General Evolution of life Quote Collection:

General Evolution:

"Mr. Bird is concerned with origins and the evidence relevant thereto. He is basically correct that evidence, or proof, of origins-of the universe, of life, of all of the major groups of life, of all of the minor groups of life, indeed of all of the species-is weak or nonexistent when measured on an absolute scale, as it always was and will always be."

(Nelson, Gareth [Chairman and Curator of the Department of Herpetology and Ichthyology, American Museum of Natural History, New York], "Preface," in Bird W. R., "The Origin of Species Revisited," Regency: Nashville TN, 1991, Vol. I, pxii)

"Biology is the study of complicated things that give the appearance of having been designed for a purpose."

(Dawkins, Richard [Atheist, Zoologist, and Professor for the Public Understanding of Science, Oxford University], "The Blind Watchmaker," [1986], Penguin: London, 1991, reprint, p.1)

"Biologists must constantly keep in mind that what they see was not designed, but rather evolved."

(Crick F.H.C., [Co-discoverer of the structure of DNA, Nobel laureate 1962, Professor at the Salk Institute, USA], "What Mad Pursuit: A Personal View of Scientific Discovery," [1988], Penguin Books: London, 1990, reprint, p.138, Note: So, in other words, biologists should not go where their intuition leads, but rather abide by what the dogmatic paradigm tells them?)

"Natural selection is not the only process that changes organisms over time. But is the only process that seemingly designs organisms over time."

(Stephen Pinker, "How The Mind Works")

"It is now possible, however, to redescribe the evolutionary process in the language of modern genetics. Evolution can be broadly defined as a change in the heredity of a population. Population genetics permits an even more precise definition: evolution is any change in gene frequency in a population."

(Wilson, Edward O. [Honorary Curator in Entomology, Museum of Comparative Zoology, Harvard University], et al., "Life on Earth," [1973], Sinauer Associates: Sunderland MA, 1975, reprint, p.772)

"The theory of the transmutation of species is a scientific mistake, untrue in its facts, unscientific in its method, and mischievous in its tendency."

(Louis Agassiz)

"The immediate cause of this conference is a pretty widespread sense of dissatisfction about what has come to be thought of as the accepted evolutionary theory in the English-

speaking world, the so-called neo-Darwiniam theory ... These objections to current neo-Darwinian theory are very widely held among biologists generally; and we must on no account, I think, make light of them. The very fact that we are having this conference is evidence that we are not making light of them."

(Sir Peter Medawar of the National Institute for Medical Research in London speaking in an opening address to the Mathematical Challenges to the Neo-Darwinian Interpretation of Evolution" conference at the Wistar Institute of Anatomy and Biolgy in Philadelphia, April 25-26, 1962)

"The existence of design and nature is a fact which must certainly be taken seriously ... [because] in every main branch of science- physics, geophysics, astronomy, chemistry, biology- we are faced by the same surprising fact.... Nearly everywhere it [nature] shows the signs.... of something that we can only think of in terms of ingenuity and deliberate design."

(Robert E.D.Clark, Phd Organic Chemistry (Cambridge University), The Universe: Plan or Accident? (Grand Rapids, MI: Zondervan, 1972), 151, 181.)

"I have always been slightly suspicious of the theory of evolution because of its ability to account for any property of living beings (the long neck of the giraffe, for example). I have therefore tried to see whether biological discoveries over the last thirty years or so fit in with Darwin's theory. ... I do not think that they do. To my mind, the theory does not stand up at all."

(Lipson, A Physicist Looks at Evolution, 31 Physics Bulletin 138, 138 (1980)

"...if evolution is in some sense channeled, then this reopens the controversial prospect of a teleology; that is, the process is underpinned by a purpose. It is no coincidence that interest in the Anthropic Principle, which broadly seeks evidence for the boundary conditions of the Big Bang and the ensuing physics and chemistry uniquely favoring the emergence of life...is being extended to the fields of biochemistry and molecular biology (For one view, see Denton, 1998)"

(Simon Conway Morris, “Evolution: Bringing Molecules into the Fold,” Cell 100 (2000):1-11)

"Evolution is baseless and quite incredible."

(Dr Ambrose Fleming, President, British Assoc. Advancement of Science, in The Unleashing of Evolutionary Thought)

"Organisms either appearedon the earth fully developed or they did not. If they did not, they must have developed from preexisting species by some process of modification.If they did appear in a fully developed state, they must indeed have beencreated by some omnipotent intelligence."

(Douglas J. Futuyma, Science on Trial, New York:Pantheon Books, 1983. p. 197.)
"The only competing explanation for the order we all see in the biological world is the notion of Special Creation."

(Niles Eldridge, PhD., palaeontologist and evolutionist, American Museum of Natural History).

"My attempts to demonstrate evolution by an experiment carried on for more than 40 years have completely failed."

(N.H.Nilson, famous botanist and evolutionist)

"[T]he origin of no innovation of large evolutionary significance is known."

(Wesson, R., 1991, Beyond Natural Selection MIT Press, Cambridge, MA, p. 45)

"I have often thought how little I should like to prove organic evolution in a court of law."

(E. White, in his presidential address to the Linnean Society, 1966)

"A chicken is really the chicken genes' way of making more copies of themselves."

(Wilson, E.O. 1975. Sociobiology: The New Synthesis. Harvard University Press, Cambridge, MA)

"Nothing in biology makes sense except in the light of evolution."

(Theodosius Dobzhansky in Nothing in Biology Makes Sense Except in the Light of Evolution, American Biology Teacher, 35, 125-129

"The subject of evolution occupies a special, and paradoxical, place within biology as a whole. While the great majprity biologists would probably agree with Theodosius Dobzhansky's dictum that 'nothing in biology makes sense except in the light of evolution', most can conduct their work quite happily without partiuclar reference to evolutionary ideas. 'Evolution' would appear to be the indispensible unifying idea and, at the same time, a highly superfluous one."

