The Unbridgeable Chasm Between Microevolution and Macroevolution

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Abstract

The concepts of microevolution and macroevolution are examined, focusing both on their similarities and differences. It is concluded that at least 17 criteria exist that demonstrate macroevolution is not merely an extension of microevolution as is often claimed by Darwinists. But, instead, they are two different processes that involve distinctively different mechanisms. A major difference is that microevolution has been demonstrated empirically, whereas macroevolution is largely the product of speculation. Another key difference is that microevolution involves *loss* of information, and macroevolution involves a *gain* of new information. A common approach to proving macroevolution is to demonstrate microevolution, and then infer by extension that macroevolution also has been proven. While this "bait and switch" tactic may be useful to win arguments, it does not justify the conclusion.

Introduction

Two basic and fundamentally different types of evolutionary change exist—one that usually is labeled *microevolution* (minor changes) and the other *macroevolution* (major changes), often called trans-species evolution. "Micro" is a Greek term that means small, and "macro" large or big, suggesting at first glance that only *quantitative* differences exist between these two processes. Actually, fundamental *qualitative* differences also exist between micro- and macroevolution. The key factor is necessarily not the *amount* of morphological change, but the *type* of change. This is indicated by the many other terms commonly used to describe both microevolution and macroevolution. For example, microevolution also is referred to as "adaptive variation" or "variations within the genesis kinds," while macroevolution is often called "Darwinism," "evolutionary naturalism," or "evolutionism."

The simplest and most common definition of the two terms is that microevolution involves "relatively small changes below the species level," while macroevolution involves "relatively large changes sufficient to produce new species and higher taxa" including new families, phyla, or genera (Price, 1996, p. 11). One of the most authoritative Darwinists, Ernst Mayr of Harvard, defined microevolution as "evolution at or below the species level" and generally "refers to relatively minor variations that occur in populations over time." Conversely, he defined macroevolution as "evolution above the species level; the evolution of higher taxa and the production of evolutionary novelties such as new structures" (Mayr, 1991, p. 182). In other words, macroevolution is a result of *cladogenesis*. A *clade* is a group whose members share a common ancestor, and cladogenesis is when a species line splits into two new species (Horvitz, 2002).

The Interbreeding Definition

Differentiations based on the species distinction are very common and very useful (but also very imperfect, because the species classification is often not clear). The definition of an animal species usually involves the ability to interbreed. If two animals can interbreed, they are considered part of the same species; if not, they are considered a different species. However, differentiation of species based upon interbreeding applies only to sexually reproducing organisms. Since many known species are asexual (and that number may increase dramatically in the next few decades; some microbiologists estimate we have only classified 1–5% of all bacteria species), many of all known species cannot be classified in this manner. In fact, even for sexual reproducing animals there are numerous exceptions, making it only a partially functional definition (Hey, 2001; Shaw, 2002).

Many other difficulties exist in using the ability of two groups to interbreed as the major distinction between macro- and microevolution. For example, some animals, e.g. large dogs such as the Great Dane and a small dog

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such as a terrier, normally cannot interbreed because of their size differences. Although these two dogs may not be able to interbreed naturally, both are part of the same species and can be made to interbreed by various methods, such as by artificial insemination or by breeding with a middle-sized animal first. In addition, some animals that can be made to interbreed have offspring that usually are sterile. The most common example is a female horse and a male donkey, which can breed to produce a mule that is usually sterile.

Speciation based upon interbreeding is complicated by those situations where Species A can interbreed with Species B, and Species B with Species C, but Species A and C cannot interbreed. Where is the true species division? This example shows how difficult it is to determine species divisions sharply and thus how subjective the field can become. Other animals regarded as different species such as lions and tigers, cows and buffaloes, camels and llamas, and wolves and dogs all have been interbred successfully. The Bryan College web site, as of this writing, lists 2,711 hybrid crosses (www.bryancore.org/hdb/). Furthermore, some so called microevolutionary changes are fairly large in the physical changes that can result (as is obvious with dog breeds).

