered to be the single most important and fundamental 'law of nature' known to science, and is one of the most firmly established. Endless studies and experiments have confirmed its validity over and over again under a multitude of different conditions" (1985, p. 165).

Although the first law of thermodynamics has serious implications for any evolution-based scenario, since Mr. Rennie mentioned in his article in *Scientific American* only the second law, we will restrict our comments here to that law. [For an in-depth discussion of the implications of the laws of thermodynamics in the creation/evolution controversy, see Thompson and Major, 1988.]

As men began to work with heat engines in the nineteenth century, the second law of thermodynamics came to be formulated. In 1824, Sadi Carnot (1796-1832), a French physicist, correctly noted that every heat engine requires a hot body (or source of heat) and a cold body (or sink), and that as the engine operates, heat passes from the hot body to the cold body. In such an engine, only a portion of the heat from the source can be utilized to per-

form useful work. The remainder is wasted. As a result of Carnot's discovery, two scientists of his generation independently stated what came to be known as the second law of thermodynamics. German scientist Rudolph Clausius (1822-1888), and Irish scientist Lord Kelvin (William Thomson, 1824-1907), introduced concepts in 1850 and 1851, respectively, which ultimately became known as the second law. In 1852, Kelvin published a paper in which he delineated what was to become one of the most secure generalizations in all of science. In his treatise titled "On a Universal Tendency in Nature to the Dissipation of Mechanical Energy," he set forth three propositions in which he summarized the concept that although energy is conserved (the first law), it is becoming less and less available for use (the second law). Energy is, to use Kelvin's own words, "irrevocably lost to man and therefore 'wasted,' though not annihilated" (as quoted in Thompson, 1910, pp. 288-291). Clausius enunciated another form of the second law in 1854 when he stated that "heat cannot of itself, without the intervention of any external agency, pass from a colder to a hotter body" (as quoted in Glasstone, 1946, p. 217). Clausius also defined a quantity known as entropy—the energy per degree of absolute temperature that cannot be recovered as work. He thus was able to give succinct definitions of the first and second laws of thermodynamics in this form: according to the first law, the total amount of **energy** in nature is constant; according to the second law, the total amount of **entropy** in nature is increasing. Entropy (from two Greek terms meaning "to turn in on oneself") thus came to represent a measure of the lost usefulness (i.e., randomness, disorderliness) of the system.

Basically the second law says three things: (a) systems will tend toward the most probable state; (b) systems will tend toward the most random state; and (c) systems will increase in entropy, where entropy is a measure of the unavailability of energy to do useful work (see Wysong, 1976, p. 241). In "open" systems, energy may be lost to or gained from outside sources (i.e., the system is **not** self-contained). In "closed" systems, no outside energy or other "interference" is allowed (i.e., the system **is** self-contained).

Sir Arthur Eddington, the eminent British astronomer of the past generation, referred to the second law as "time's arrow," because it regulated the direction of all material events in time. That is to say, since the Universe is considered to be a closed (isolated) system, and since as time goes forward usable energy becomes less and less available, eventually the Universe will experience a "heat death"—that point in time when there is no more energy available for use. As Richard Morris observed, "The Second Law tells us that past and future look different; there will be more entropy in the future, and there was less entropy in the past" (1985, p. 121). Harold Blum seized upon Eddington's phrase "time's arrow" and authored a book titled *Time's Arrow and Evolution*, in which he noted that "...all real processes tend to go toward a condition of greater probability.... Increase in randomness may be taken as a measure of direction in time.... The Second Law of thermodynamics predicts that a system left to itself will, in the course of time, go toward greater disorder" (1968, pp. 5,192,201).

The first and second laws of thermodynamics know no exceptions. As we have already noted, they are among the most secure generalizations of all of science. One writer put it this way:

> It has been my experience that many people do not appreciate how uncompromising the Laws of Thermodynamics actually are. It is felt, perhaps, that the Laws are merely general tendencies or possibly only theoretical considerations. In reality, though, the Laws of Thermodynamics are hard as nails, and I have been told that the more one works with these Laws, the deeper respect one gains for them (Walters, 1986, 9[2]:8).

Evolutionary writer Jeremy Rifkin, in his book, *Entropy: A New World View*, pointed out that "the Entropy Law will preside as the ruling paradigm over the next period of history. Albert Einstein said that it is the premier law of all science; Sir Arthur Eddington referred to it as the 'supreme metaphysical law of the entire universe'" (1980, p. 6). Eddington also noted: "[I]f your theory is found to be against the Second law of thermodynamics, I can give you no hope; there is nothing for it but to collapse in deepest humiliation" (1930, p. 74). Isaac Asimov likewise observed that "in any spontaneous process, entropy either does not change (under ideal cases) or it increases (in real cases). Forgetting the ideal, we can just take it for granted that, in the real world about us, entropy always increases" (1962, pp. 57-58, parenthetical items in orig.). Several years after making that statement, Dr. Asimov went on to comment that "as far as we know, all changes are in the direction of increasing entropy, of increasing disorder, or increasing randomness, of running down" (1973, p. 76).

But what does all of this have to do with evolution? The fact is: **the second law of thermodynamics strictly prohibits organic evolution,** Mr. Rennie's disclaimers notwithstanding. Evolutionists have attempted to downplay the problems in regard to thermodynamics and evolutionary theory. But the problems **do** exist, and are serious. All natural processes occur in a direction such that there is an increase in entropy (disorder, randomness). And natural processes tend to go **spontaneously** only one way. As King noted: "This 'onewayness' appears to be a very fundamental characteristic of natural processes. The Second Law of thermodynamics epitomizes our experiences with respect to the direction taken by thermophysical processes" (1962, p. 78). In defining the second law (or any other natural process), we speak of "spontaneous" processes, because any natural process is a spontaneously occurring one. Thermodynamically speaking, all isolated systems (and the Universe is accepted as an isolated system) proceed toward a state of equilibrium. That is to say, a system changes its state toward one in which the physical properties of the system are as uniform throughout as possible under prevailing conditions (King, p. 103). If the system is exposed to its surroundings, both the system and the surroundings will approach a state of equilibrium with each other. Natural processes proceed so that entropy increases. Movement toward a state of "maximum entropy" (equilibrium) is the norm, not the exception.

The evolutionist has accepted, and thus is forced to defend, a concept which states that in a closed system (the Universe) in which the second law of thermodynamics is operating (with all systems ultimately proceeding toward randomness and disorder), naturally occurring, spontaneous processes produced the order and complexity seen throughout both the living and nonliving worlds. But as Emmett Williams correctly observed:

> The Second Law of thermodynamics is an empirical law, directly observable in nature and in experimentation. This law implies that the direction of all natural processes is toward states of disorder. From the standpoint of statistics, natural operations proceed in a direction of greatest probability. The most probable state for any natural system is one of disorder. All natural systems degenerate when left to themselves (1981, p. 19).

Even evolutionists admit as much. Isaac Asimov, surely the most prolific science writer of our generation, commented:

> Another way of stating the Second Law then is "The universe is constantly getting more disorderly!" Viewed that way we can see the Second Law all about us. We have to work hard to straighten a room, but left to itself it becomes a mess again very quickly and very easily. Even if we never enter it, it becomes dusty and musty. How difficult to maintain houses, and machinery, and our own bodies in perfect working order: how easy to let them deteriorate. In fact, all we have to do is nothing, and everything deteriorates, collapses, breaks down, wears out, all by itself—and that is what the Second Law is all about (1970, p. 6).

Indeed, Dr. Asimov, that **is** what the second law is "all about." What more could one say to get the point across? Every particle, every atom in every part of the natural Universe, as far as scientists have been able to determine, is subject to this natural tendency. It is equally as obvious, however, that there is no tendency on the part of matter to **spontaneously** and naturally organize itself from nonliving antecedents into living organisms, which then transform themselves to higher levels of complexity. As one scientist reminded us:

> Let us now go back and consider once again what evolutionists believe has occurred on this planet by spontaneous, naturally occurring processes. Simple gases, such as methane, ammonia, hydrogen, and water vapor, have transformed themselves in the presence of highly destructive energy sources, such as ultraviolet light and electrical discharges, into incredibly complex living cells. According to evolutionists, this was a progressive process that inexorably transformed matter to higher and higher levels of organization until finally the living cell arose—the most complex, the most unstable arrangement of matter in the universe... (Gish, 1981, p. 70).