(Introduction December 2000 issue of BioEssays, a special issue on evolution)

"It might be thought, therefore, that evolutionary arguments would play a large part in guiding biological research, but this is far from the case. It is difficult enough to study what is happening now. To try to figure out exactly what happened in evolution is even more difficult. Thus evolutionary arguments can usefully be used as hints to suggest possible lines of research, but it is highly dangerous to trust them too much. It is all too easy to make mistaken inferences unless the process involved is already very well understood."

(Crick, Francis H.C. [Co- discoverer of the structure of DNA, Nobel laureate 1962, Professor at the Salk Institute, USA], "What Mad Pursuit: A Personal View of Scientific Discovery," [1988], Penguin: London, 1990, reprint, pp.138-139)

"At the moment, I can't find any rational argument to knock down the view which argues for conversion to God. We used to have an open mind; now we realize that the only logical answer to life is creation--and not accidental random shuffling."

(Wickramasinghe, C., Interview in London Daily Express (August 14, 1981), Wickramasinghe is Professor of Applied Math & Astronomy, University College, Cardiff.)

"Curious about why the museum would go so far, and no further, I talked with Roger Miles, an authority on pollen who is also head of the department of public services. Many of the troublesome questions that have emerged about evolution turned out to be beyond the scope of this exhibition:

Does it have anything to say about the gaps in the fossil record?
No.

Does it present any examples of gradual evolution of a series of fossils?
No.

Does it tackle the problem caused by the scarcity of transitional forms?
No.

Does it explain how life emerged from inorganic chemicals?
No.

Does it offer an explanation for the explosion of complex life forms at the beginning of the Cambrian?
No.

Nor the origin of the genetic code?
No.

Does it concern itself with the problems faced by breeders that there is a genetic limit to change?
Breeding is mentioned in the way that Darwin saw it, as an analogy to evolution.

What does it say about the origin flight?
Nothing.

Does it touch common patterns of form, such as segmentation?
No.

What about Goldschmidt's hopeful monsters-embroynic restructuring?
Nothing.

Anythign about punctuated equilibria?
No. "

(Interview by Francis Hitching with Roger Niles in The Neck of the Giraffe)

"...both fields have been labeled as failures for not having lived up to grandiose promises. At the heart of this disappointment lies the fact that neither AI nor Alife has produced artifacts that could be confused with a living organism for more than an instant. AI just does not seem as present or aware as even a simple animal and Alife cannot match the complexities of the simplest forms of life."

"We build models to understand the biological systems better, but the models never work as well as biology. We have become very good at modelling fluids, materials, planetary dynamics, nuclear explosions and all manner of physical systems. Put some parameters into a program, let it crank, and out come accurate predictions of the physical character of the modelled system. But we are not good at modelling living systems, at small or large scales. Something is wrong."

"we might be missing something fundamental and currently unimagined in our models of biology ... We would then need to find new ways of thinking about living systems to make any progress, and this will be much more disruptive to all biology. ... So what might be the nature of this unimagined feature of life? One possibility is that some aspect of living systems is invisible to us right now. The current scientific view of living things is that they are machines whose components are biomolecules. It is not completely impossible that we might discover some new properties of biomolecules or some new ingredient. One might imagine something on a par with the discovery of X-rays a century ago, which eventually led to our still-evolving understanding of quantum mechanics. Relativity was the other such discovery of the twentieth century, and had a similarly disruptive impact on the basic understanding of physics. Some similar discovery might rock our understanding of the basis of living systems."

(Rodney Brooks, “The relationship between matter and life,” Nature 409 (2001): 409-411)

"On reading The Origin of Species, I found that Darwin was much less sure himself than he is often represented to be; the chapter entitled "Difficulties of the Theory" for example, shows considerable self-doubt. As a physicist, I was particularly intrigued by his comments on how the eye would have arisen"

(H. S. Lipson, "A Physicist's View of Darwin's Theory", Evolution Trends in Plants, Vol 2, No. 1, 1988, p. 6.)

"I have quoted some voices of dissent coming from biologists in eminent academic positions. There have been many others, just as critical of the orthodox doctrine, though not always as outspoken--and their number is steadily growing. Although these criticisms have made numerous breaches in the walls, the citadel stills stands--mainly as said before, because nobody has a satisfactive alternative to offer. The history of science shows that a well-established theory can take a lot of battering and get itself into a tangle of contradictions--the fourth phase of 'Crisis and Doubt' in the historic cycle and yet still be upheld by the establishment until a breakthrough occurs, initiating a new departure, and the start of a new cycle.

But that event is not yet in sight. In the meantime, the educated public continues to believe that Darwin has provided all the relevant answers by the magic formula of mutation plus natural selection--quite unaware of the fact that random mutations turned out to be irrelevant and natural selection a tautology.'

(Arthur Koestler in Janus: A Summing Up, Random House, New York, 1978, pp 184-185)

"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."

(Simpson, George Gaylord [Professor of Vertebrate Paleontology, Museum of Comparative Zoology, Harvard University] & Beck, William S. [Harvard University] , "Life: An Introduction To Biology," [1957], Routledge & Kegan Paul: London, Second Edition, 1965, p.466)

"Neo-Darwinism is an attempt to reconcile Mendelian genetics, which says that organisms do not change with time, with Darwinism, which claims they do."

(Margulis, Lynn. cited in The Third Culture by John Brockman. Simon and Schuster 1995. p 133.)

"The neo-Darwinist is now reaching the point of dignity in the history of science that the Ptolemaic system in astronomy, the epicycle system, reached long ago. We know that it does not work. And that is interesting. Because from the actual structure of the chromosome we can demonstrate that the human species did not come from a progressive humanisation of a pre-human.'