For these reasons, other criteria in addition to the ability to interbreed must be used to differentiate species. It is also for this reason that many creationists prefer the term “baramin” or “genesis kinds” instead of “species” in discussions about micro- and macroevolution. Nonetheless, because the word species is widely used and is very useful, until a better term is widely used, we are forced to use an imperfect term that is appropriate if the reader understands its limitations. Furthermore, large biological changes can occur due to homeodomain mutations, for example, which do not involve increased genetic information and are representative of microevolution only. The reason is homeodomain genes regulate a large number of other genes, such as those needed to produce body limbs. A homeodomain mutation can cause, for example, a fly to develop an extra set of wings or no wings.

Thus, the claim that macroevolution occurs as a result of “new” species being created by microevolution is very problematic for many other reasons. As noted above, the species label is may be useful in classifying life, but sharp lines often cannot be drawn (Hey, 2001; Shaw, 2002). The definition and criteria used to define a species, genus, etc. generally are skewed by most taxonomists to favor evolutionary interpretations of the data. Taxonomists also often create a new species according to their understanding of how evolution works (i.e.. how they perceive microevolution to support macroevolution). Darwinists widely acknowledge the difficulties and ambiguity of species classification: taxonomic classification may result in ten species of finches even if evidence exists that these ten are not all legitimate separate species because the specialization that occurs is solely a result of genetic information loss, genetic shuffling, and/or new genetic combinations.

Is Macroevolution Just More Microevolution?

Some Darwinists attempt to argue that “evolution is evolution” no matter what you call it, and that there is no fundamental qualitative distinction between microevolution and macroevolution. They conclude that the difference is only a matter of degree on a continuum that is bridged by time. Many evolutionists attempt to argue that microevolution plus time, chance, and natural selection equals macroevolution. Under the subheading “Microevolution Versus Macroevolution,” Mader (1998) argues that changes of the gene frequency in local populations are microevolution and that “evolutionists believe that the same processes have been involved in major transformations over geological time, such as those observed in *lineages*, lines of descent from a common ancestor (called *macroevolution*).” (p. 342)

Certain Darwinists even try to argue that the “intelligent design” theory lacks a scientific case and, therefore, are forced to confuse the issue by creating definitions and distinctions (such as micro-/macroevolution) that do not really exist. However, the microevolution/macroevolution distinction is widely used in the literature and textbooks by both scientists and writers (both creationists and anti-creationists) from Darwin to today. Examples include Horvitz (2002) and also Hickman et al. (1997), who defines microevolution as “genetic variation and change within a species” (p. 59) and macroevolution as “major evolutionary events” such as speciation (p. 41). Many textbooks include a whole chapter on microevolution and another chapter on macroevolution (for example see chapters 17 and 18 in Krogh, 2002).

Part of the problem in resolving this issue is that evolutionists themselves do not always agree on the exact meaning and appropriate usage of terms including “micro-” and “macroevolution,” nor do they agree on the definition of a species. This paper addresses this matter, and concludes that major qualitative differences exist between microevolution and macroevolution. Macroevolution is not just microevolution plus time and chance; rather, as described below, the two biological processes are fundamentally different in critical ways (see Table I). Rensch (1959) and Woodward (2003) have documented a large number of leading authorities that have concluded macroevolution cannot be explained in terms of microevolution.

Criteria	Microevolution	Macroevolution
1. Other terms used	Variations within kinds, intra-evolution	Darwinism, evolutionism, trans-specific evolution
2. Kirkut's term	Special theory	General theory
3. Level of change	Below species level	Above species level
4. Examples	206 breeds of dogs, antibiotic resistance	Molecules to humans (common descent of all life)
5. Variation level	Generally within species	Beyond species or genera
6. Type of evolution	Horizontal	Vertical
7. Major sources	Shuffling existing genes (sexual reproduction, crossing over, and natural selection)	Creation of new genes (mutations and natural selection)
8. Increase in information?	No (rearrangement and loss only)	Yes (major increases required)
9. Change level	Usually minor changes (color frequency changes)	Generally major changes (evolution of wings)
10. Change measurable?	Yes, directly	No, not directly
11. Time	Seen in one or a few generations	Thousands of generations or more
12. History	Historical	Prehistorical
13. Evidence	Testable, experimentally verified	No direct evidence (inferred only)
14. Scientific acceptance	Universal	Controversial
15. Short/long age creationists' acceptance	Universal	Reject
16. Intelligent Design theorists' acceptance	Universal	Most reject
17. Atheists'/agnostics' acceptance	Universal	Nearly universal

