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Lack of Fossil Evidence for Arthropod Evolution Is a Major Difficulty for Neo-Darwinism

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Abstract

The fossil record of the phylum Arthropoda is a major problem for neo-Darwinian evolutionism. No clear fossil evidence for arthropod evolution has ever been uncovered, even though millions of arthropod fossils have been found. The record as a whole clearly shows stasis or persistence of types, not progressive evolution from one order to another. A large proportion of all living and extinct animal species are members of the phylum Arthropoda, and the critical lack of fossil evidence for macroevolution of the entire phylum of Arthropoda favors creation.

Introduction

Arthropoda is the largest and most diverse phylum in the entire animal kingdom, comprising over one million different species (Giribet and Ribera, 2000). About 78% of all described extant animal species are arthropods (Wills, 2001), found in fresh water, marine, and terrestrial habitats worldwide (Wills et al., 1997). Arthropoda is not only the largest phylum in the animal kingdom, but it is also the only invertebrate phylum that contains aquatic, terrestrial, and aerial members. It includes the trilobites, crustaceans, arachnids, myriapods, horseshoe crabs (not covered in this article—see Helder, 1997), and hexapods (insects and three small orders of insect-like animals also not covered in this article—see Bergman, 2004, and Manning, 2003). They are so diverse that some entomologists have questioned whether or not they could have descended from a common ancestor, as is commonly taught (Manton, 1973). Lammerts (1974) concluded from his study of entomology that it

> was a source of constant wonder to me how such a remarkable array of creatures as are found in the order Coleoptera could ever be considered as having arisen from a common ancestor. One of my professors, Dr. E.C. VanDyke, a world authority on this group, often was equally puzzled. (p. 125.)

Arthropods are defined as "bilaterally symmetrical segmented animals with a characteristic tough chitinous protective exoskeleton flexible only at the joints; growth is by ecdysis" (Tootill, 1988). Ecdysis growth (often called *molting*) involves periodic shedding of the cuticle exoskeleton and growth of a new and larger exoskeleton. Each segment typically contains a pair of jointed appendages, modified so as to serve different functions. The coelom of an arthropod is a long fluid-filled cavity located between the gut wall and the body wall. The coelom in non-insect arthropods functions as a hydrostatic skeleton, and is reduced in size compared to the coelom of insects. The main arthropod body cavity is a blood-filled coelom, a structure known as the haemocoel. They also have a ventral nerve cord, a pair of cerebral ganglia, and paired segmental ganglia (Tootill, 1988). Arthropods are also the "only invertebrates that show a definite, individualized form of adipose tissue" (Kaufmann, 1977, p. 214).

The Arthropod Fossil Record in General

Darwin saw the fossil record as a major problem with his theory and expected that time would fill the now-famous

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"missing links." Most of the fossil evidence used in an attempt to support neo-Darwinism consists of vertebrate bone fragments that require much interpretation and this has led to much controversy among vertebrate paleontologists. Of the estimated 1.7 million known species of animals, fully 95% are invertebrates, and most of these are arthropods (Barnes, 1987). An enormous fossil record exists for many invertebrates, including arthropods—easily in the millions. Many of these arthropod fossils show excellent external morphology (Eldredge, 2000). Furthermore, "some of the earliest, most conspicuous and informative metazoan fossils are ... arthropods" (Wills, 2001, p. 187), which are found in greater profusion in the rocks labeled *Paleozoic*, *Mesozoic*, and *Cenozoic* than any other group of organisms. Even plant arthropod interactions have been documented as far back as the postulated Paleozoic Era (Chaloner et al., 1991).

While major problems exist with the vast time periods ascribed to these supposed geologic ages, they will be used throughout this paper as a frame of reference. Arthropod larvae that are less than one millimeter long have been found in late Cambrian rocks (Anderson, 1998, p. 434). A rich arthropod fossil record has been found in such excellent preservatives as amber, tar, or ice that often shows exquisite detail of even minute body structures such as eyes and hair (Gayrard-Valy, 1994; Alonso et al., 2000). Another reason for the rich fossil record is that certain arthropods, including trilobites, malacostrancans, and ostracods, have skeletons reinforced with calcium carbonate (Wills, 2001).