(Quoted from Conference Paper dated October 1975, The Beginning of Life, by Professor Jerome Lejeune, Chair of Fundamental Genetics, University of Paris, France)

"Any living being possesses an enormous amount of "intelligence," very much more than is necessary to build the most magnificent of cathedrals. Today, this "intelligence" is called "information," but it is still the same thing. It is not programmed as in a computer, but rather it is condensed on a molecular scale in the chromosomal DNA or in that of any other organelle in each cell. This "intelligence" is the sine qua non of life. If absent, no living being is imaginable. Where does it come from? This is a problem which concerns both biologists and philosophers and, at present, science seems incapable of solving it."
"When we consider a human work, we believe we know where the `intelligence' which fashioned it comes from; but when a living being is concerned, no one knows or ever knew, neither Darwin nor Epicurus, neither Leibniz nor Aristotle, neither Einstein nor Parmenides. An act of faith is necessary to make us adopt one hypothesis rather than another. Science, which does not accept any credo, or in any case should not, acknowledges its ignorance, its inability to solve this problem which, we are certain, exists and has reality. If to determine the origin of information in a computer is not a false problem, why should the search for the information contained in cellular nuclei be one?"
"Biochemists and biologists who adhere blindly to the Darwinism theory search for results that will be in agreement with their theories and consequently orient their research in a given direction, whether it be in the field of ecology, ethology, sociology, demography (dynamics of populations), genetics (so-called evolutionary genetics), or paleontology. This intrusion of theories has unfortunate results: it deprives observations and experiments of their objectivity, makes them biased, and, moreover, creates false problems."

"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 of the interpretations 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 the falsity of their beliefs."

(Grasse, Pierre-P., [editor of the 28-volume "Traite de Zoologie," former Chair of Evolution, Sorbonne University and ex-president of the French Academie des Sciences], "Evolution of Living Organisms: Evidence for a New Theory of Transformation," [1973], Academic Press: New York NY, 1977, p2, 2, 7, 8)

"There is a considerable gap in the neo-Darwinian theory of evolution, and we believe this gap to be of such a nature that it cannot be bridged with the current conception of biology"

(Schutzenberger, M. [mathematician], "Algorithms and the Neo-Darwinian Theory of Evolution" in Mathematical Challenges to the Neo-Darwinian Interpretation of Evolution, ed., P.S. Moorehead and M. M. Kaplan, Wistar Institute Press, Philadelphia (1967), pg. 75)

"The concept of organic evolution is very highly prized by biologists, for many of whom it is an object of genuinely religious devotion, because they regard it as a supreme integrative principle. This is probably the reason why severe methodological criticism employed in other departments of biology has not yet been brought to bear on evolutionary speculation."

(Conklin, Edwin G. [Professor of Biology , Princeton University, USA], "Man Real and Ideal", Scribner, 1943, p.147, in Macbeth N., "Darwin Retried: An Appeal to Reason", Gambit: Boston MA, 1971, pp.126-127)

"'IT IS TOTALLY WRONG. It's wrong like infectious medicine was wrong before Pasteur. It's wrong like phrenology is wrong. Every major tenet of it is wrong,' said the outspoken biologist Lynn Margulis about her latest target: the dogma of Darwinian evolution.... Margulis was now denouncing the modern framework of the century-old theory of Darwinism, which holds that new species build up from an unbroken line of gradual, independent, random variations. Margulis is not alone in challenging the stronghold of Darwinian theory, but few have been so blunt. Disagreeing with Darwin resembles creationism to the uninformed; therefore the stigma that any taint of creationism can bring to a scientific reputation, coupled with the intimidating genius of Darwin, have kept all but the boldest iconoclasts from doubting Darwinian theory in public. What excites Margulis is the remarkable incompleteness of general Darwinian theory. Darwinism is wrong by what it omits and by what it incorrectly emphasizes. A number of microbiologists, geneticists, theoretical biologists, mathematicians, and computer scientists are saying there is more to life than Darwinism. They do not reject Darwin's contribution; they simply want to move beyond it. I call them the `postdarwinians.'"

(Kelly, Kevin [Executive Editor of Wired], "Out of Control: The New Biology of Machines," [1994], Fourth Estate: London, 1995, reprint, pp470-471. Emphasis in original)

"In considering the Origin of Species, it is quite conceivable that a naturalist, reflecting on the mutual affinities of organic beings, on their embryological relations, their geographical distribution, geological succession, and other such facts, might come to the conclusion that species had not been independently created, but had descended, like varieties, from other species. Nevertheless, such a conclusion, even if well founded, would be unsatisfactory, until it could be shown how the innumerable species inhabiting this world have been modified, so as to acquire that perfection of structure and coadaptation which justly excites our admiration."

(Darwin, Charles R. [English naturalist and founder of the modern theory of evolution], "The Origin of Species," [1872], Everyman's Library, J.M. Dent & Sons: London, 6th edition, 1928, reprint, p.18)

"During the period of nearly universal rejection, direct evidence for continental drift-that is, the data gathered from rocks exposed on our continents-was every bit as good as it is today. .... In the absence of a plausible mechanism, the idea of continental drift was rejected as absurd. The data that seemed to support it could always be explained away. ... The old data from continental rocks, once soundly rejected, have been exhumed and exalted as conclusive proof of drift. In short, we now accept continental drift because it is the expectation of a new orthodoxy. I regard this tale as typical of scientific progress. New facts, collected in old ways under the guidance of old theories, rarely lead to any substantial revision of thought. Facts do not `speak for themselves', they are read in the light of theory."