Table I. Microevolution Versus Macroevolution

The Primary Difference is New Information

The terms macroevolution/microevolution (which focus on small-versus-large changes that are subjective) are also problematic because the central issue is *increased genetic information* (the production of new codes that make new functional protein parts, increase enzyme specificity, generate regulatory systems, form new transport proteins, etc.). The major difference that can most accurately be used to separate micro- and macroevolution is that microevolution involves a rearranging, sorting, and ultimately a *loss* of existing genetic information, whereas macroevolution requires the creation of *increased*, new original genetic information. Microevolution involves loss because natural selection removes information. In the words of Harvard professor Ernest Mayr (2001), "What Darwin called natural selection is actually a process of elimination ... [of] individuals of lower fitness" (pp. 117, 288).

The level of morphological changes, therefore, cannot be the chief criteria used to differentiate microevolution from macroevolution, but rather the criterion is the increase of genetic information. It is for this reason that the information-gain or information-loss criterion is the *primary distinction* between microevolution and macroevolution. Loss of genetic information alters the gene pool in the opposite direction of macroevolution. Hence, genetic mechanisms that give rise to the observable changes involved in microevolution actually work against macroevolution. The extant empirical, genetic evidence demonstrates that the genetic mechanisms that account for microevolution *cannot* produce the changes predicted by macroevolution (Anderson, 2001).

Macroevolution in Contrast to Microevolution

The level of structural change involved in microevolution is usually minor, often comparatively trivial, while in contrast, the change level required for macroevolution is major. The major difference is that microevolutionary changes have been demonstrated by numerous empirical studies (such as those on finches, dogs, and moths), but no direct evidence exists for macroevolution. Rather, macroevolution can only be inferred from evolutionary interpretations of the fossil record and other presumptive reasoning—a very problematic approach to prove a theory that has produced so much controversy.

Examples of microevolution include humans producing 206 breeds of dogs, and the development of antibiotic resistance by bacteria (Palumbi, 2001). As Price (1996) notes, "many experiments have demonstrated microevolution" (p. 11) and there is abundant proof that it has occurred, and still occurs today. Conversely, no experiment has yet been able to unambiguously demonstrate macroevolution. As Silvius (1994) notes:

> In addition to the contradictory fossil record, laboratory evidence offers little indication that mutations are the source of the awesome variation in millions of species. Thus, *there appears no mechanism for such extensive variation, and no prehistoric record that extensive variation occurred over time*. That is, there does not appear to be clear evidence for *macroevolution* (*general theory of evolution*), which allegedly occurs with no limits to biological change. Both Neo-Darwinism and punctuated equilibrium claim that there are no limits to genetic variation (p. 339).

Another critical difference is that microevolution can often be seen in one generation, while macroevolution is believed to require hundreds of generations or longer to be observable. Consequently, changes via microevolution have been demonstrated empirically, and evolutionists often offer these studies as the irrefutable evidence for Darwinism. Actually, the scientific acceptance of microevolution is universal, but macroevolution is still very controversial. Mayr (1982) concludes that

> The futile attempts to establish the relationship of the major phyla of animals induced at least one competent zoologist at the turn of the century to deny common descent. Fleischmann (1901) called the theory a beautiful myth not substantiated by any factual foundation. Kerkut, fifty years later ... is almost equally pessimistic about ever achieving an understanding of the relationship of the higher animal taxa. Honesty compels us to admit that our ignorance concerning these relationships is still great, not to say overwhelming. This is a depressing state of affairs considering that more than one hundred years have passed since the great *post-Origin* period of phylogeny construction (p. 218).

The acceptance of microevolution by both short- and long-age creationists is also universal, while most intelligent design theorists reject macroevolution. At a genetic level, microevolution primarily involves changes of allelic frequencies within populations (Hickman, et al., 2001). This change usually involves such mechanisms as sexual reproduction, gene cross-over, gene exchange (such as is common among bacteria), transposition and, to a small extent, some minor mutations.

In contrast, macroevolution requires *increased* information that produces new functional proteins and biological structures. Ultimately, the only viable mechanism that has been proposed for macroevolution is mutations, a mechanism that has been shown to be inadequate (Spetner, 1997).