The obvious question then becomes, "what process (or processes) could, in light of the second law of thermodynamics, be responsible for matter **naturally, spontaneously** organizing itself into living organisms as we see them today?" Evolutionists, of course, have an answer. The Earth, they suggest, is an "open system," and thus partakes of the immense amounts of energy coming in from the Sun. It is this energy, as Mr. Rennie suggested in his Scientific American article, that ultimately is responsible for matter organizing itself into living forms. Given that immense energy, matter could "circumvent" the second law and spontaneously organize itself. In fact, we are being asked to believe that this is exactly what happened. Fourteen years before Mr. Rennie suggested that creationists have a fundamental "misunderstanding" about the second law of thermodynamics, Brent Becker, writing in the January/February 1988 issue of *Creation/Evolution Newsletter*, complained that "creationists get confused" over these points, and then stated that they "equate complexity with organization, disorder with disorganization, and information entropy with thermodynamic entropy. Further, they ignore the effect of physical and chemical laws when discussing entropy changes in open systems. It is these laws which provide the creationists' 'missing blueprint' for transforming energy flow into organization" (8[1]:19-20). As Rennie stated: "Our planet as a whole can grow more complex because the sun pours heat and light onto it, and the greater entropy associated with the sun's nuclear fusion more than rebalances the scales. Simple organisms can fuel their rise toward complexity by consuming other forms of life and nonliving materials" (2002, 287[1]:82).

Evolutionists **must** seek refuge in the "open system" argument, because it is the only option they have left. The formal statement of the second law would immediately be the downfall of evolutionary theory if accepted at face value since, according to the second law, entropy (randomness, disorderliness) always tends to increase in closed systems. And the Universe (so far as we are aware) is a **closed system**. Scientifically speaking, then, evolution would be plainly impossible, as it requires exactly the opposite of what the second law states is actually happening in nature (remember Huxley's description of evolution as "an increasingly high level of organization"?). Yet evolutionists refer to creationists as "confused" or "ignorant" when we call into question the concept of evolution in light of the scientific facts surrounding the second law. The evolutionist says: "But the Earth is an 'open system' and the second law does not apply to open systems that have energy supplied from an outside source. It is this 'outside energy from the Sun' that causes evolution to occur."

With all due respect, it is evolutionists like Becker and Rennie who have grossly misstated the issues. It is not creationists who are "confused." Nor is it creationists who "ignore" physical and chemical laws. Quite the opposite is true, in fact. It is creationists who continually point out that the second law applies to open systems as well, and even has mathematical constructs to apply to such systems (see Morris and Parker, 1987, pp. 205ff.). Evolutionist John Ross of Harvard plainly stated the matter in a letter to the editor of *Chemical and Engineering News* when he wrote:

> ...there are no known violations of the Second Law of thermodynamics. Ordinarily the Second Law is stated for isolated systems, **but the Second Law applies equally well to open systems**.... There is somehow associated with the field of far-from-equilibrium phenomena the notion that the Second Law of thermodynamics fails for such systems. It is important to make sure that this error does not perpetuate itself (1980, p. 40, emp. added).

Evolutionists boldly (and correctly) assert that "the Earth is an open system." Yet even they recognize that **the second law of thermodynamics applies to the Earth—as an open system!** Evidence for that is all around them. Energy supplies (coal, natural gas, oil, etc.) constantly are being depleted; animals and people die; decay is ubiquitous; etc. Entropy increases at every turn. Furthermore, as far as the Earth itself is concerned, **every real system is an open system**. There are no "closed systems" in nature (except the Universe itself). Emil Borel, the world-renowned Swiss scientist and mathematician established this years ago. Speaking of Dr. Borel's efforts in this regard, Harvard astronomer David Layzer commented: "Borel showed that no finite physical system can be considered closed" (1975, 223:56).

You can bathe the Earth with energy from the Sun day in and day out, and it will not cause evolution to occur because, while energy from the Sun is a **necessary** condition, it is not a **sufficient** condition. There are other factors involved besides just the need for energy. It is those conditions that evolutionists "ignore" and on which they are "confused." A discussion of this "open system" argument, and the factors that prevent evolution from occurring even in such a system, is therefore in order.

Is it legitimate to suggest, as Mr. Rennie has, that since the Earth is an open system, evolution somehow could have "sidestepped" the second law and occurred anyway? No, it is not. And some evolutionists will admit as much. Charles J. Smith, writing in *Biosystems*, recognized that a serious problem does exist in this area. He stated:

> The thermodynamicist immediately clarifies the latter question by pointing out that the Second Law classically refers to isolated systems which exchange neither energy nor matter with the environment; biological systems are open and exchange both energy and matter. **This explanation, however, is not completely satisfying, because it still leaves open the problem of how or why the ordering process has arisen** (an apparent lowering of the entropy), and a number of scientists have wrestled with this issue. Bertalanffy called the relation between irreversible thermodynamics and information theory **one of the most fundamental unsolved problems in biology**. I would go further and include the problem of meaning and value (1975, 1:259, emp. added).

Unfortunately, many of the rank-and-file evolutionists do not have even the slightest idea of the situation that confronts them regarding the second law of thermodynamics—a situation so grave that it has been called "one of the most fundamental unsolved problems in biology." In the meantime, they go on parroting the timeworn cliché that "the second law applies only to closed systems, and since the Earth is an open system with energy available from the Sun, evolution can occur." Smith is correct in saying that "this explanation, however, is not completely satisfying." It is, in fact, vacuous. Let us explain why.

Merely having an energy field available to an open system does not mean that the system will somehow automatically become organized or increase in complexity. We know of no one who could make this very point more forcefully than the renowned evolutionists, George Gaylord Simpson and W.S. Beck, when they stated in their biology textbook *Life: An Introduction to Biology*:

> We have repeatedly emphasized the fundamental problems posed for the biologist by the fact of life's complex organization. We have seen that organization requires work for its maintenance and that the universal quest for food is in part to provide the energy needed for this work. **But the simple expenditure of energy is not sufficient to develop and maintain order**. A bull in a china shop performs work, but he neither creates nor maintains organization. The work needed is **particular** work; it must follow specifications; it requires information on how to proceed (1965, p. 466, emp. added).

These two evolutionary scholars seemingly have stumbled onto the very point that the creationists have been making for years. **Energy alone is not sufficient to cause the evolutionary process to occur!** Energy is a **necessary** condition, but it is not a **sufficient** condition. Raw, unbridled, uncontrolled energy alone (like a bull in a china shop) is more damaging than helpful. It destroys; it does not build. Raw, unbridled, uncontrolled solar energy is no different. In order to be **con**structive instead of **de**structive, it must be managed or controlled. Here is where the evolutionists have made a grievous error in their thinking. Their response that "the Earth is an open system and has available to it the Sun's energy that causes evolution to occur" confuses the **quantity** of energy (of which there is certainly enough) with the **conversion** of energy. The question is not whether there is enough energy from the Sun to sustain the evolutionary process; the question is **how** does the Sun's energy cause, and eventually sustain, evolution? Or, put another way, the question is: what condition(s) must be satisfied to cause any finite system to advance to a higher degree of order, when the Universe as a whole is decreasing in order?

Simpson and Beck, as evolutionists, clearly stated what is necessary. They noted that a **particular kind of work is required**. They noted that **it must follow specifications**. And, they noted that **it requires information on how to proceed**. At this point, it would be appropriate to observe that these observations were made by **evolutionists**, not creationists. It may come as somewhat of a surprise to learn that these are the exact requirements that creationists have been suggesting for decades.

Earlier, we spoke of energy being a "necessary," but not a "sufficient" condition. Let us now dwell on those conditions that would be both **necessary** and **sufficient** to cause the biosphere to evolve from lower to higher order. And, simultaneously, let us inquire as to how the evolutionist would propose that each of the conditions could be present and accounted for on a primitive, primordial Earth.

First, of course, it would be essential to have an open system. Second, it would be necessary to have adequate energy. Now, as we have already noted, the Earth is an open system. And, the Sun's energy certainly is present in adequate amounts. But are these conditions alone **sufficient** to cause and sustain evolution? No, they are not. There are at least two other conditions (discussed in the next few sentences) that are absolutely necessary. Third, it is essential to have in place some kind of complex mechanism that can convert the available energy arriving from the Sun. The available environmental energy is of no avail unless it can be converted into the specific forms needed to organize and bond the components into the complex and ordered structure of the completed system. It is equally important to note that unless such a mechanism is available, environmental energy will be more likely to break down any structure(s) already present. Remember the statement of evolutionists Simpson and Beck that "the work needed is particular work." The energy must be converted into **specific forms**. That requires an energy

conversion mechanism of some sort (motor, membrane, etc.). Fourth, there must be present a highly specific program to direct the growth and employ the converted energy. That is to say, the energy must be "told" what to do, and how to do it, once it has been converted from its raw state into a usable form. Remember the statement of Simpson and Beck that the work "must follow specifications; it requires information on how to proceed."