(Gould, Stephen Jay [Professor of Zoology and Geology, Harvard University], "The Validation of Continental Drift," in "Ever Since Darwin: Reflections in Natural History," [1978], Penguin: London, 1991, reprint, p161, note: So I guess today's 'old theory' would be evolution, and the continental drift, for which ample evidence already exists, would be "Intelligent Design')

"Darwin's book-On the Origin of Species-I find quite unsatisfactory: it says nothing about the origin of species; it is written very tentatively; with a special chapter on "Difficulties on theory"; and it includes a great deal of discussion on why evidence for natural selection does not exist in the fossil record. Darwin, I think, has been ill-served by the strength of his supporters."

(Lipson, H.S. [Professor of Physics, University of Manchester Institute of Science and Technology, UK], "Origin of species," in "Letters," New Scientist, 14 May 1981, p.452. Emphasis in original.)

"most observers see the current situation in evolutionary theory--where the object is to expalin how, not if, life evolves--as bordering on total chaos."

(Niles Eldredge, An Ode to Adaptive Transformation, Nature, vol 296:508 (1982))
"There is absolutely no disagreement among professional biologist on the fact that evolution has occurred .... But the theory of how evolution occurs is quite another matter, and is the subject of intense dispute."

(Douglas Futuyma, Evolution as Fact and Theory, 56 Bios 3, 8 1985)

"Since we hardly know anything about the major types of organization, suggestions, and suggestions only, can be made. How can one confidently assert that one mechanism rather than another was at the origin of the creation of the plans of organization, if one relies entirely upon imagination to find a solution? Our ignorance is so great that we dare not even assign with any accuracy an ancestral stock to the phyla Protozoa, Arthropoda, Mollusca, and Vertebrata. The lack of concrete evidence relative to the "heyday" of evolution seriously impairs any transformist theory. In any case, a shadow is cast over the genesis of the fundamental structural plans and we are unable to eliminate it."

"The united efforts of paleontology and molecular biology, the latter stripped of its dogmas, should lead to the discovery of the exact mechanism of evolution, possibly without revealing to us the causes of the orientations of lineages, of the finalities of structures, of living functions, and of cycles. Perhaps in this area biology can go no farther: the rest is metaphysics."

(Grasse, Pierre-P. [editor of the 28-volume "Traite de Zoologie," former Chair of Evolution, Sorbonne University and ex- president of the French Academie des Sciences], "Evolution of Living Organisms: Evidence for a New Theory of Transformation," Academic Press: New York NY, 1977, p17, 246)

"I mean the stories, the narratives about change over time. How the dinosaures became extinct, how the mammals evolved, where man came from. These seem to me to be little more than story-telling. And this is the result about cladistics because as it turns out, as it seems to me, all one can learn abou tthe history of life is learned from systematics, from groupings one finds in nature. The rest of it is story-telling of one sort or another. We have access to the tips of a tree, the tree itself is a theory and people who pretened to know about the tree and to describe what went on with it, how the branches came off and the twigs came off are, I think, telling stories."

(Dr. Colin Patterson (Senior Palaeontologist, British Museum of Natural Hisotyr, London) in an interview on British Broadcasting Corporation (BBC) television 4 March 1982.)

"Those searching for specific information useful in constructing phylogenies of mammalian taxa will be disappointed."

(R. Eric Lombard, "Review of Evolutionary Principles of the Mammalian Middle Ear, Gerald)

Mutations and Natural Selection:

"Microevolution provides no satisfactory explanation for the extraordinary burst of novelty during the late Neoproterozoic-Cambrian radiation (Valentine et al. 1999; Knoll and Carroll 1999), nor the rapid production of novel plant architectures associated with the origin of land plants during the Devonian (Kendrick and Crane 1997), followed by the origination of most major insect groups (Labandeira and Sepkoski 1993). "

"These discontinuities impart a hierarchical structure to evolution, a structure which impedes, obstructs, and even neutralizes the effects of microevolution..."

(Douglas Erwin, “Macroevolution is more than repeated rounds of microevolution,” Evolution & Development 2 (2000):78-84)

"...starting in the 1970s, many biologists began questioning its [neo-Darwinism's] adequacy in explaining evolution. Genetics might be adequate for explaining microevolution, but microevolutionary changes in gene frequency were not seen as able to turn a reptile into a mammal or to convert a fish into an amphibian. Microevolution looks at adaptations that concern the survival of the fittest, not the arrival of the fittest. As Goodwin (1995) points out, “the origin of species -- Darwin’s problem -- remains unsolved"

(Scott F. Gilbert, John M. Opitz, and Rudolf A. Raff, “Resynthesizing Evolutionary and Developmental Biology,” Developmental Biology 173 (1996): 357-372)

"The popular theory of evolution is the modern synthesis (neo-Darwinism), based on changes in populations underpinned by the mathematics of allelic variation and driven by natural selection. It accounts more for adaptive changes in the colouration of moths, than in explaining why there are moths at all. This theory does not predict why there were only 50 or so modal body plans, nor does it provide a basis for rapid, large scale innovations. It lacks significant connection with embryogenesis and hence there is no nexus to the evolution of form. It fails to address the question of why the anatomical gaps between phyla are no wider today than there were at their Cambrian appearance. It has no predictions about macromolecules and cellular evolution in the Archaean, about evolution via symbiogenesis, nor the manner in which cells and organisms alter and revise their genomic rules as they evolve."

"Allelic changes in natural populations are almost totally oblique to understanding the events that gave rise to the major metazoan body plans. Studies of speciation are targeting the evolutionary peripheries, and missing the significant metazoan issue -- the origin of complex forms."

"The modern synthesis moved evolution theory into a mathematical siding from which there has been no return. Here is a theory which, as I have shown in this essay, does not touch upon any level of detail or mechanism that impinges on large scale evolutionary complexity or novelty. Whenever data have undermined its foundations, it is the data that have been considered inadequate. Thus the traditional gradualistic view is largely at variance with the fossil record, which is largely one of episodic change followed by stasis."