Furthermore, "most of the evidence of large-scale evolutionary change (which is conveniently called macroevolution) comes from the fossil record" (Ridley, 1985, p. 134). And the fossil record always has been one of the major problems for macroevolution. Even anti-creationists recognize that "transitional fossils were real organisms that were adapted to the environment of their time" and they

> only become "transitional" in hindsight. Paleontologists of the future will consider organisms living today as "transitional." Also remember that you can never know for certain that an individual fossil was ancestral to another fossil or to a currently living organism. All you can say for sure is that younger fossils (and modern organisms) had ancestors that lived at the same time as the individual fossil in question. An interesting question is: if evolution did not occur (or if it is limited to microevolution within "types"), why are there *any* transitional fossils at all? (Frymire, 2000, p. 17).

In response to Frymire, some researchers are convinced that *no* confirmed macroevolution transitional forms exist. The few putative transitional forms that are claimed are all highly debated, even among Darwinists. Given that over 1,000,000 animal species are now known to exist, and many more may have existed in the past (although Darwinists surmise that hundreds of millions of animal species have existed in the past, most all which are extinct, *evidence* exists for only about 150,000 extinct animals), many animals once existed that can be construed as "transitional," especially when all we have to study is their fossilized bone fragments (Carroll, 1997). As Frymire (2000) notes, all we can know for sure from fossils is that the animal is probably extinct. We try to estimate when the animal lived, and then if it has traits that appear to be intermediate between an assumed more primitive animal (no easy task, considering that we usually have only bone fragments to judge from), we assume it is "transitional."

The major source of the genetic variety for microevolution is the shuffling of existing gene pools, such as by sexual reproduction and genetic crossing over. This variety is exploited by artificial selection and, in the wild, by natural selection. In contrast, macroevolution includes evolution of molecules into single-cell life forms, and ultimately these single-cells into humans. Thus, macroevolution ultimately involves the formation of *increased* genetic information by mutations (discussed below), along with Darwinian natural selection of that new information which confers a survival advantage. New genes are thought to be created by mutations that cause a modification of existing genes, copying errors, and damage to the genome.

In addition, microevolution involves horizontal changes (variations that do not produce increased complexity, such as is required for atoms-to-human evolution, but rather changes such as color or size variations). In contrast, macroevolution involves vertical change (variations that produce increased levels of complexity, such as the evolution of new body organs). Table II summarizes some of the differences between microevolution and macroevolution according to Carroll (1997).

The Literature on the Micro/ Macroevolution Dichotomy

In his seminal work on evolution, Kerkut (1965) categorized Darwinian ideas into two general theories, the "Special Theory of Evolution" and the "General Theory of Evolution." Kerkut defined the "Special Theory of Evolution" as biological morphology changes resulting from genetic

Microevolution	Macroevolution
Based on observations of modern populations and species.	Based on evolutionary interpretations of the fossil record.
Most populations within species diverge progressively over time.	Major lineages appear suddenly in the fossil record and then persist for long periods of time
Evolutionary rates are relatively similar from lineage to lineage, and over time within a single lineage.	Evolutionary change appears to be very rapid during the origin of major groups and much slower within groups.
The entire range of possible morphologies is represented by some populations within the history of a species.	Significant gaps separate structural and adaptive patterns that are characteristic of major groups.

(Adapted from Carroll, 1997, p. 8.)

Table II. Carroll's Comparisons of Micro- and Macroevolution

alterations, such as size and shape changes in finch beaks. These changes are testable because they typically can be observed in the laboratory or in nature.

Kerkut used the term "General Theory" to describe most aspects of macroevolution, which he defined as the theory that all living forms have evolved from a single source (i.e., the common descent of all life). Kerkut regards the "Special Theory" as proven but the "General Theory" as only "a working hypothesis" because the "evidence that supports it is not sufficiently strong to allow us to consider it as anything more ..." than this (p. 157).

Anderson (2001) argues that Kerkut's terminology achieves a precision that is lacking in the terms "micro" and "macro." Many Darwinists (such as Ernst Mayr) regard Kerkut's terminology as an excellent summary of Darwin's ideas (Anderson, 2001). Mayr even argues that the use of these terms is the best way to understand Darwin's writings. Darwin's *Origin of Species* consists largely of a detailed analysis of observable biological changes in nature (microevolution), along with his explanation of how he believed these changes could lead to even greater changes (but not directly observed), such as fish developing lungs, legs, and evolving into higher animals, eventually becoming humans. According to Mayr (1991), Darwin observed a number of biological changes or adaptations, and then tried to comprehend how these changes helped us to understand all biological diversity.