The fossil record of terrestrial arthropods goes back to before the Early Devonian in the evolutionary time scheme (Edgecombe, 1998a, p. 174). This excellent fossil record allows accurate comparisons of ancient and modern arthropod forms that can be used to evaluate Darwinism. For an example see Delclos et al, 2000. Budd (1997) concluded that "what these fossils mean, however, both in terms of arthropod classification and the early evolution of the phylum is far from clear: no single opinion has won universal assent" because the fossil record shows no clear evidence of macroevolution (p. 125).

Trackways left by trace-forming animals and arthropod borings are also common and important in the fossil record, especially for non-marine arthropods (Donovan, 1994, p. 200). Furthermore, ancient or fossil spider webs as well as wasp, bee, and ant nests all have been discovered.

A major problem in determining evolutionary relationships of the phylum Arthropoda is the lack of a consensus on what exactly defines a phylum or other taxonomic rank (Meglitsch and Schram, 1991). An even greater problem is determining if those creatures now classified as arthropods actually belong to the single phylum Arthropoda (Anderson, 1998). Disagreements exist about even such basic information as the adequacy of the fossil record to determine phylogeny. For example:

> The fossil record of the Crustacea is often stated in textbooks to be poor, but the truth is that the record is good. All four classes of crustaceans have fossils.... The record is so extensive, in fact, that limitations of space do not allow much discussion. (Meglitsch and Schram, 1991, p. 490.)

Although an "abundance" of fascinating fossil arthropods is known (Meglitsch and Schram, 1991, p. 368), the record provides little evidence for either their origin or development by macroevolution. As a result a "mind-boggling array of hypotheses and scenarios" exists for

> "arthropod evolution. Every authority seems to have his own version. There is not even agreement as to whether there is one phylum, Arthropoda" (Meglitsch and Schram, 1991, p. 369).

A significant problem for Darwinism is the fact that some of the oldest forms of animal life that are found in the fossil record are also some of the most complex (Eldredge, 2000, p. 42). Little disagreement exists about the facts concerning fossil arthropods, but there is considerable disagreement about the implications of those facts (Morris, 2000: Hallam, 1977).

Aguinaldo et al., (1997) concluded that the

> arthropods constitute the most diverse animal group, but, despite their rich fossil record and a century of study, their phylogenetic relationships remain unclear. Taxa previously proposed to be sister groups to the arthropods include Annelida, Onychophora, Tardigrada and others, but hypotheses of phylogenetic relationships have been conflicting. (p. 489.)

So many fossils have been found that some paleontologists believe the "early terrestrial ecosystems were dominated by small arthropods" (Shear et al., 1996, p. 555). In spite of the "excellent preservation, there are many conspicuous gaps in the arthropod record" and, as a result, "enormous controversy has surrounded the relationships of the major groups" (Wills, 2001, pp. 188, 190). For several suggested phylogenetic relationships among arthropods, see Valentine (1989) and Edgecombe (1998a).

The Trilobita

The trilobites are extremely abundant in strata assigned to both the Cambrian and Silurian (see Figures 1 and 3 for examples). About 65 different genera and over 100 species have been named so far (Margulis and Sagan, 2002, see p. 180). Trilobites have a flat, oval body divided longitudinally into three lobes—hence their name. In common with other arthropods, they have a head, a thorax, and an abdomen. Like dogs, they display a great deal of variety, yet the trilobites all possess three lobes and a chitinous

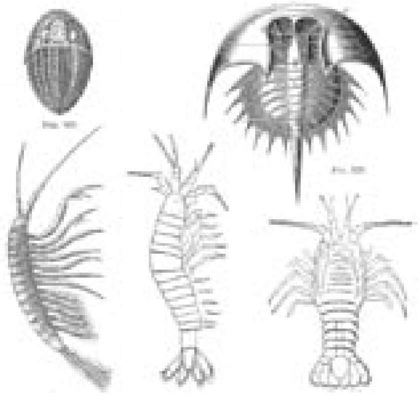

Figure 1. Examples of trilobites illustrating the enormous variety found. (From Le Conte, 1908, pp. 311 & 334.)

exoskeleton (Sherwin and Armitage, 2003). Trilobites are easy to identify because many of their traits, such as their overall plan of limb organization, are unique to Trilobita when compared to other arthropod groups (Eldredge, 1977, see p. 327).