"Finally, it is necessary to acknowledge that after over a century of the dominant paradigm, the evolution of major complexities in the history of life has had very little to do with the origin of species. The seamless moving footway of neo-Darwinism that was to have smoothly transported us from allelic variation in natural populations to understanding body plans in different phyla has led to a cul-de-sac. The origin of phyla is not via speciation ‘writ large’. To understand what fuelled origins of phyla, the complexities that emerged long ago from macromolecular and supracellular complexes and from symbiogenic events will need to be understood via molecular embryology, where the quintessence of evolutionary truth is to be found."

(George L. Gabor Miklos, “Emergence of organizational complexities during metazoan evolution: perspectives from molecular biology, palaeontology and neo-Darwinism,” Mem. Ass. Australas. Palaeontols. 15 (1993): 7-41)

"While the origins of major morphological novelties remains unsolved, one can also view the stubborn persistence of macroevolutionary questioning, and particularly its revival in recent years, as a challenge to orthodoxy: resistance to the view that the synthetic theory tells us everything we need to know about evolutionary processes."
"no one has satisfactorily demonstrated a mechanism at the population genetic level by which innumerable very small phenotypic changes could accumulate rapidly to produce large changes: a process for the origin of the magnificently improbable from the ineffably trivial”

(Keith Stewart Thomson, “Macroevolution: The Morphological Problem,” American Zoologist 32 (1992): 106-112)

"Domain shuffling aside, it remains a mystery how the undirected process of mutation, combined with natural selection, has resulted in the creation of thousands of new proteins with extraordinarily diverse and well optimized functions."

(Thornton & DeSalle, Genomics meets phylogenetics. Annual Rev. of Genomics and Human Genetics, 2000, pg. 64)

"Micromutations do occur, but the theory that these alone can account for evolutionary change is either falsified, or else it is an unfalsifiable, hence metaphysical theory. I suppose that nobody will deny that it is a great misfortune if an entire branch of science becomes addicted to a false theory. But this is what has happened in biology: ... I believe that one day the Darwinian myth will be ranked the greatest deceit in the history of science. When this happens many people will pose the question: How did this ever happen?"

(S Lovtrup, Darwinism: The Refutation of a Myth (London:Croom Helm, p.422)

"...It is true that nobody thus far has produced a new species or genus, etc., by macromutations. It is equally true that nobody has produced even a species by the selection of micromutations....Neither has anyone witnessed the production of a new specimen of a higher taxonomic category by selection of micromutants."

(Goldschmidt, Richard B., Amer. Scientist, 40, 1952, p.97.)

"Generation after generation, through countless cell divisions, the genetic heritage of living things is scrupulously preserved in DNA ... All of life depends on the accurate transmission of information. As genetic messages are passed through generations of dividing cells, even small mistakes can be life-threatening ... if mistakes were as rare as one in a million, 3000 mistakes would be made during each duplication of the human genome. Since the genome replicates about a million billion times in the course of building a human being from a single fertilised egg, it is unlikely that the human organism could tolerate such a high rate of error. In fact, the actual rate of mistakes is more like one in 10 billion."

(Miroslav Radman and Robert Wagner, The High Fidelity of DNA Duplication...Scientific America. Vol. 299, No 2 (August 1988, pp 40-44. Quote is from page 24)

"It is good to keep in mind ... that nobody has ever succeeded in producing even one new species by the accumulation of micromutations. Darwin's theory of natural selection has never had any proof, yet it has been universally accepted."

(Prof. R Goldschmidt PhD, DSc Prof. Zoology, University of Calif. in Material Basis of Evolution Yale Univ. Press)

It is fashionable in modern evolutionary genetics to state: "The raw materials of evolution arise by mutation and recombination" and then to proceed to discuss how alleles may change frequences under directional or nondirectional forces."

(Proof of an Adaptive Linkage Association, *Science*, November 17, 1961, pg. 1617, by Max Levitan)

"[w]hether the slightly deleterious hypothesis can expalin the patterns of molecular polymorphism and evolution is subject of debate"

(Wen Hsuing Li, Molecular Evolution, Sunderland, MA 1997)

"Viable mutations with major morphological or physiological effects are exceedingly rare and usually infertile; the chance of two identical rare mutant individuals arising in sufficient propinquity to produce offspring seems too small to consider as a significant evolutionary event. These problems of viable "hopeful monsters" are exacerbated when considering evolution near the Precambrian - Cambrian boundary, when new higher taxa appeared at such a rate that we have estimated that 1 in 40 or so species represented a new class. This figure is arguable, but it is clear that the process causing evolutionary novelty could not have depended on exceedingly rare events. Explanations of the Cambrian radiation of invertebrate marine phyla and classes have focused on species selection or traditional microevolutonary processes. The rapidity of and low species numbers during the radiation render these explanations untenable."

(Erwin, D..H., and Valentine, J.W. "'Hopeful monsters,' transposons, and the Metazoan radiation", Proc. Natl. Acad. Sci USA 81:5482-5483, Sept 1984)

"When speaking here of Darwinism, I shall speak always of today's theory that is Darwin's own theory of natural selection supported by the Mendelian theory of heredity, by the theory of the mutation and recombination of genes in a gene pool, and by the decoded genetic code. This is an immensely impressive and powerful theory. The claim that it completely explains evolution is of course a bold claim, and very far from being established."