Link together all four of these criteria, and the necessary components become sufficient to perform the task. For example, in the case of a building, fossil fuels and human labor operate numerous complex electrical and mechanical devices used to erect the structure. But, this is accomplished according to an architect's blueprint. The energy is available; the system is "open;" the energy conversion systems are present; and the specific program (blueprint) directs the ongoing construction.

Transfer that into the living world of plants. The process of photosynthesis, which is so complex that even today we do not fully understand it, converts sunlight into the building of the plant's structure. Energy, air, water, sunlight, and other factors work together to produce the plant. The energy (sunlight) is available; the system is "open"; the energy conversion system (photosynthesis) is present; and the specific program (DNA) directs the ongoing "construction."

Or, transfer that into the living world of animals or humans. In both animals and humans, numerous complex mechanisms (digestion, circulatory system, respiratory system, etc.) combine efforts to transform food into body structure, and into energy to maintain that structure. The energy (sunlight for the food; food for the body) is available; the system is "open"; the energy conversion system (digestion and all it entails) is present; and the specific program (DNA with its multifarious systems of the Krebs cycle, the Cytochrome C cycle, etc.) directs the ongoing "construction" in conjunction with the organelles of each cell. And so on.

To simply repeat the phrase that evolution can occur because "the Earth is an open system" ignores the fact that all four of these criteria are necessary in order for evolution to have sufficient cause to occur. The evolutionary process, if it did indeed exist, would be by far the greatest growth process of all. If a specific directing program and energy conversion mechanism are essential for all **lesser** growth processes, then surely an infinitely more complex program and more specific energy conversion system would be required for the beginning and continued success of evolution. Every stage in organic evolution would represent an immense and unprecedented increase in complexity (remember Huxley's definition?) of a living system, and therefore (according to the list established by Simpson and Beck) would require **all four criteria**—not just raw, uncontrolled energy and an "open system."

Where, in the evolutionary scheme of things, are the directing program and energy conversion mechanisms? Therein lies "one of the most fundamental unsolved problems in biology," to use the evolutionist's own words. Where in the Universe does one find a plan (a directing program) that sets forth how to organize random particles into particular people? And where does one find the marvelous motor or membrane that converts the continual flow of solar radiant energy arriving here on the Earth into the work of building chemical elements into self-replicating cellular systems, or of organizing populations of single-celled organisms into populations of humans over vast periods of supposed geologic time?

Last but not least, we would like to discuss Mr. Rennie's suggestion that if the creationists' interpretation of the second law of thermodynamics is valid, "mineral crystals and snowflakes would also be impossible, because they, too, are complex structures that form spontaneously from disordered parts." Evolutionist Boyce Rensberger tried this same approach in an article ("How Science Responds When Creationists Criticize Evolution") he wrote for the January 8, 1997 issue of the *Washington Post*. His statement was:

> If the Second Law truly prohibited local emergence of increased order, there would be no ice cubes. The greater orderliness of water molecules in ice crystals than in the liquid state is purchased with the expenditure of energy at the generator that made the electricity to run the freezer. And that makes it legal under the Second Law.

Physical chemist Jonathan Sarfati, in a response to Rensberger titled "The Second Law of Thermodynamics: Answers to Critics," completely demolished arguments such as Rensberger's and Rennie's when he noted:

> An energy source is not enough to produce the specified complexity of life. The energy must be **directed** in some way. The ice cubes of his example would not form if the electrical energy was just wired into liquid water! Instead, we would get lots of heat, and the water breaking up into simpler components, hydrogen and oxygen.
>
> The ice example is thermodynamically irrelevant to the origin of life. When ice freezes, it releases heat energy into the environment. This causes an entropy increase in the surroundings. If the temperature is low enough, this entropy increase is greater than the loss of entropy in forming the crystal. But the formation of proteins and nucleic acids from amino acids and nucleotides not only lowers their entropy, but it removes heat energy (and entropy) from their surroundings. Thus ordinary amino acids and nucleotides will not spontaneously form proteins and nucleic acids at **any** temperature.
>
> Rensberger also fails to distinguish between **order** and **complexity**. Crystals are ordered; life is complex. To illustrate: a periodic (repeating) signal, e.g. ABABABABABAB, is an example of order. However, it carries little information: only "AB" and "print 6 times."
>
> A crystal is analogous to that sequence; it is a regular, repeating network of atoms. Like that sequence, a crystal contains little information: the co-ordinates of a few atoms (i.e. those which make up the unit cell), and instructions "more of the same" x times. If a crystal is broken, smaller but otherwise identical crystals result. Conversely, breaking proteins, DNA or living structures results in destruction, because the information in them is greater than in their parts.
>
> A crystal forms because this regular arrangement, determined by directional forces in the atoms, has the lowest energy. Thus the maximum amount of heat is released into the surroundings, so the overall entropy is increased.
>
> Random signals, e.g. WEKJHDF BK LKGJUES KIYFV NBUY, are not ordered, but **complex**. But a random signal contains no useful information. A non-random aperiodic (non-repeating) signal—specified complexity—e.g. "I love you" **may** carry useful information. However, it would be useless unless the receiver of the information understood the English language convention. The amorous thoughts have no relationship to that letter sequence apart from the agreed language convention. The language convention is imposed onto the letter sequence.
>
> Proteins and DNA are also non-random aperiodic sequences. The sequences are not caused by the properties of the constituent amino acids and nucleotides themselves. This is a huge contrast to crystal structures, which **are** caused by the properties of their constituents. The sequences of DNA and proteins must be imposed from outside by some intelligent process. Proteins are coded in DNA, and the DNA code comes from pre-existing codes, not by random processes.
>
> Many scientific experiments show that when their building blocks are simply mixed and chemically combined, a random sequence results. To make a protein, scientists need to add one unit at a time, and each unit requires a number of chemical steps to ensure that the wrong type of reaction doesn't occur. The same goes for preparing a DNA strand in a correct sequence….
>
> Even the simplest known self-reproducing life form (*Mycoplasma*) has 482 genes, and it must parasitize more complex organisms to obtain the building blocks it cannot manufacture itself. The simplest organism that could exist in theory would need at least 256 genes, and it's doubtful whether it could survive (2002b, emp. in orig.).

In an article titled "Some Thermodynamics Criticisms—and Answers," creationist Carl Wieland addressed this very point in response to an evolutionary critic.

> Again, we now discuss this in terms of **information**…. [b]reak a crystal and you just get smaller crystals; break a protein and you don't simply get a smaller protein, rather you lose the function completely. This is the equivalent of saying that the crystal has low information content that is simply repeated, while the protein molecule can't be constructed simply by repetition, because there is no chemical tendency for amino acids to align in specific ways during polymerization. Those who manufacture proteins know that they have to add one amino acid at a time, and each addition has about 90 chemical steps involved (2002, emp. in orig.).

The three authors of a critically acclaimed book on chemical evolution, *The Mystery of Life's Origin*, took great pains (and correctly so) to distinguish between **order** and **specified complexity**, reserving the former for low-information symmetrical structures such as crystals, and the latter for the high-information structures such as those in living things (see Thaxton, et al., 1984). Anti-creationists like Rennie and Rensberger quite frequently confuse **order** (repetitive, low information) with **specified complexity** (non-repetitive, high information). Creationists know better.

Evolutionists are quick to assert that creationists do not understand the laws of thermodynamics and thus form erroneous conclusions. Surely that same charge (which is nothing more than an opinion unsupported by the facts) will not be applied to the work of the two men who have been recognized as international authorities on thermodynamics, Gordon J. Van Wylen and Richard Sonntag. In their university textbook, *Fundamentals of Classical Thermodynamics*, at the end of the chapter dealing with the second law of thermodynamics and the concept of entropy, their conclusion was as follows:

> Quite obviously it is impossible to give conclusive answers to these questions on the basis of the Second Law of thermodynamics alone. **However, we see the Second Law of thermodynamics as a description of the prior and continuing work of a creator**, who also holds the answer to our future destiny and that of the universe (1985, pp. 232-233, emp. added).

With this conclusion we are in full agreement. It is a conclusion drawn from the scientific facts of the matter.

10. [Creationists suggest that] mutations are essential to evolution theory, but mutations can only eliminate traits. They cannot produce new features.