Michael Denton also used the "special theory" and "general theory" dichotomy. In a study of Denton's work, Woodward (2003) found that Denton first

> establishes a *split between Darwin's two theories*. On the one hand is the "special theory" of speciation, called "microevolution," which is the generation of slightly different sister species. On the other hand is the "general theory" of the evolution of all life forms from common ancestors, called "macroevolution." After splitting "micro" from "macro," Denton shows how Darwin himself distinguished the two in the *Origin* (p. 49).

Mayr concluded that Darwin made field observations of changes that were accounted for by "The Special Theory," and then extrapolated those conclusions to his "General Theory." In essence, Darwin concluded that if enough small changes could accumulate for a long enough period of time, they eventually would provide the level of biological change required to produce humans from inorganic molecules. Thus, the presumed relationship of the "General" and "Special Theory" is essentially the same as that of micro- and macroevolution. However, the terms "General Theory" and "Special Theory" are not in wide use today (although some feel that they should be), and therefore are not used here.

Can the Processes Associated with Microevolution Account for Macroevolution?

Darwin (and most subsequent Darwinists) assumed (assume) that the changes predicted by the "Special Theory of Evolution" are sufficient to produce new genetic information (and consequently a new species). Any factor that can produce a new species is assumed to ultimately give rise to a new genus, and eventually to a new family, a new order, etc. Some evolutionists even object to the terms "microevolution" and "macroevolution," suggesting that these terms serve only as a means that Darwin's critics use to confuse the issue. Some Darwinists also acknowledge that many people who reject macroevolution accept evolution as "adaptation within a species" but "argue that such small changes cannot explain the evolution of new groups of plants and animals" (Coyne, 2001, p. 588). Coyne argues that proof of microevolution proves macroevolution using the following reasoning:

> When, after a Christmas visit, we watch grandma leave on the train to Miami, we assume that the rest of her journey will be an extrapolation of that first quarter-mile. A creationist unwilling to extrapolate from micro- to macroevolution is as irrational as an observer who assumes that, after grandma's train disappears around the bend, it is seized by divine forces and instantly transported to Florida (Coyne, 2001, p. 588).

Among the various problems with this reasoning are: 1) We know that both grandma and the train remained unchanged during the entire trip, therefore her course is easy to follow and no speculation is necessary about where her journey took her, or how and when she was able to arrive safely. All of this can be empirically monitored. 2) Since train travel is routinely observed, it fits within observed facts (i.e., "The Special Theory"). But, by evolutionists' own acknowledgment, "macroevolution" is not readily observed in real time. Hence, it does not fit within commonly observed experience. Therefore, Coyne had proposed a false analogy. 3) Since macroevolutionary transformation of a train passenger has never been observed, we would not expect grandma to arrive at her destination in a Greyhound bus, or for her to be transformed into an Airedale or parakeet during the journey. Hence, we do not need to observe her for the entire journey to know in what form of transportation she will arrive or what she would look like when she arrives.

The Attempt to Prove Macroevolution Via Evidence for Microevolution

Darwinists have long argued that since microevolution is true, common descent must also be true. But years of research have consistently contradicted this assumption: variation produced by breeding is typically rapid initially, but then levels off until it reaches a ceiling that breeders cannot cross (Lester and Bohlin, 1984). For example, plant breeders have been working to increase the sugar content of the sugar beet since about 1800. In the first 75 years they improved it from 6 to 17 percent. However, they have been unable to increase the content very much since that time. Breeding horses for speed indicates that definite practical limits are achievable from breeding, and to go beyond these limits requires other means (such as genetic reengineering of major structures). Certain horse families tend to give rise to faster horses, but chance is critical. As one breeder expressed this problem, Secretariat's foals were mostly not Secretariats (Budiansky, 1997; Crowell, 1973).

Unfortunately, breeding usually produces extremes of one trait (seedless fruit, faster horses, bigger flowers, meatier cows) at the expense of other traits. Thoroughbreds are typically less healthy, a fact well known among dog owners. Also, breeding often develops one trait, but not the supportive traits. The fastest horses possess the muscles needed to run fast, but lack the total compliment accessory structures and, as a result, if pushed to their limits, commonly have joint, bone, and other major health problems. They can run faster than their body can cope, and all mechanical parts have certain limits. Breeding only shuffles existing information, it does not create new information. Physical characteristics are obtained by removing specific pools of genetic information, which allows a greater concentration of the information that contributes to the desired characteristic. Miniature horses are obtained by a breeding program that reduces the genetic information necessary for taller horses. Unfortunately, removal of certain genetic tracts also allows negative traits to accumulate (often because breeders inbreed heavily to maximize a desired trait). Darwin either was not fully aware of this critical problem or largely ignored it.