(Popper, Karl R., [Emeritus Professor of Philosophy, University of London], "Natural Selection and the Emergence of Mind," Dialectica, Vol. 32, Nos. 3-4, pp.339-355, 1978, pp.343-344)

"The primary problem with the [modern evolutionary] synthesis is that its makers established natural selection as the director of adaptive evolution by eliminating competing explanations, not by providing evidence that natural selection among 'random' mutations could, or did, account for observed adaptation (Box 2). Mayr remarked, 'As these non-Darwinian explanations were refuted during the synthesis ... natural selection automatically became the universal explanation of evolutionary change (together with chance factors).' Depriving the synthesis of plausible alternatives, which seemed such a triumph, in fact sowed the seeds of its faults."

"The 'modern evolutionary synthesis' convinced most biologists that natural selection was the only directive influence on adaptive evolution. Today, however, dissatisfaction with the synthesis is widespread, and creationists and antidarwinians are multiplying. The central problem with the synthesis is its failure to show (or to provide distinct signs) that natural selection of random mutations could account for observed levels of adaptation."

(Leigh, Egbert G., Jr. [Biologist, Smithsonian Institution, USA], "The modern synthesis, Ronald Fisher and creationism," Trends in Ecology and Evolution, Vol. 14, No. 12, pp.495-498, December 1999, p.495)

"If I were convinced that I required such additions to the theory of natural selection, I would reject it as rubbish.... I would give nothing for the theory of natural selection, if it requires miraculous additions at any one stage of descent."

(Darwin F., ed., "The Life and Letters of Charles Darwin", John Murray: London, 1888, ii:210)

"The [peppered-moth] experiments show the effects of predation on the survival of the dark and of the normal forms of the Peppered Moth in a clean environment and in one polluted by smoke. The experiments beautifully demonstrate natural selection--or survival of the fittest--in action, but they do not show evolution in progress, for however the population may alter in their content of light, intermediate or dark forms, all the moths remain from beginning to end *Biston Betularia*."

(L. Harrison Matthews, FRS, in the introduction to the 1971 edition of Darwin's Origin of Species, J.M. Detn & Sons Ltd, London, pg. xi)

"Gene duplication has generally been viewed as a necessary source of material for the origin of evolutionary novelties, but it is unclear how often gene duplications arise and how frequently they evolve new functions"

"the vast majority of gene duplicates are silenced within a few million years, with the survivors subsequently experiencing a strong purifying selection."

"it is unclear how duplicate genes successfully navigate an evolutionary trajectory from an initial state of complete redundancy, wherein one copy is likely to be expendable, to a stable situation in which both copies are maintained by natural selection. Nor is it clear how often these events occur."

"Becausevthe vast majority of mutations affecting fitness are deleterious and because gene duplicates are generally assumed to be functionally redundant at the time of origin, virtually all models predict tha the usual fate of a duplicate-gene pair is the nonfunctionalization of one copy."

"[there is a] rather narrow window of opportunity for evolutionary exploration by gene duplicates"

(108. Lynch, M., Conery, J. S., "The Evolutionary Fate and Consequence of Duplicate Genes" Science 290:1151-1155 (Nov 10, 2000))

"We can here consider an oxymoron commonly used by evolutionists -- "selection for this or that trait". Aside from the fact that selection pressure is modeled negatively in mathematical models (see (7), above), we can now see, in this quite reasonable soft selection model, that no phenotypic trait could be isolated as showing a character state that is favored by natural selection (any more than any other one evolving simultaneously). Selection for something can only be modeled in cases like artificial selection, where human agency repeatedly applies truncation selection on a given trait. Using the monkey at keyboards analogy again (see (7), above), we could model selection for something by having the inspection of the random letters be informed by a pregiven text. There is one other possibility where selection for could be used, but neoDarwinians are not likely to embrace it. It would be possible to have a single-gene Darwinism in which traits are viewed as evolving one at a time, sequentially, with the information from each new allele being assimilated into a developmental system which oversees the construction of the phenotype. The problem with this for Darwinians is that this privileges the ontogenetic system as the site of all the action, with selection just providing tokens or memory bench marks cuing that system into modulating some developmental processes. This view would also go against the current enthusiasm for genetic reductionism shown in phrases like "this trait is coded for by by gene X", and would make nonsense of the popular Dawkins / Dennett genic reductionism"

(Stanley N. Salthe, Ph.D. Zoology, 1963, Columbia University, former Professor Emeritus, Brooklyn College of the City University of New York & Visiting Scientist in Biological Sciences, Binghamton University in "Analysis and critique of the concept of Natural Selection (and of the Darwinian theory of evolution) in respect to its suitability as part of Modernism's origination myth, as well as of its ability to explain organic evolution")

"In other words, natural selection over the long run does not seem to improve a species' chance of survival but simply enables it to "track," or keep up with, the constantly changing environment"

(Richard C. Lewontin (Prof of Zoology, University of Chicago, and co-editor of the American Naturalist), "Adaptation". Scientific American, vol 239(3), Septemeber 1978, pg. 159)

"The conventional explanation, that random changes accumulate one locus at a time, is unconvincing on both functional and probabilistic grounds..."

(James Shapiro of The University of Chicago, Molecular Strategies in Biological Evolution, A New York Academy of Sciences Conference, June 27-29, 1998, The Rockefeller University, New York City)

"To get the actual mosaic you need a designer. The designer corresponds to natural selection."

"Language learning is not programming: parents provide their children with sentences of English, not rules of English. We suggest that natural selection was the programmer."

(Pinker and Bloom's NATURAL LANGUAGE AND NATURAL SELECTION, in *Behavior and Brain Sciences* Volume 13 Number 4 December 1990)

"A peculiarity of Darwinism, both in biology and in other fields, is that it explains too much. It is very hard to imagine a condition of things which could not be explained in terms of natural selections. If the state of various elements at a given moment is such and such then these elements have displayed their survival value under the existing circumstances, and that is that. Natural selection explains why things are as they are: It does not enable us, in general, to say how they will change and vary. It is in a sense rather a historical than a predictive principle and, as is well known, it is rather a necessary than a sufficient principle for modern biology."