Rennie commented:

> On the contrary, biology has catalogued many traits produced by point mutations (changes at precise positions in an organism's DNA)—bacterial resistance to antibiotics, for example. Mutations that arise in the homeobox (*Hox*) family of development-regulating genes in animals can also have complex effects. *Hox* genes direct where legs, wings, antennae and body segments should grow. In fruit flies, for instance, the mutation called *Antennapedia* causes legs to sprout where antennae should grow. These abnormal limbs are not functional, but their existence demonstrates that genetic mistakes can produce complex structures, which natural selection can then test for possible uses (2002, 287[1]:282, parenthetical items in orig.).

In trying to go from single-celled "primitive" organisms to *Homo sapiens*, evolutionists commonly point to mutations as the catalyst for transforming one species into another. Simpson and Beck stated: "Mutations are the ultimate raw materials for evolution" (1965, p. 430). Evolutionist Luigi Cavalli-Sforza, head of the international human genome diversity project, remarked in his book, *Genes, Peoples, and Languages*:

> Evolution also results from the accumulation of new information. **In the case of a biological mutation, new information is provided by an error of genetic transmission** (i.e., a change in the DNA during its transmission from parent to child). **Genetic mutations are spontaneous, chance changes, which are rarely beneficial, and more often have no effect, or a deleterious one**. Natural selection makes it possible to accept the good ones and eliminate the bad ones (2000, p. 176, emp. added).

Dr. Cavalli-Sforza is correct on one of his points, and incorrect on another. It is true that genetic mutations "most often have no effect." Neutral mutations, as they are known, are of little use to evolutionists (see Hitching,

1982, pp. 62-63), as they themselves are dependent on still further mutations in order to be fully expressed and "useful" (in an evolutionary sense). But Dr. Cavalli-Sforza was **in**correct when he stated that "new information is provided by an error of genetic transmission." It most certainly is not! As Sarfati commented:

> The issue is not **new traits**, but new genetic information. In no known case is antibiotic resistance the result of new information. There are several ways where an information **loss** can confer resistance. We have pointed out in various ways how new traits, even helpful, adaptive traits, can arise through loss of genetic information (which is to be expected from mutations) [2002a, parenthetical comment and emp. in orig.].

Mutations do **not** result in **new** information! And this is what evolution is all about. Mutations in bacteria, for example, may result in antibiotic resistance. But in the end, the resistant microorganisms are still the same species of microorganisms they were **before** the mutations occurred. Alan Hayward correctly noted:

> ...mutations do not appear to bring progressive changes. Genes seem to be built so as to allow changes to occur within certain narrow limits, and to prevent those limits from being crossed. To oversimplify a little: mutations very easily produce new varieties within a species, and might occasionally produce a new (though similar) species, but—despite enormous efforts by experimenters and breeders—**mutations seem unable to produce entirely new forms of life** (1985, p. 55, emp. added, parenthetical item in orig.).

In the end, after mutations have occurred, no macroevolution has taken place. **None!** [For a discussion of the concept of mutations and microbial antibiotic resistance, see Harrub and Thompson, 2002.]

Elsewhere, we have dealt with the concept of Hox genes, which Mr. Rennie also mentioned (see Harrub and Thompson, 2002), and so we will not deal with that subject again here in any great length. Simply put, Hox genes are pieces of DNA that either promote or inhibit other genes, which, in turn, play a role in the development of a particular organism. For instance, in the fruit fly there is a Hox gene that promotes wing development. And so, during the early stages of the fruit fly's development, this gene signals the manufacture of wing structures. Scientists have been able to use this information to produce flies without wing, or even flies with two sets of wings. And, Hox genes even can result in already-existing information being switched on in the wrong place. But let's not lose sight of the forest for the trees. Producing a two-winged fly, or adding a pair of legs to the head of an animal, is a far cry from explaining how plants, animals, and bacteria all descended from a nonliving source.

Hox genes themselves do not produce the information that results in such complex structures as legs, wings, antennae, or body segments (to use Mr. Rennie's examples). Hox genes do not act in a "biological vacuum." They rely on many other genes and proteins as valuable pieces of the overall outcome. For instance, a light switch is great for turning on a light—but only if you have the necessary wires and bulb in place "downstream" from that switch. Without those, the switch is nothing more than, well, a switch. Hox genes, like light switches, are reliant on certain postcursors (other genes that already are present). Hox genes cannot do everything "by themselves." Keep in mind there is a well-balanced feedback mechanism in place inside every living cell. If more proteins are needed, genes are "turned on" so that those proteins can be produced. When genes mutate, this delicate balance of proteins is affected adversely, causing the production of either too much or too little of these much-needed proteins.

Just because a Hox gene can alter the development of some structure, that does not mean necessarily that all of the items necessary for that structure will be present in the newly mutated animal. For instance wings, legs, or eyes may be transplanted to various regions of the body. But experiments have shown that the muscles and nerves

necessary for those structures to function normally are not routinely manufactured. So while a non-flying animal might possess a mutated Hox gene, and thus develop wings, the muscles needed for those wings to function would not necessarily be present—thereby making this new structure worthless. Hox genes are not the "magic bullet" that Mr. Rennie and his evolutionist colleagues make them out to be.

11. [Creationists suggest that] natural selection might explain microevolution, but it cannot explain the origin of new species and higher orders of life.

Mr. Rennie wrote:

> Evolutionary biologists have written extensively about how natural selection could produce new species. For instance, in the model called allopatry, developed by Ernst Mayr of Harvard University, if a population of organisms were isolated from the rest of its species by geographical boundaries, it might be subjected to different selective pressures. Changes would accumulate in the isolated population. If those changes became so significant that the splinter group could not or routinely would not breed with the original stock, then the splinter group would be **reproductively isolated** and on its way toward becoming a new species (2002, 287[1]:82, emp. in orig.).

In section 2 of this review, we dealt at great length with the concept of natural selection, and so we will not repeat that information here. But we would like to point out that Mr. Rennie has done nothing more than create and then tear down a "straw man" in a feeble-but-failed attempt to make his own position look better. Creationists have no problem whatsoever with the creation of a **species**. As creationist Bill Hoesch correctly pointed out:

> A new population of creatures that has lost its will or ability to reproduce with its parent population (i.e., a new species) is no problem for the creationist. It would represent a loss of function, not a gain. Such change does nothing to establish the truth of macroevolution, for the traits that typify the new population were also a part of the original gene pool. Nothing new is created, in other words (2002).

Furthermore, the definition of a biological species is controversial at best, and poorly understood at worst. In his 2001 seminal work, *What Evolution Is*, Ernst Mayr—arguably the most eminent taxonomist in the world—plainly admitted as much when he wrote:

> Obviously one cannot study the origin of gaps between species unless one understands what species are. But naturalists have had a terrible time trying to reach a consensus on this point. In their writings this is referred to as "the species problem." **Even at present there is not yet unanimity on the definition of species** (p. 163, emp. added).

Mayr then went on to note:

> Taxonomists finally came to the conclusion that they had to develop a new species concept, not based on difference but on some other criterion. Their new concept was based on two observations: (1) species are composed of populations, and (2) populations are conspecific if they successfully interbreed with each other. This reasoning resulted in the so-called **biological species concept** (BSC): "Species are groups of interbreeding natural populations that are reproductively isolated from other such groups" (p. 166, emp. and parenthetical item in orig.; see also Gee, 1999, p. 124).

Geneticist Theodosius Dobzhansky echoed the widely accepted definition of a species when he said that a species is "a group of individuals fully fertile *inter se* [among themselves—BT/BH], but barred from interbreeding with other similar groups by its physiological properties (producing either incompatibility of parents, or sterility of the hybrids, or both)" [see Schwartz, 1999, pp. 285-286, parenthetical item in orig.]. In his 2001 book, *The Evolutionists: The Struggle for Darwin's Soul*, Richard Morris commented:

> The most common definition of the term "species" is this: a population that is reproductively isolated from other, related species. If two populations do not interbreed or do not produce fertile offspring when they do, they are said to be distinct species (p. 40).

In his 2002 book, *From Genesis to Genetics*, evolutionist John A. Moore stated:

> Thus, the individuals of a species are **usually** part of a single potentially interbreeding unit, **usually** do not interbreed with individuals of another species, are **usually** distinguishable on the basis of external characteristics and behavior patterns, and are **usually** found in a restricted geographic area where all individuals can, in theory, meet all other individuals of the same interbreeding unit (p. 134, emp. in orig.).

Why the hedging? The reason is that in "real life," **species do not fall into neatly nested categories**. Dogs, jackals, coyotes, wolves, hyenas, and dingoes are all separate, distinct species. But they also frequently can interbreed—which they should not be able to do if the above definitions are legitimate. In fact, Moore alluded to this very fact when he said:

> On the other hand, the ability of two populations to interbreed under natural conditions does not mean that they are always recognized as a single species. A notable example is lions and tigers. They can be crossed in captivity, and depending on the direction of the cross, the offspring are ligers (male lion and female tiger) or tiglons (male tiger and female lion) [p. 134, parenthetical items in orig.].