Trilobites have been preserved extremely well (see Figure 2), partly because their hard calcium-carbonate carapace (body covering) is highly resistant to deterioration (Margulis and Sagan, 2002). For this reason, their fossil record is one of the best of any plant or animal. They can be found in "trilobite beds" located many places (Meister, 1968). For this reason they are by far one of the most carefully studied of all the invertebrate groups (Clarkson, 1986). Trilobites are "commonly preserved as chitinous plates" or as molds and, in some cases, their "actual integument is so well preserved that the markings on the surface can still be seen" (Twenhofel and Shrock, 1935, p. 433).

Their eyes, especially, have been studied extensively, as have their numerous paired appendages. Fortunately, trilobites have been preserved in the fossil record in enormous detail (see Levi-Setti, 1993, see pp. 45–54 for SEM photographs that show this detail). Trilobites' eyes consisted of huge, complex, compound-faceted structures that sometimes formed a continuous band across their whole frontal margin (Prokop, 1995). The trilobite eyes resemble eyes of modern insects, and were probably at least as complex. Design features such as these strongly support the handiwork of an intelligent Creator (Sherwin and Armitage, 2003; DeYoung, 2002).

Trilobites are important both to the neo-Darwinian and Creation position (Cook, 1968). Eldredge (2000) claims that the Trilobita "are as compelling examples of evolution as any of which I am aware," yet they show only microevolution (p. 122). Millions have been found in excellent condition, which allow an accurate reconstruction of their history but shows no support for macroevolution. Instead, the fossil record shows a "relatively sudden, abrupt appearance

Figure 2. A photograph of a section of how trilobites are found, indicating mass burial. Photograph courtesy of the Big Valley Creation Science Museum, Alberta, Canada.

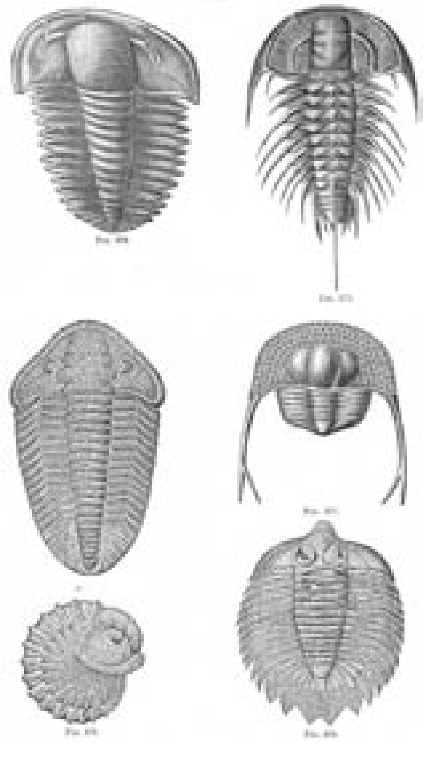

Figure 3. Some examples of Carboniferous Crustaceans illustrating the enormous variety found. (From Le Conte, 1908, p. 411.)

of trilobites and other complex forms of animal life at the base of the Cambrian" (Eldredge, 1977, p. 44). As Clarkson (1986) noted, "almost nothing is known about the ancestors of the trilobites. In common with other arthropods it may be presumed that trilobites were possibly derived from the same ancestors as the annelids ... but this is only speculation" (p. 330). Many researchers argue that trilobites are most closely related to crustaceans. Most trilobite types existed contemporaneously with each other, which precludes hypothesizing any clear evolutionary trends within existing fossils.

Extensive study of their fossils has demonstrated that trilobite "species and subspecies tend to remain relatively unchanged ... throughout their stratigraphic ranges" and that there are "fewer long-term 'evolutionary trends' within lineages 'documented' for trilobites than for many other groups" (Eldredge, 1977, pp. 309, 316). Some devolution, though, such as loss of eyes, is seen in the fossil record (Whittington, 1992).