(MacRae D.G., "Darwinism and the Social Sciences," in Barnett S.A., ed., "A Century of Darwin," [1958], Mercury Books: London, 1962, p.304)

"Finally, there is the question of natural selection. In one sense, the influence of the theory of natural selection on sociology was enormous. It created for a while, in fact, a branch of sociology. It seems now to be felt that the influence on sociology of the doctrine of 'survival of the fittest' was theoretically speaking, unfortunate, chiefly because it seemed to offer an explanatory short cut, and encouraged social theorists to aspire to be Darwin's when probably they should have been trying to be Linnaeuses or Cuviers. As Professor MacRae points out, in sociology the principle explains too much. Any state of affairs known to exist or to have existed can be explained by the operation of natural selection. Like Hegel's dialectic and Dr Chasuble's sermon on The Meaning of Manna in the Wilderness, it can be made to suit any situation."

(Burrow J.W., "Evolution and Society: A Study in Victorian Social Theory," [1966], Cambridge University Press: London, 1968, reprint, p.115)

"The point of my letter (Science's Compass, 30 July, p. 663), which perhaps was not well articulated, is that there is one hypothesis, central to evolution, that remains barely tested- that evolution proceeds through the process of survival and reproduction of the fittest."

(Hogg, David W. [cosmologist, Institute for Advanced Study, Princeton University, USA], Science, Vol. 286, 26 November 1999, p.167)

"Although the importance of speciation is clear and convincing, the processes involved are, for the most part, unknown."

(14 Bush, Guy L., "What Do We Really Know About Speciation?" in Perspectives on Evolution, R. Milkman, Ed. (Sinauer, Sunderland, Mass., 1976), p. 119.)

"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 ... or even a new enzyme."

(Gordon Taylor, The Great Evolution Mystery (New York: Harper and Row, 1983, pp 34, 38)

"The best clincher is extinction. For every species now in existence, roughly ninety-nine have become extinct. The question of why they have become extinct is of enormous importance to evolutionists. It has been studied by many men, but a convincing answer has not been found. It remains unclear why any given species has disappeared. The discusion of suvival of the fittest showed that the phrase led to circular reasoning; you survive because you are fit, and you are fit because you survive. Discussion of extinction is beset by a similar danger. It is all too easy to say that a species becomes extinct because it fails to adapt, while establishing its failure to adapt only by its becoming extinct: in other words, you die because you are unfit and you are unfit because you die."

(David Raup, 1979, Conflicts Between Darwin and Paleontology)

"At the present time the way in which mutation and selection (survival of the fittest) has worked over evolutionary time no longer seems to apply to Homo sapiens."

(Said in reference to the futher of humans race. The Seven Pillars of Life Daniel E. Koshland Jr., Department of Molecular and Cell Biology, University of California, Berkeley, March 22, 2002, issue of Science (pages 2215-2216)

"...[natural selection] states that the fittest individuals survive in a population (defined as those which leave the most offspring) will leave the most offspring."

(C.H. Waddington, Evolutionary Adaptation (1960)

"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 to this question is that current evolutionist follow Darwin's example - they refuse to accept falsifying evidence."

(Soren Lovtrup, prof zoo-physiology at the University of Umea in Sweden in *Darwinism: The Refutation of a Myth*)

"Consider the well-known example of industrial melanism in the British peppered moth, Biston betularia. Few high school biology texts fail to mention this study yet few students (and almost no Creationists) seem to understand what it is that this example demonstrates. ... Clearly, environmental pressures, through natural selection, can effect rapid shifts in the genotype of a population. In this case the spontaneously produced variation that proved to be advantageous to the species' survival was a genetic mutation. This is evolution in action, under observation. What it is not (nor was it ever claimed to be despite what one may find in Creationist literature) is an example of the evolution of a new species."

(Archer M., "The Reality of Organic Evolution," Selkirk D.R. & F.J. Burrows, eds., "Confronting Creationism: Defending Darwin," New South Wales University Press: Kensington, NSW, Australia, 1988, pp.30-31)

"[the probability of the coincidental formation of Cythochrome-C, an essential protein for survival is] as unlikely as the possibility of a monkey writing the history of humanity on a typewriter without making any mistakes"

"In essence, the probability of the formation of a Cytochrome-C sequence is as likely as zero. That is, if life requires a certain sequence, it can be said that this has a probability likely to be realised once in the whole universe. Otherwise some metaphysical powers beyond our definition must have acted in its formation. To accept the latter is not appropriate for the scientific goal. We thus have to look into the first hypothesis"

(Ali Demirsoy, Kalitim ve Evrim (Inheritance and Evolution), Ankara: Meteksan Publishing Co., 1984, p. 61)

"In light of what we know about evolution, it seems most likely that our extraordinary cognitive capacity was somehow acquired as a unit, rather than in a gradual process of modular accretion, for it is plainly wrong to regard natural selection as a long-term fine-tuning of specific characteristics, however much we like the resulting stories. And it's important to remember that even today we are still testing the limits of this generalized capacity that makes so much possible..."

(Letters, Page 12, Scientific American April 2002. Ian Tattersall, Reply to letter by Dudley Miles, concerning Tattersall's article "How We Came to Be Human" in Scientific American, Dec 2001, pages 56-63)

"There is no doubt that natural selection is a mechanism, that it works. It has been repeatedly demonstrated by experiment. There is no doubt at all that it works. But the question of whether it produces new species is quite another matter. 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-Darwnism is about this question: how a species originates and it is there that natural selection seems to be fading out and chance machanisms of one sort or another are being invoked."