In his book, *In Search of Deep Time*, Henry Gee made a fascinating observation along these same lines.

> To classical thinkers, the concept of species was not at all problematic. Each species was represented by an archetype, represented by a collection of more or less varied instances. Whether Dalmatian or Doberman, retriver or Rottweiler, a dog is a dog because it is an instance of an archetype. A dog will always be different from a wolf, say, or a jackal, which will have their own distinct archetypes.
>
> But if variation is the substrate of evolution, and if the individuals and populations that constitute a species can vary so much that they can evolve by infinitesimal stages into other species, it becomes very difficult to define a species in such an unequivocal way, based solely on the appearance of the individuals within it. If species do not change, a dog is a dog no matter how strange an individual dog might look. But if species can change, it is possible that some dogs represent evolutionary stages between dogs and other things, such as wolves or jackals. Defining what is meant by "dog" in that sense becomes difficult, and sometimes arbitrary (1999, p. 124).

Species **do** change. Creationists and evolutionists both agree on that point. Evolutionists suggest, however, as did Moore, that "if species can change, it is possible that some dogs represent evolutionary stages between dogs and other things, such as wolves or jackals." Creationists, on the other hand, suggest that the original dog family very likely may have included the potential for producing the more than 200 different breeds of domestic dogs, the Australian dingoes, coyotes, wolves, jackals, foxes, and maybe even hyenas, even though these animals now are classified as different species. As Walter Kaiser commented:

> God created the basic forms of life called *min* [kind—BT/BH] which can be classified according to modern biologists and zoologists as sometimes species, sometimes genus, sometimes family or order. This gives no support to the classical evolutionist view which requires developments across kingdom, phyla, and classes (1980, 1:503-504).

Natural selection works to weed out the unfit, true. But there certainly is nothing inherent in the concept to empower it to produce a genus, a family, a class, or an order. When pressed, even evolutionists admit as much.

12. [Creationists suggest that] nobody has ever seen a new species evolve.

This is a worse straw man than Rennie produced in point number 11 above. Creationists freely acknowledge that speciation **does** occur. But strangely (in light of Mr. Rennie's accusation), it has been the evolutionists themselves who have made the type of accusation of which he has accused creationists. Colin Patterson once remarked:

> **No one has ever produced a species by mechanisms of natural selection**. No one has ever gotten near it and most of the current argument in neo-Darwinism is about this question: how a species originates. And it is there that natural selection seems to be fading out, and chance mechanisms of one sort of another are being invoked (1982).

Evolutionist Gordon Rattray Taylor wrote: "In all the thousands of fly-breeding experiments carried out all over the world for more than fifty years, a distinct new species has never been seen to emerge..." (1983, p. 34). Why didn't Mr. Rennie include some of **these** statements in his examples of "nonsense"?

13. [Creationists suggest that] evolutionists cannot point to any transitional fossils—creatures that are half reptile and half bird, for instance.

Rennie continued:

> Actually, paleontologists know of many detailed examples of fossils intermediate in form between various taxonomic groups. One of the most famous fossils of all time is *Archaeopteryx,* which combines feathers and skeletal structures peculiar to birds with features of dinosaurs. A flock's worth of other feathered fossil species, some more avian and some less, has also been found. A sequence of fossils spans the evolution of modern horses from the tiny *Eohippus*. Whales had four-legged ancestors that walked on land, and creatures known as *Ambulocetus* and *Rodhocetus* helped to make that transition…. Fossil seashells trace the evolution of various mollusks through millions of years. Perhaps 20 or more hominids (not all of them our ancestors) fill the gap between Lucy the australopithecine and modern humans.
>
> Creationists, though, dismiss these fossil studies. They argue that *Archaeopteryx* is not a missing link between reptiles and birds—it is just an extinct bird with reptilian features. They want evolutionists to produce a weird, chimeric monster that cannot be classified as belonging to any known group (2002, 287[1]:83, parenthetical item in orig.).

Again, we ask, why doesn't Mr. Rennie quote any of his evolutionist colleagues—like we did in point number 5 above—when **they** say that the fossil record exhibits a specific **lack** of transitional forms? Why does he center only on creationists' statements in this regard, instead of quoting someone like Ernst Mayr, who admitted: "Nothing has more impressed the paleontologists than the discontinuous nature of the fossil record. This is the reason so many of them were supporters of saltational theories of evolution" (2001, p. 163). Why not quote George Gaylord Simpson:

> This **regular absence of transitional forms** is not confined to mammals, but is an almost universal phenomenon, as has long been noted by paleontologists. It is true of almost all orders of all classes of animals, both vertebrate and invertebrate. *A fortiori*, it is also true of the classes, and of the major animal phyla, and it is apparently also true of analogous categories of plants (1944, p. 105, emp. added).

Or why not quote University of Oklahoma paleontologist Dave Kitts?

> Despite the bright promise that paleontology provides a means of "seeing" evolution, it has presented some nasty difficulties for evolutionists, the most notorious of which is the presence of "gaps" in the fossil record. **Evolution requires intermediate forms between species and paleontology does not provide them**…. (1974, 28:467, emp. added).

Stephen Jay Gould (whom we are **not** misquoting here) lamented:

> Paleontologists have paid an exorbitant price for Darwin's argument. We fancy ourselves as the only true students of life's history, yet to preserve our favored account of evolution by natural selection, we view our data as so bad that we never see the very process we profess to study (1977a, 86[5]:14).

Why single out the creationist for your unbridled scorn, Mr. Rennie, when your evolutionist cohorts are making even bolder statements than we are?

And then there's the timeworn *Archaeopteryx* argument. We have dealt with this at great length elsewhere, and so will not repeat that refutation here (see Harrub and Thompson, 2001; 2002). Suffice it to say that Mr. Rennie finally got it right when he said that "creationists argue that *Archaeopteryx* is not a missing link between reptiles and birds—it is just an extinct bird." Of course, once again, it is not just creationists who have offered such an assessment. Evolutionists have chimed in as well. Evolutionary ornithologist Allan Feduccia wrote in *Science* almost a decade ago:

> I conclude that *Archaeopteryx* was arboreal and volant [i.e., possessing extended wings for flight—BT/BH], considerably advanced aerodynamically, and probably capable of flapping, powered flight to at least some degree. ***Archaeopteryx*...was, in the modern sense, a bird** (1993, 259:792, emp. added).

Plus, the fossil remains of two crow-sized birds 75 million years older than *Archaeopteryx* (i.e., approximately 225 million years old according to evolutionary dating schemes) were found in 1986 near Post, Texas, by Sankar Chatterjee and colleagues from Texas Tech University in Lubbock, Texas (see Beardsley, 1986; Chatterjee, 1991). Chatterjee has named the find *Protoavis texensis* (first bird from Texas). In 1997, he authored a beautifully illustrated book on the evolution of birds (*The Rise of Birds*), in which *Protoavis* was displayed prominently as being the forerunner of modern birds. All of this, needless to say, has caused evolutionists severe problems because *Protoavis* appeared at the time of the earliest dinosaurs, which means that if it is accepted as genuine, then birds certainly could not have evolved from dinosaurs and *Archaeopteryx* could not be the ancestor of modern birds. After looking at the evidence for *Protoavis*, Kansas University paleontologist Larry Martin suggested: "There's going to be a lot of people with Archaeopteryx eggs on their face" (as quoted in Anderson, 1991, 253:35). Yes, and Mr. Rennie is one of them!

Next, in what must surely be a terrible **embarrassment** to his evolutionary colleagues, Mr. Rennie trotted out horses as evidence for transitional fossils, beginning with the tiny *Eohippus* and going all the way up to our modern *Equus*. If Rennie were the well-informed scientist he wants us to think he is, then he would realize that evolutionists themselves no longer consider horse evolution to be a good example of transitional forms since they do not believe it represents anything like a straightforward progression, but instead a bush with many varying branches. As Heribert Nilsson correctly pointed out as long ago as 1954:

> **The family tree of the horse is beautiful and continuous only in the textbooks**. In the reality provided by the results of research it is put together from three parts, of which only the last can be described as including horses. The forms of the first part are just as much little horses as the present day damans are horses. The construction of the horse is therefore a very artificial one, since it is put together from non-equivalent parts, and cannot therefore be a continuous transformation series (pp. 551-552, emp. added).