The fossil record does not provide evidence of relatively rapid evolution followed by stasis and then more evolution. Instead, it shows "the *abrupt appearance* of different kinds of trilobites in the Lower Cambrian, and the replacement of these early groups by new ones during the transition from Cambrian to Ordovician" (Whittington, 1992, p. 84, emphasis added). Furthermore, "no evidence, such as a transition series of fossils," has been found to bridge the gulfs separating the various species of trilobites from each other (Whittington, 1992, p. 85, and also see chart, p. 86). Lack of intermediate forms is consistent with a creation origins model.

Wholesale speculation about trilobite evolution by paleontologists is the norm, causing Whittington to state that there "is no lack of either interpretation or speculation" (1992, p. 85). Eldredge (2000) tried to account for the lack of fossil evidence for trilobite evolution by resorting to the punctuated equilibrium model—the theory that evolution proceeded for relatively short periods of time followed by long periods of stasis (see p. 44). Eldredge and Gould actually developed their punctuated equilibrium theory specifically to explain the lack of fossil record for trilobite evolution (Eldredge, 1977, 2000; Gould, 1977).

Large numbers of trilobites died off at the end of the Cambrian for unknown reasons, and the fossil record indicates that a burst of new kinds appeared in rock formations assigned to the next period, the Ordovician. But "after this great burst of new constructional themes in the early Ordovician very few entirely new patterns of organization arose ... trilobites as a whole remained constructed on the same archetypal plan defined in the earliest Cambrian" (Clarkson, 1986, p. 331). All trilobites became extinct, as evidently did many other animals, in what evolutionists call the great Permian extinction.

The Crustaceans

The subphyla Crustacea contains over 35,000 species located worldwide, primarily in freshwater and marine habitats. For some examples see Figure 3. Crustaceans have the highest diversity of body plans of all arthropoda, and include shrimp, crabs, lobsters, barnacles, wood lice, water fleas such as Daphnia, and copepods (Giribet and Ribera, 2000, p. 220). They have five pairs of locomotion appendages, the first two of which may be pincers for defense or manipulation of food. They also have complex, well-developed eyes (Hamilton, 1986). The oldest crustacean fossils date all the way back to the early Cambrian times. Anderson notes that, although the

> fossil record is quite abundant for many crustacean groups, it provides no clear evidence on the origin of the Crustacea, and there has been considerable debate regarding the primitive or ancestral body form of the first crustaceans. Current opinion favours a long body with many similar trunk segments, two pairs of biramous [arthropod appendages that have two branches] antennae and a nauplius [a larva stage characterized by three appendages] larva, but is divided on whether the trunk bore biramous or polyramous [arthropod appendages that have more than two branches] swimming appendages (1998, p. 316, brackets added).

Other researchers disagree and argue that the Crustacea evolved from a type of spiralian or proto-platyhelminthes worm (Willmer, 1990, see pp. 298–299). The phylogenetic relationship of the crustaceans is complicated, and little consensus exists (Giribet and Ribera, 2000, see p. 220).

Arachnida (Chelicerates)

Arachnids (spiders, scorpions, solifuges, mites, and ticks) have four pairs of walking appendages. Spiders are an arachnid group that ranks seventh in number among all animal species so far described and estimated. Between 30,000 and 40,000 species of spiders are found worldwide, from Arctic regions to deserts (Williams and Goette, 1997, see pp. 3–4). One of the most infamous spiders is the tarantula, a large "hairy" spider, famous in horror films but actually it is a shy creature whose bites are relatively harmless (Williams and Goette, 1997). Of the tarantula, Foelix, (1982, see pp. 45–46) writes that its bite is hardly worse than a wasp sting.

The "earliest" known spiders had a "nearly complete spinneret whose structure is quite advanced" (Preston-Mafham, 1991, see p. 13). The tough exoskeleton of many Arachnids aids in both preservation and identification. Many spiders have been extremely well preserved in the fossil record (in amber and elsewhere), and are readily identifiable. Amber has preserved even those arthropods that lack tough exoskeletons. Fossil spiders have been identified from close to 60 different families in one amber type alone, dating back to the Tertiary, and some date as far back as the Upper Cretaceous or earlier (Penney, 2001, 2002; Schawaller, 1983; Poinar, 2000).