Actually Darwin based the vast majority of his arguments on extrapolating microevolution to macroevolution. The lethal problem with this logic comes from the fact that increased:

> knowledge of the fossil record over the past hundred years emphasizes how wrong Darwin was in extrapolating the pattern of long-term evolution from that observed within populations and species. If the patterns of evolution over time scales of millions and hundreds of millions of years are so different from those that Darwin postulated for modern populations and species, can the process of natural selection that he established on the basis of living species adequately explain long-term evolutionary phenomena? .... Biologists have long struggled with the conceptual gap between the small-scale modifications that can be seen over the short time scale of human study and major changes in structure and ways of life over millions and tens of millions of years. Paleontologists in particular have found it difficult to accept that the slow, continuous, and progressive changes postulated by Darwin can adequately explain the major reorganizations that have occurred between dominant groups of plants and animals (Carroll, 1997, pp. 8–9).

Darwinists have long tried to grapple with the question:

> Can changes in individual characters, such as the relative frequency of genes for light and dark wing color in moths adapting to industrial pollution, simply be multiplied over time to account for the origin of moths and butterflies within insects, the origin of insects from primitive arthropods, or the origin of arthropods from among primitive multicellular organisms? How can we explain the gradual evolution of entirely new structures, like the wings of bats, birds, and butterflies, when the function of a partially evolved wing is almost impossible to conceive? (Carroll, 1997, p. 8–9).

Carroll concludes that the "extremely irregular occupation of adaptive space" found in nature is "opposed to the nearly continuous spectrum of evolutionary change postulated by Darwin." In short, he argues:

> Although an almost incomprehensible number of species inhabit Earth today, they do not form a continuous spectrum of barely distinguishable intermediates. Instead, nearly all species can be recognized as belonging to a relatively limited number of clearly distinct major groups, with very few illustrating intermediate structures or ways of life. All of us can immediately recognize animals as being birds, turtles, insects, or jellyfish, and plants as conifers, ferns, or orchids. Even with millions of living species, there are only a very few that do not fit into readily recognizable taxonomic categories. Of all living mammals, only the tree shrews are difficult to classify. Are they primitive relatives of primates (our own distant relatives) or closer to the true shrews and moles among the insectivores? Even among the hundreds of thousands of recognized insect species, nearly all can be placed in one or another of the approximately thirty well-characterized orders (Carroll, 1997, p. 9).

Carroll (1997) then adds that evolution would lead us to expect "a very different pattern among extinct plants and animals" than what is found in the fossil record; namely, the fossil record "would be expected to show a continuous progression of slightly different forms linking all species and all major groups with one another in a nearly unbroken spectrum" (p. 9). In contrast, he notes what is found is "most well-preserved fossils are as readily classified in a relatively small number of major groups as are living species. Nearly all mammals that lived in North America and Europe during the past 50 million years can be classified among the seventeen living orders" (p. 9).

A major point to be considered is that creationists:

> who acknowledge the existence of *micro*evolution agree with proponents of *macro*evolution that natural selection does cause "evolutionary change." Indeed, much of the discussion of macroevolution in modern writings relates to *micro*evolution, which is discussed accurately from a scientific standpoint, but then is used as evidence for the "great leap" of extrapolation to *macro*evolution. The most extensive "leap" appears when evolution is elevated to *worldview status* as *evolutionism*. Evolutionism combines organic evolution, biological evolution, and societal evolution into one atheistic, naturalistic framework (Silvius, 1994, p. 341).

In a review of *Defending Evolution* (Alters and Alters, 2001), a book highly recommended "by such eminent evolutionists as Ernst Mayr and Stephen J. Gould ... [and] Eugenie C. Scott," Morris (2001) concludes that their defense of Darwinism fails because

> ...it focuses almost exclusively on defending microevolution (what creationists call adaptive variation), whereas it is only macroevolution that creationists reject in the first place. Essentially only three pages of the book (pp. 117–119) are devoted to defending macroevolution, and the concluding sentence of *this* section simply complains that it is "unreasonable" to expect observational evidence of macroevolution, since this does not follow the "normal procedures used in historical science research." That is true of course, but then why call it *science*? (p. 1).