Mr. Rennie apparently does not realize that as far back as the 1950s, scientists already had cast aside the false notion of horse evolution in North America via classic Darwinian changes. David Raup acknowledged:

> Well, we are now about 120 years after Darwin, and knowledge of the fossil record has been greatly expanded.… Ironically, we have even fewer examples of evolutionary transition than we had in Darwin's time. By this I mean that some of the classic cases of Darwinian change in the fossil record, such as the evolution of the horse in North America, have had to be discarded or modified as a result of more detailed information—what appeared to be a nice, simple progression when relatively few data were available now appears to be much more complex and much less gradualistic (1979, pp. 24,25).

George Gaylord Simpson summed it up well when he wrote: "The uniform, continuous transformation of *Hyracotherium* into *Equus*, so dear to the hearts of generations of textbook writers, **never happened in nature**" (1953, p. 125, emp. added). Creationist Jonathan Sarfati wrote along these lines:

> Even informed evolutionists regard horse evolution as a bush rather than a sequence. But the so-called *Eohippus* is properly called *Hyracotherium*, and has little that could connect it with horses at all. The other animals in the "sequence" actually show hardly any more variation between them than that within horses today. One non-horse and many varieties of the true horse kind does not a sequence make (2002a).

In fact, the fossil record does not demonstrate a sequence of transitional fossils **for any** species. As *Newsweek* reporter Jerry Adler accurately noted:

> In the fossil record, missing links are the rule: the story of life is as disjointed as a silent newsreel, in which species succeed one another as abruptly as Balkan prime ministers. The more scientists have searched for the transitional forms between species, the more they have been frustrated.... Evidence from fossils now points overwhelmingly away from the classical Darwinism which most Americans learned in high school: that new species evolve out of existing ones by the gradual accumulation of small changes, each of which helps the organism survive and compete in the environment (1980, 96[18]:95).

14. [Creationists suggest that] living things have fantastically intricate features—at the anatomical, cellular, and molecular levels—that could not function if they were any less complex or sophisticated. The only prudent conclusion is that they are the products of intelligent design, not evolution.

Mr. Rennie concluded:

> Generations of creationists have tried to counter Darwin by citing the example of the eye as a structure that could not have evolved. The eye's ability to provide vision depends on the perfect arrangement of its parts, these critics say. Natural selection could thus never favor the transitional forms needed during the eye's evolution—what good is half an eye? Anticipating this criticism, Darwin suggested that even "incomplete" eyes might confer benefits (such as helping creatures orient toward light) and thereby survive for further evolutionary refinement. Biology has vindicated Darwin: researchers have identified primitive eyes and light-sensing organs throughout the animal kingdom and have even tracked the evolutionary history of eyes through comparative genetics. (It now appears that in various families of organisms, eyes have evolved independently.)
>
> Today's intelligent-design advocates are more sophisticated than their predecessors, but their arguments and goals are not fundamentally different. They criticize evolution by trying to demonstrate that it could not account for life as we know it and then insist that the only tenable alternative is that life was designed by an unidentified intelligence (2002, 287[1]:83, parenthetical comments in orig.).

This argument is leveled at the modern-day Intelligent Design movement. In an attempt to defuse this "bomb" on the doorstep of the evolutionary camp, Mr. Rennie attempted to undermine the origin and design of the eye by suggesting that "incomplete" eyes might confer benefit. However, R.L. Gregory noted:

> The problem of how eyes have developed has presented a major challenge to the Darwinian theory of evolution by Natural Selection. We can make many entirely useless experimental models when designing a new instrument, but this was impossible for Natural Selection, for each step must confer some advantage upon its owner, to be selected and transmitted through the generations. But what use is a half-made lens? What use is a lens giving an image, if there is no nervous system to interpret the information? How could a visual nervous system come about before there was an eye to give it information? In evolution there can be no master plan, no looking ahead to form structures which, though useless now, will come to have importance when other structures are sufficiently developed. And yet the human eye and brain have come about through slow painful trial and error (1972, p. 25).

As long ago as 1949, Sir Arthur Keith of Great Britain acknowledged the problem of **any** attempt to explain the complexity of the eye.

> What are we to say, then, about such a complicated and efficient instrument as the human eye? **If it had been made of wood, brass, and glass, it would have been said to have been planned for a purpose,** but because it has been "evolved," is made up of living tissues, and came into existence without a preliminary "blueprint," it is not purposive. Are not my critics, by the use of a verbal quibble, seeking a sophist's escape from a real difficulty? Would it not be more honest to say that the finer purposive adaptations we see in plants and animals remain as yet, unexplained? The eye has been evolved; that much is quite certain; the living vital forces which have molded it are probably still at work, but as yet we have not isolated them. I could as easily believe the theory of the Trinity as one which maintains that living, developing protoplasm, by mere throws of chance, brought the human eye into existence (p. 238, emp. added).

Did you catch the statement that the eye "came into existence without a preliminary blueprint," and "has been evolved; that much is quite certain"? In other words, **assume** what you are supposed to set out to **prove**, and then go on from there. In philosophy, that sleight-of-hand trick is known as the fallacy of "begging the question." And evolutionists should know better, shouldn't they Mr. Rennie?

Rennie suggested that "researchers have identified primitive eyes and light-sensing organs throughout the animal kingdom and have even tracked the evolutionary history of eyes through comparative genetics. It now appears that in various families of organisms, eyes have evolved independently." But there are two things wrong with such an assessment. First, as Sarfati has pointed out:

> This overlooks the incredible complexity of even the simplest light-sensitive spot. Second, it's fallacious to argue that 51% vision would necessarily have a strong enough selective advantage over 50% to overcome the effects of genetic drift's tendency to eliminate even beneficial mutations.

Second, as Sarfati went on to note:

> Rennie contradicts himself here. If the evolutionary history of eyes has been tracked though comparative genetics how is it that eyes have supposedly evolved independently? Actually, evolutionists recognize that eyes must have arisen independently at least 30 times because there is no evolutionary pattern to explain the origin of eyes from a common ancestor. What this really means is that since eyes cannot be related by common ancestor, then since they are here, and only materialistic explanations are allowed, hey presto, there's proof that they evolved independently! (2002a).

Evolutionist Frank Salisbury admitted: "Even something as complex as the eye has appeared several times; for example, in the squid, the vertebrates, and the arthropods. It's bad enough accounting for the origin of such things once, but the thought of producing them several times according to the modern synthetic theory **makes my head swim**" (1971, p. 338, emp. added). So now we are to believe that this magical development of the eye occurred not just once, but several times in different organisms.

Additionally Mr. Rennie neglected a major problem with his theory regarding the origin of the eye. According to evolutionists, the eye has evolved to the pinnacle at which we now find it. Yet, the trilobite, an index fossil that evolutionists claim is 450 million years old, possessed an even more complex eye (with a dual lens system) than anything seen in nature today. And even the evolutionists know this to be true. Writing in *Science News*, Lisa Shawver wrote that trilobites possessed "**the most sophisticated eye lenses ever produced by nature**" (1974, 105:72, emp. added). Indeed they did! Trilobites possessed a lens system known in ophthalmology as an "optical doublet." But in order to make such a lens system function properly, it is necessary to have what is known as a "refracting interface" between the two lenses. And that is exactly what the trilobites—which evolutionists believe is one of the first living things on the Earth, and which is an index fossil for the Cambrian period)—do indeed possess! The acknowledged worldwide expert on the trilobites, Riccardo Levi-Setti of the University of Chicago, literally "wrote the book" on these creatures. In his volume, *Trilobites*, he said:

> In fact, this optical doublet is a device so typically associated with human invention that its discovery in trilobites comes as something of a shock. The realization that trilobites developed and used such devices half a billion years ago makes the shock even greater. And a final discovery—that the refracting interface between the two lens elements in a trilobite's eye **was designed in accordance with optical constructions** worked out by Descartes and Huygens in the mid-seventeenth century—borders on sheer science fiction…. The **design of the trilobite's eye lens could well qualify for a patent disclosure** (1993, pp. 57,58, emp. added).

Niles Eldredge, paleontologist of the American Museum of Natural History (and a scientist who devoted a portion of his doctoral dissertation to the trilobite's eye), remarked:

> These lenses—technically termed aspherical, aplanatic lenses—optimize both light collecting and image formation better than any lens ever conceived. **We can be justifiably amazed that these trilobites, very early in the history of life on Earth, hit upon the best possible lens design that optical physics has ever been able to formulate** (as quoted in Ellis, 2001, p. 49, emp. added).

"Justifiably amazed?" What an understatement! Darwin once said that it made him turn "cold" to think of something as complex as an eye evolving. With that in mind, Ian Taylor observed: "If Darwin turned cold at the thought of the human eye at the **end** of the evolutionary cycle, what, one wonders, would he have thought of the trilobite eye near the **beginning**?" (1984, p. 169, emp. added). Yes, one does "wonder," doesn't one, Mr. Rennie?