Over 200 spider species have been identified in Miocene amber from the Dominican Republic alone (Penney, 2001). Many of the fossils in amber that "date from as long as 55 million years ago belong to genera which are still in existence today" (Preston-Mafham, 1996, p. 9). Those arachnida in amber appear very modern in all respects, and even include fully developed web threads (Poinar and Poinar, 1999). Fully modern-looking scorpions also have been found in amber (Poinar and Poinar, 1999, see pp. 76–78). Leeming concluded that scorpions have existed relatively unchanged since they first appeared in the fossil record—an estimated 450 million years ago (2004).

Recent fossil discoveries date modern forms of arachnids back to about 414 million years, "forcing scientists to revise their thoughts about ... one of the most important steps in evolutionary history" (Monastersky, 2003, p. 292). The existing examples preserved in amber support the conclusion that no evidence for macroevolution exists (Shultz, 1994). A common view is that arachnids evolved from some king crab type of animal. As Preston-Mafham admits, however, "we can only guess at what the ancestors of spiders and scorpions might have looked like [although] we as of yet have no definite proof, it is believed that all of the arachnids arose from a common ancestor" (Preston-Mafham, 1991, pp. 12, 15). An absence of ancestral links also applies to scorpions and other arachnids (Poinar et al., 1998; Fortey and Thomas, 1997).

The evolution of arachnid accessory organs also must be accounted for by neo-Darwinism. For example, the evolution of the spider silk glands and spinnerets necessary for making webs are explained by assuming that 180 million years ago spider silk was simply "excretory material deposited behind as the spider ran about it" (Kaston, 1966, p. 27). From this stage the silk evolved into a dragline, next into a trip wire, and finally it formed a spider web. Problems with this idea include explaining how the spider survived until the spinneret was fully evolved, and the fact that the spinneret silk producing organ is irreducibly complex and separate from the anus.

Another theory of spider-web evolution is that ancestral spiders used alpha keratin (a component of spider threads) to cover their eggs (Vollrath, 1992). Once the silk glands evolved, the brain program to produce a web must have also evolved—the silk is useless to capture food until the spider has the mental ability to make a web (Williams, 1992, see p. 88–89). Furthermore, "'primitive' webs are not necessarily structurally simpler or less complex than 'advanced' webs" (Williams, 1988, p. 123).

Spider silk is produced in silk glands that open from spigots located on the spinnerets (Donovan, 1994). Many varieties of silk exist—the female garden-cross spider alone can produce at least seven different kinds of silk (Vollrath, 1992). The silk is proteinaceous and can be preserved well in the fossil record—threads of spider silk date back to mid-Tertiary, and one spider web dates from the Eocene (Codington, 1992). The fossil record traces spinnerets all the way back to the Devonian and Carboniferous (Donovan, 1994). The evidence indicates the earliest known silk and spinnerets were fully modern, and no evidence exists of spinneret evolution—the theory that they evolved from a pair of legs finds no evidence in the fossil record (Vollrath, 1992, see p. 72).

Myriapoda

The subphyla Myriapoda includes centipedes and millipedes. Evidence of myriapods exists all the way back to the Cambrian (Budd, 2001; Kraus and Kraus, 1994). These animals have many pairs of walking legs, with either one or two pairs per body segment (Williams et al., 1991). Millipedes are preserved in amber, and even in rock, as a result of such events as calcite coating, lining, and the impregnation of their chitinous exoskeleton. Even "delicate structures such as limbs, antennae, gonopods, and eyes" all have been beautifully preserved (Donovan and Veltkamp, 1994, p. 355). Excellently preserved Lower Devonian fossils that reveal fine detail of the exoskeleton have been found in regions isolated from the major landmasses, such as Australia (Edgecombe, 1998a, see pp. 172–174). These fossils reveal only evidence of variation within the spider baramin, not evolution; many are identical to Myriapoda existing today. For this reason, the Myriapoda is one of the most problematic groups in which to use morphology as a basis for producing phylogenetic trees (Giribet and Ribera, 2000).