A review of *most* books defending Darwinism reveals that they focus on, or even discuss solely, microevolution (for example see Weiner, 1994; Carroll, 1997). These books then imply (or even state) that because microevolution has been proven, macroevolution also has been proven. In the words of Niles Eldrege "microevolution proves macroevolution" (quoted in Witham, 2002, p. 97). This "bait and switch" approach, although a useful debating tactic, does not bridge the gap between the two different events. For this and other reasons, some feel that the terms micro- and macroevolution should be avoided, and that the expression "variations within the created kinds" is preferred instead of the term microevolution, while for macroevolution, the term "Darwinism" or "Neo-Darwinism" should be used.

Unfortunately, the terms micro- and macroevolution are widely used both by creationists and Darwinists, and therefore their replacement by any other terms will be very difficult. Another problem is that the term "evolution" usually is used by both Darwinists and creationists in both the professional and popular literature to mean macroevolution (such as in the phrase, "I don't believe in evolution"). Nonetheless, regardless of which terms we use, it is critical that we define our terms carefully in order to effectively communicate.

Summary

A review of the literature indicates that macroevolution is not simply microevolution extended. This study also indicates that explanations and evidence for microevolution cannot be used to support macroevolution. Microevolution and macroevolution can be differentiated by at least 17 different criteria, and probably more if an exhaustive review of the evidence were preformed (see Table I). These 17 criteria demonstrate that a major contrast exists between macroevolution and microevolution that cannot be bridged by time (Spetner, 1997). The definition preferred by the author is macroevolution involves *increasing* genetic information and, in contrast, microevolution involves duplication of and/or genetic recombination, transposition, or other rearrangements of *existing* information. Because microevolution also involves loss of information as a result of species or subspecies extinction, a dichotomy results. The fundamental differentiating trait of microevolution is the *loss* of information (which is well documented) and of macroevolution is a *gain* of information (for which no direct empirical evidence exists).

The conclusions here also agree with the basic conclusions presented at an important University of Chicago conference on macroevolution and microevolution involving the world's leading evolutionary biologists. A report on the conference concluded, in answer to the question can the "mechanisms underlying microevolution can be extrapolated to explain the phenomena of macroevolution," that "at the risk of doing violence to the positions of some of the people at the meeting, the answer can be given as a clear, No" (Lewin, 1980, p. 883). Macroevolution and microevolution involve two different processes, divided to the degree that the participants at the conference actually debated what would happen if "macroevolution is totally decoupled from microevolution" (Lewin, 1980, p. 883). Many conference presenters argued that evolutionary change is not continuous but "jerky." Francisco Ayala even concluded that he is “now convinced ... that small changes do not accumulate” to produce macroevolution (Lewin, 1980, p. 884).

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Book Review

Prey by Michael Crichton
Avon Books, New York 2002, 502 pages, $8

Author Crichton also wrote *Andromeda Strain* (1969), *Jurassic Park* (1991), and *Lost World* (1996). This latest bestseller and techno-thriller concerns nanotechnology, the nanometer scale of molecular motors, digital electronic components, and microrobotics. The latter topic is explained dramatically in *Prey*. The U.S. military contracts with a private firm to produce simple dust-size robots. Swarms of these floating specks are able to transmit composite pictures on the battlefield, similar to the compound eye of insects. The novel’s tension begins quickly when the nanorobots escape the lab, become self-sustaining and self-reproducing, then commence to attack and choke people to death.

The book gives extreme, continuous credit to evolution theory. The nanoparticles gain in intelligence by mutations, becoming more deadly hour by hour. They display predation, stalking, symbiosis, and altruism. Crichton compares his robotic swarm behavior with bird flocking and termite mound-building. Along with evolutionary propaganda, Crichton portrays corporations as evil, money-grabbing outfits which may well destroy us. This same theme appeared in *Jurassic Park*. The book ends with the total destruction of the Nevada lab which first produced the runaway nanorobots. This book is good recreational reading. However its excessive evolutionary overtones provide further life-support for a failed theory.

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