15. [Creationists suggest that] recent discoveries prove that even at the microscopic level, life has a quality of complexity that could not have come about through evolution.

Yes, Mr. Rennie, creationists **do** suggest that "even at the microscopic level, life has a quality of complexity that could not have come about through evolution," but must instead have been designed. Consider the human body as the penultimate proof that "complexity." In speaking of the human body as a whole, one evolutionist wrote:

> When you come right down to it, the most incredible creation in the universe is you—with your fantastic senses and strengths, your ingenious defense systems, and mental capabilities so great you can never use them to the fullest. Your body is a structural masterpiece more amazing than science fiction (Guinness, 1987, p. 5).

Could a rational person really be expected to conclude that the "structural masterpiece" we call the human body—with all of its "ingenious" systems and its "highly endowed organization"—is the result of undirected evolutionary processes operating over eons of time in nature? Or is it more logical to conclude that the body is the result of purposeful design by a Master Designer?

From an organizational standpoint, the human body may be considered at four different levels. First, there are **cells**, which represent the smallest unit of life. Second, there are **tissues** (muscle tissue, nerve tissue, etc.), which are groups of the same types of cells carrying on the same kind of activity. Third, there are **organs** (heart, liver, etc.), which are groups of tissues working together in unison. Fourth, there are **systems** (reproductive system, circulatory system, etc.), which are composed of groups of organs carrying out specific bodily functions. To the unbiased, it should be obvious that the physical body has been marvelously designed and intricately organized for the purpose of facilitating human existence upon the Earth.

THE BODY'S CELLS

A human body is composed of over 250 different kinds of cells (red blood cells, white blood cells, muscle cells, fat cells, nerve cells, etc.—Baldi, 2001, p. 147), totaling approximately 100 trillion cells in an average adult (Fukuyama, 2002, p. 58). These cells come in a variety of sizes and shapes, with different functions and life expectancies. For example, some cells (e.g., male spermatozoa) are so small that 20,000 would fit inside a capital "O" from a standard typewriter, each being only 0.05 mm long. Some cells, placed end-to-end, would make only one inch if 6,000 were assembled together. Yet all the cells of the human body, if set end-to-end, would encircle the Earth over 200 times. Even the largest cell of the human body, the female ovum, is unbelievably small, being only 0.01 of an inch in diameter.

Paul Ferrigno admitted: "The complexity of Millennium domes, Eiffel towers and 'Ferris wheels' are likely just pale reflections of life at the heart of the cell" (2000, p. 366). Each cell possesses organelles such as ribosomes, mitochondria, Golgi apparatus, endoplasmic reticulum, and a nucleus—all of which play vital roles in

keeping the organism alive. While all of these microscopic organelles point to an intelligent designer, the truly amazing intricate complexity of a cell is observed within the nucleus, for it is within the nucleus that the DNA—or genetic code—is to be found.

Cells have three major components. First, each cell is composed of a cell membrane that encloses the organism. Second, inside the cell is a three-dimensional cytoplasm—a watery matrix containing specialized organelles. Third, within the cytoplasm is the nucleus, which contains most of the genetic material, and which serves as the control center of the cell.

The lipoprotein cell membrane (lipids/proteins/lipids—known as a bilipid membrane) is approximately 0.06-0.08 of a micrometer thick, yet allows selective transport into, and out of, the cell. Evolutionist Ernest Borek has observed: "The membrane recognizes with its uncanny molecular memory the hundreds of compounds swimming around it and permits or denies passage according to the cell's requirements" (1973, p. 5). Inside the cytoplasm, there are over 20 different chemical reactions occurring at any one time, with each cell containing five major components for: (1) communication; (2) waste disposal; (3) nutrition; (4) repair; and (5) reproduction. Within this watery matrix there are such organelles as the mitochondria (over 1,000 per cell in many instances) that provide the cell with its energy. The endoplasmic reticulum is a "...transport system designed to carry materials from one part of the cell to the other" (Pfeiffer, 1964, p. 13). Ribosomes are miniature protein-producing factories. Golgi bodies store the proteins manufactured by the ribosomes. Lysozomes within the cytoplasm function as garbage disposal units.

The nucleus is the control center of the cell, and is separated from the cytoplasm by a nuclear membrane. Within the nucleus is the genetic machinery of the cell (chromosomes and genes containing deoxyribonucleic acid —DNA). The DNA is a supermolecule that carries the coded information for the replication of the cell. If the DNA from a single human cell were removed from the nucleus and unraveled (it is found in the cell in a spiral configuration), it would be approximately six feet long, and would contain over 3 billion base pairs. It has been estimated that if all the DNA in an adult human were placed end-to-end, it would reach to the Sun and back (186 million miles) 400 times.

If transcribed into English, the chemical code (deoxyribonucleic acid—DNA) in the human genome (i.e, in a spermatozoon or ovum) would fill a 300-volume set of encyclopedias of approximately 2,000 pages each (Baldi, p. 21). Yet just as amazing is the fact that all the genetic information needed to reproduce the entire human population (around six billion people) could be placed into a space of about one-eighth of a square inch. In comparing the amount of information contained in the DNA molecule with a much larger computer microchip, evolutionist Irvin Block remarked: "We marvel at the feats of memory and transcription accomplished by computer microchips, but these are gargantuan compared to the protein granules of deoxyribonucleic acid, DNA" (1980, p. 52).

It also should be noted that the DNA molecule does something that we as humans have yet to accomplish: it stores coded information in a chemical format and then uses a biologic agent (RNA) to decode and activate it. As Darrel Kautz stated: "Human technology has not yet advanced to the point of storing information **chemically** as it is in the DNA molecule" (1988, p. 45, emp. in orig.; see also Jackson, 1993, pp. 11-12). The intricate and complex nature of the DNA molecule—combined with the staggering amount of chemically coded information that it contains—speaks unerringly to the fact that this "supermolecule" simply could not have come into existence due to blind chance and random natural forces operating through eons of time, as evolutionists have claimed. This is not an adequate explanation for the inherent complexity of the DNA molecule. Does coded information happen by chance? And could the decoding system (RNA and ribosomes) just happen by chance as well? Hardly.

What, then, may we say about the infinitely more complex genetic code found within the DNA in each cell? Sir Fred Hoyle concluded that the notion that the code's complexity could be arrived at by chance is "nonsense of a high order" (1981a, p. 527). In their classic text on the origin of life, Thaxton, Bradley, and Olsen addressed the implications of the genetic code found within the DNA molecule.

> We know that in numerous cases certain effects always have intelligent causes, such as dictionaries, sculptures, machines and paintings. We reason by analogy that similar effects have intelligent causes. For example, after looking up to see "BUY FORD" spelled out in smoke across the sky we infer the presence of a skywriter even if we heard or saw no airplane. We would similarly conclude the presence of intelligent activity were we to come upon an elephant-shaped topiary in a cedar forest.
>
> In like manner an intelligible communication via radio signal from some distant galaxy would be widely hailed as evidence of an intelligent source. Why then doesn't the message sequence on the DNA molecule also constitute prima facie evidence for an intelligent source? After all, DNA information is not just analogous to a message sequence such as Morse code, it is such a message sequence....
>
> We believe that if this question is considered, it will be seen that most often it is answered in the negative simply because it is thought to be inappropriate to bring a Creator into science (1984, pp. 211-212, emp. in orig.).

The complexity and intricacy of the DNA molecule—combined with the staggering amount of chemically coded information it contains—speak unerringly to the fact that this "supermolecule" simply could not have happened by blind chance. As Andrews has observed:

> It is not possible for a code, of any kind, to arise by chance or accident.... A code is the work of an intelligent mind. Even the cleverest dog or chimpanzee could not work out a code of any kind. It is obvious then that chance cannot do it.... This could no more have been the work of chance or accident than could the "Moonlight Sonata" be played by mice running up and down the keyboard of my piano! Codes do not arise from chaos (1978, pp. 28-29).

Indeed, codes do not arise from chaos. Richard Dawkins (quoted earlier) correctly remarked: "The more statistically improbable a thing is, the less we can believe that it just happened by blind chance. Superficially, the obvious alternative to chance is an intelligent Designer" (1982, p. 130, emp. added). But it hardly is "superficial" to suggest that the obvious alternative to chance is an intelligent Designer. You cannot hide the complexity of life Mr. Rennie. The fact is, an intelligent Designer is demanded by the evidence!