Genetic Comparisons

Problems in using the fossil record to trace the origin of arthropods are so serious that some researchers have tried to ignore the fossils entirely and have chosen to produce evolutionary trees by using other means, such as DNA sequence data. Because these DNA data often are contradictory, others, such as Meglitsch and Schram (1991) ignored both biochemical and DNA data in developing their evolutionary trees. They relied only on the morphology of living animals. It is difficult at this early stage to draw anything but tentative conclusions about the usefulness of genetic comparisons in constructing phylogenies, because only a small percentage of arthropods have been examined. Also, we now realize that we do not know as much as we thought we did a few years ago about how nucleic acids affect final phenotypes.

Existing biochemical comparisons have not been very encouraging for neo-Darwinists. For example, Burmester (2002) noted that hemocyanin evolution is strikingly different in each of three arthropoda groups: the Chelicerata, the Myriapoda and the Crustacea. One solution is to place the origin of phyla earlier and hypothesize periods of "speeded-up" molecular evolution (Vermeij, 1996, p. 525). But this solution creates other discrepancies and problems with the fossil record (Schram, and Koenemann, 2001).

The rRNA is believed to be the most useful nucleotide for studying Metazoan evolution (Valentine et al., 1996). In a study of ribosomal DNA sequences, Giribet and Ribera (2000) found a high level of sequence heterogeneity in the 18s rRNA gene, making it so difficult to do phylogenetic comparisons that some workers feel this is approach of little or no value. Differences between the data from molecular biology, paleontology, and neontology [the retention of juvenile features in the adult stage of development] have produced what Giribet and Ribera (2000) describe as furious debates (see p. 204). They actually conclude that ribosomal DNA sequence data by themselves "may not contain enough information to give a satisfactory explanation for the large and complicated evolutionary history of arthropods" (p. 225).

Discussion

The whole arthropod fossil record shows what Eldredge found was true of trilobites: that "stability was the norm," although "small" changes (microevolution) occasionally do appear (Eldredge, 2000, p. 84). Eldredge also stated that a century of the study of fossils by paleontologists has consistently found "the persistence of stable species for millions of years" (Eldredge, 2000, p. 85). After noting that "paleontology has to date contributed almost nothing to evolutionary theory," Eldredge (1977, p. 306) proposed several reasons why this is true and the main reason was "[evolution] typically happens so quickly that rarely do we catch it in midstream when we scour the fossil record for insights on how evolution occurs" (2000, p. 85). This conclusion is based only upon speculation and is why Gould (1977) concluded that "the basic questions paleontologists have asked about the history of life" have "found no resolution within the Darwinian paradigm" (p. 1).

The practice of overcoming fossil-record problems by using other criteria produces cladograms based solely on comparisons of morphological traits. It totally ignores both biochemical data and the fossil record, neither of which provide evidence for neo-Darwinism. As Willmer (1990, p. 75) concluded, despite our best efforts we have "not achieved very much understanding" of invertebrate evolution from our study of the fossil record. New conclusions overturning existing firmly established ideas are common in the field (Cowen, 2003; Doyle, 1996).

Even modern symbiotic relationships have been shown to exist in the fossil record of some arthropods. Phoresy is a symbiotic relationship, especially among arthropods and some fishes, in which one organism transports another organism of a different species. Poinar et al. (1998) found that between pseudoscorpions and a many arthropods phoresy is of long standing and is obligatory in many cases as "demonstrated by its continuance for millions of years, as shown by the fossil record" (p. 78).

Conclusions

If evolution had occurred, clear evidence would be abundant to support it in the enormously large arthropod fossil record. This review has confirmed invertebrate zoologist Robert Barnes's (1980) observation that "the fossil record tells us almost nothing about the evolutionary origin of phyla and classes. Intermediate forms are non-existant" (p. 365). Barnes (1980) also noted that the only exception to this generalization was an animal "which may be on the line leading to the cephalopods" (p. 365). He added, optimistically, that the needed intermediate forms exist, but are now undiscovered or not recognized and more work will reveal them (Barnes, 1980).

Over two decades later Barnes's conclusion is still true: the needed forms have not been found. What the fossil record shows is that the number of marine invertebrate species has been fairly constant for most of the last 600 million years of evolutionary "time" (Raup, 1976, 1991; Raup and Boyajian, 1988). One problem is that the proposed lineages were based on charts produced from assumptions based on evolutionary theory, and the charts were then in turn used as evidence of the theory used to produce them, which is circular reasoning (Easton, 1960, see p. 34).