THE BODY'S TISSUES

In the human body, there are numerous tissues (e.g., muscle tissues, nerve tissues, etc.). In fact, a single human has more than 600 muscles (containing about six billion muscle fibers), composing about 40% of the body's weight. Muscles are the "engines" that the body uses to provide the power for movement. Some muscles are tiny (such as those regulating the amount of light entering the eye), while others (like those in the legs) are massive.

Muscles may be classified either as "voluntary" (i.e., under the control of the human will), or "involuntary" (i.e., not under control of the will). The voluntary muscles of the arms, for example, are attached to the bones by tough cords of connective tissue called tendons. One must "think" in order to move these muscles. The involuntary muscles are those whose contraction and relaxation are not controlled consciously (e.g., the heart and intestines). Some muscles are both voluntary and involuntary (e.g., the muscles controlling the eyelids, and the diaphragm). All muscles, in one way or another, are regulated by the nervous system. The design inherent in voluntary and involuntary muscles is utterly incredible.

If it is clear that an automobile engine was intelligently designed, why is it not reasonable to draw the same conclusion with reference to muscles. John Lenihan, although an evolutionist, wrote: "The body's engines [muscles—BT/BH]...demonstrate some surprisingly modern engineering ideas" (1974, p. 43). Who initiated these "engineering ideas"?

THE BODY'S ORGANS

The Skin

The skin is the largest single organ of the human body. It consists of three areas: (a) the skin layers; (b) the glands; and (c) the nails. If the skin of a 150-pound man were spread out, it would cover 20 square feet of space and weigh about 9 pounds. The skin is also a very busy area. "A piece of skin the size of a quarter contains 1 yard of blood vessels, 4 yards of nerves, 25 nerve ends, 100 sweat glands, and more than 3 million cells" (Youmans, 1979, 17:404d).

The skin absorbs ultraviolet rays from the Sun, and uses them to convert chemicals into vitamin D, which the body needs for the utilization of calcium. It retains the fluids in the body, and yet still is permeable enough for perspiration to penetrate in order to cool the body. And, the skin is the primary means of defense against bacteria and other harmful organisms. Man has yet to develop a durable material that can perform the many functions that the skin carries out on a daily basis.

THE BODY'S SYSTEMS

The Skeletal System

As a specific example of bone design, consider the bones of the human foot. One-fourth of all the body's bones are in the feet. Each human foot contains 26 bones. The feet have been designed to facilitate a number of mechanical functions. They **support**, using arches similar to those found in an engineered bridge. They operate as **levers** (as in those occasions when one presses an automobile accelerator peddle). They act like hydraulic **jacks** when a person tiptoes. They **catapult** a person as he jumps. And feet act as a **cushion** for the legs when one is running. All of these features are quite helpful—especially in view of the fact that an average person will walk about 65,000 miles in his/her lifetime (equivalent to traveling around the world more than two-and-a-half times). The human skeletal system demonstrates brilliant design, which shows that there must have been a brilliant Designer behind it.

The Circulatory System

The circulatory system—which consists of the heart, arteries, arterioles, vessels, and capillaries—has several functions. First, it transports digested food particles to the various parts of the body. Second, it takes oxygen to the cells for burning food, thus producing heat and energy. Third, it picks up waste materials and carries them to the organs that eliminate them from the body.

The heart is an involuntary muscle that beats about 100,000 times a day, or nearly 40,000,000 times in a year. It pumps about 1,800 gallons of blood a day. In a lifetime, a heart will pump some 600,000 metric tons of blood!

Evolutionists Miller and Goode conceded that "for a pump that is keeping two separate circulatory systems going in perfect synchronization, **it is hard to imagine a better job of engineering**" (1960, p. 68, emp. added). Yet this amazing device, which Miller and Goode admitted is "hard to describe as anything short of a **miracle**" (p. 64, emp. added), was produced by blind forces?

The Nervous System

The brain, located in the protective case called the skull, is the most highly specialized organ in the body. The late Isaac Asimov, well-known science writer and prominent humanist, once stated that man's brain is "the most complex and orderly arrangement of matter in the universe" (1970, p. 10). Who arranged it? Paul Davies, professor of mathematics and physics at the University of Adelaide in Australia, observed that the human brain is "the most developed and complex system known to science" (1992b, 14[5]:4).

It is not just the brain that is "difficult to explain by evolution." Were space to permit, we could examine numerous other body systems (e.g., digestive, reproductive, etc.), each of which provides clear and compelling evidence of design. Atheistic philosopher Paul Ricci has suggested: "Although many have difficulty understanding the tremendous **order and complexity** of functions of the human body (the eye, for example), **there is no obvious designer**" (1986, p. 191, emp. added). The only people who "have difficulty understanding the tremendous order and complexity" found in the Creation are materialistic evolutionists who have "refused to have God in their knowledge" (Romans 1:28). Such people can parrot the phrase that "there is no obvious designer," but in light of the actual evidence, their arguments are not convincing.

CONCLUSION

In his book, *Nemesis: The Death-Star and Other Theories of Mass Extinction*, Donald Goldsmith made the following comments:

> People who simply demand results may not consider the important distinction between scientists' perceptions and pseudoscientists' procedures, but scientists do. By constructing an environment—the world of science—in which theories survive not because they are emotionally satisfying but because they fit into the existing framework more successfully than competing theories, scientists have created the potential for anyone within their purview to make important advances in our collective knowledge. **Individuals make the theories; the social structure of science does the testing. If you don't accept this principle, you don't belong to the scientific community.** This does not mean that your ideas must be wrong, only that you (and they) won't be taken seriously. No one guarantees that your ideas will always receive serious consideration in any case, **but there is no hope if you don't "think like a scientist"**—accept the proposition that your ideas may or may not be right, and look for ways to prove the former and reject the latter (1985, p. 157, emp. added, parenthetical item in orig.).

Notice the phrases that "the social structure of science does the testing" and that "no one guarantees that your ideas will always receive serious consideration" if you don't "think like a scientist."

In today's climate, the "social structure of science" is based in its entirety on the concept of evolution. Read that last phrase, therefore, as—"if you don't think like an **evolutionist**!" Doubt that? Listen to Niles Eldredge in his book, *The Triumph of Evolution and the Failure of Creationism*.

> This basic notion of evolution is thoroughly scientific in the strictest sense of the word, and as such is as highly corroborated and at least as powerful as the notion or gravity or the idea that the Earth is round, spins on its axis, and revolves around the sun. **In the realm of science—and indeed in grander arenas of human knowledge and wisdom—evolution truly is triumphant** (2000, p. 31, emp. added).

And so, if you don't accept the reality of the triumphant nature of evolution, "you don't belong to the scientific community." With those thoughts in mind, consider the following.

In their opening "letter from the editors" ("Bad Science and False Facts"), the editors of *Scientific American* made the following statement: "Ideas deserve a fair hearing, but fairness shouldn't be an excuse for letting rejected, inadequate ideas persist. Intelligent design and other variants of creationism lack credible support and don't mesh with the naturalistic fabric of all other science. They don't deserve to be taught as legitimate scientific alternatives to evolution any more than flat-earth cosmology does" (2002, 287[1]:10). Mr. Rennie then concluded his article by stating that "creationism, by any name, adds nothing of intellectual value to the effort" (p. 85).

Apparently it **is acceptable** for evolutionists to spout "rejected, inadequate ideas"—like *Archaeopteryx* still being considered as a "missing link" between reptiles and birds, *Eohippus* having given rise to *Equus*, the "fact" that genetic mutations actually possess the power to pass on completely new information and cause evolution at the level of the genus, family, class, order, or phylum, etc. But it is **not acceptable** for creationists to point out that exactly the opposite is known to be true scientifically. Nor is it acceptable for creationists to employ what the "man on the street" recognizes as everyday common sense—that from the microcosm to the macrocosm, the world around us is filled with evidence of design, which can only mean that there had to have been a Designer.

Mr. Rennie and his colleagues would do well to examine more closely the **rejected inadequacies** of evolutionary theory before spouting their venom against those of us who already have carried out such an investigation. They can attempt to belittle creationism by aligning it with "flat-earth" cosmology, and they can claim with all their professional might that creationism holds "nothing of intellectual value," but that will not change the evidence—and it will not make us go away. Make no mistake about it: we **will** continue to stand in defense of that evidence! In fact, seeing the paltriness of evolution only causes us to be more determined to see the ultimate collapse of evolutionary theory. And, if we may kindly say so, if the type of arguments that Mr. Rennie employed in his *Scientific American* article are the best the scientific community has to offer, that collapse surely cannot be too far in the distant future.

Evolutionists need to know: we will not go quietly into the night. And when the dust settles, it will not be evolution that is "triumphant," but truth—the truth of creationism.

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