Although the fossil record "should be the final arbiter in deciding between opposing theories on major issues of phylogeny" (Willmer, 1990, p. 52), the fossil record is ignored, and whatever method seems to work is selected to support the theory of common descent. Thomas (2003) admitted that arthropods rule the world, at least among multicellular animals, and that

> we'd like to think that we understand the basic outlines of their evolutionary relationships. Unfortunately, we don't. The last time experts on all branches of arthropods came together to discuss their phylogeny, back in 1996, consensus was conspicuously absent. Since then, it is safe to say, virtually everyone accepts that the arthropods are a monophyletic group—that is, their last common ancestor was something we would recognize as an arthropod. Beyond that rather modest point, argument still rages about many of the evolutionary relationships within

> and between the four major extant arthropod groups.... One of the few points of general agreement has been that the hexapods are monophyletic, that is, they arose just once from a single common six-legged ancestor. (p. 1854.)

Thomas concluded that even this consensus concerning six-legged creatures has now been shattered by DNA research (see Nardi et al., 2003) and this revolution has affected all invertebrates (Ruppert et al., 2004). Further work has made the Darwinistic worldview even more tenuous. As Valentine (1989) concluded, "speculations as to the evolutionary relationships among living animal phyla began shortly after Darwin's seminal publications and have continued to the present time" (p. 2272). This is true even though the fossil record today "extends back more than a hundred million years earlier than that known in Darwin's time" (Valentine, 1989, p. 2272). The current situation, as summarized by Aguinaldo (1997), agrees with my review:

> The arthropods constitute the most diverse animal group, but, despite their rich fossil record and a century of study, their phylogenetic relationships remain unclear. Taxa previously proposed to be sister groups to the arthropods include Annelida, Onychophora, Tardigrada and others, but hypotheses of phylogenetic relationships have been conflicting (p. 489).

A cladogram is a branching diagram of different life forms placed in a diagram according to comparisons of selected characteristics assumed to have been derived from a common ancestor. In a study of 179 published cladograms, Wills (2001) concluded that "on several measures, cladograms of arthropods show lower congruence with the fossil record than a large sample of cladograms of various other taxa" (p. 201). The gaps in the fossil record are often given as the reason for this low congruence. Yet arthropod fossils that are most durable, such as trilobites, show among the lowest indices of congruence, "and for some trees almost any random range reassignment or random tree topology yields higher congruence" (Wills, 2001, p. 206; see also Weygoldt, 1996). In other words, selection of different traits to make comparisons produces different cladograms.

All of these problems support the belief that many arthropod baramins were separately created. Macroevolutionism is again shown to be inferior to the concept of special creation.

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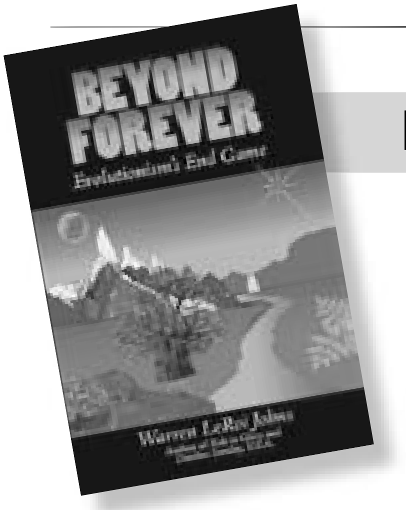

Book Review

Beyond Forever: Evolutionism's End Game

by Warren LeRoi Johns

www.CreationDigest.com, 2007, 360 pages, $25.95.

This book by Johns is loaded with information concerning all aspects of the creation/evolution controversy. The chapter titles include Evo's Dark Secrets, Extrapolated Mythology, The Gene Machine, Information, The Mouse that Laughed, Irreducible Complexity, Forty Million Mistakes, Debunking Common Ancestry, Numbers Game, Dating Planet Earth, Teaching the Controversy, Academic Freedom, and Empowering Reason: A Fresh Look at Old Ideas. Each chapter is thoroughly referenced and the bibliography includes almost 500 titles. The writing style is very readable. I highly recommend this book to both scientists and non-scientists.

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