(Colin Patterson; on the subject of 'Cladistics' in an interview with Peter Franz on the British Broadcasting Corproation, March 4, 1982)

"Mutations have a very limited 'constructive capacity'; this is why the formation of hair by mutation of reptilian scales seems to be a phenomenon of infinitesimal probability; the formation of mammae by mutation of reptilian integumentary glands is hardly more likely."

"Mutations, in time, occur incoherently. They are not complementary to one another, nor are they cumulative in successive generations toward a given direction. They modify what preexists, but they do so in disorder, no matter how. ... As soon as some disorder, even slight, appears in an organized being, sickness, then death follow. There is no possible compromise between the phenomenon of life and anarchy."

"Directed by all-powerful selection, chance becomes a sort of providence, which, under the cover of atheism, is not named but which is secretly worshipped"

(Grasse, Pierre-Paul (1977), Evolution of Living Organisms, Academic Press, New York, N.Y. (Grasse is past president of the French Academie des Sciences and editor of the 35 volume "Traite de Zoologie" published by Masson, Paris)

"One of the most important questions in evolution is: How can new adaptations originate? This is a difficult question, because most evolutionary novelties, such as the eye or the wing, involve the orchestrated expression of many different loci, a number of which act in the expression of multiple phenotypes. Conventional explanations that randomly generated advantageous changes in complex characters accumulate one locus at a time are unconvincing on both functional and probabilistic grounds, because there is too much interconnectivity and too many degrees of mutational freedom.

(Shapiro JA. Genome system architecture and natural genetic engineering in evolution. Ann N Y Acad Sci 1999 May 18;870:23-35)

"...the reasons for rejecting Darwin's proposal were many, but first of all that many innovations cannot possibly come into existence through accumulation of many small steps, and even if they can, natural selection cannot accomplish it, because incipient and intermediate stages are not advantageous."

(Lovtrup, S. (1987), Darwinism: The Refutation of a Myth, Croom Helm Ltd., Beckingham, Kent, p. 275)

"One escape hatch yet exists for spontaneous generation. Why need the event have been probable? We can just stare at the odds, shrug, and note with thanks how lucky we were... After all, improbable events occur all the time."

(Robert Shapiro in Origins: A Skeptic's Guide to Creation of Life on Earth)

"Michael Behe has done a top notch job of explaining and illuminating one of the most vexing problems in biology: the origin of the complexity that permeates all of life on this planet. Professor Behe selects an answer that falls outside of science: the original creation of life by an intelligent designer. Many scientists, myself included, will prefer to continue the search for an answer within science. Nonetheless, this book should be on the essential reading list of all those who are interested in the question of where we came from, as it presents the most thorough and clever presentation of the design argument that I have seen."

(Robert Shapiro, author of Origins: A Skeptics Guide to the Creation of Life on Earth)

"There are six major gaps in our knowledge and understanding of natural selection: (1) Why does natural selection occur? What are the biological reasons for the process, and what conditions favor natural selection? (2) How does it occur? What are the mechanisms of natural selection? What is the form of the separation line or selection function? (3) What kinds of traits are most likely to be affected by natural selection? (4) What is the effect of simultaneous natural selection on many traits, some of them intercorrelated with each other? What is the effect of genetic interactions among traits? What is the effect of phenotypic (selective) interactions among traits? Is there any limit to the number of traits that affect fitness, and does this vary with habitat? (5) Given that there is known fitness variation, what are the evolutionary dynamics and equilibrium configurations (if any) of the traits? (6) Is there a relationship between the presence of demonstrable natural selection and genera that are currently radiating rapidly?" (Endler J.A., "Natural Selection in the Wild," Princeton University Press: Princeton NJ, 1986, p.247)

"Professor Eiseley presents a detailed argument designed to show that Darwin probably derived the idea of natural selection from two articles written by his acquaintance Edward Blyth and published in The Magazine of Natural History in 1835 and 1837. If these articles were in fact the source of Darwin's theory, Darwin was guilty of grave intellectual dishonesty. In the present writer's opinion, Professor Eiseley fails to establish his case beyond reasonable doubt, although the evidence he presents is sufficiently disturbing to merit further investigation aimed at establishing or disproving his thesis."

(Greene J.C., "The Death of Adam: Evolution and its Impact on Western Thought," [1959], Mentor: New York NY, 1961, reprint, p.366)

"To suppose that the evolution of the wonderfully adapted biological mechanisms has depended only on a selection out of a haphazard set of variations, each produced by blind chance, is like suggesting that if we went on throwing bricks together into heaps, we should eventually be able to choose ourselves the most desirable house."

(Waddington, Conrad H. [Professor of Animal Genetics, University of Edinburgh], "The Listener," London, 13 November 1952, in Koestler A., "The Ghost in the Machine," [1967], Arkana: London, 1989, reprint, p127)

"But what kind of mutations could bring about the major changes I have described? Could cause a tube to roll up into a helix? Could cause other tubes to form semi-circular canals accurately set at right angles to each other. Could grade sensory hairs according to length? Could cause the convenient deposit of a crystal in the one place it will register gravity?...It just doesn't make sense."

(Taylor, Gordon Rattray [former Chief Science Adviser, BBC Television], "The Great Evolution Mystery," Abacus: London, 1983, p106)

"I am convinced it is this almost trivial simplicity that explains why the Darwinian theory is so widely accepted, why it has penetrated through the educational system so completely. As one student text puts it, `The theory is a two-step process. First variation must exist in a population. Second, the fittest members of the population have a selective advantage and are more likely to transmit their genes to the next generation.' What of the situation that bad mutations must enormously exceed good ones in number? ... The essential problem for the Darwinian theory in its twentieth century form is how to cope with this continuing flood of adverse mutations ... Supposing a favourable mutation to occur among the avalanche of unfavourable ones, how is the favourable mutation to advance against the downward pressure of the others?"

(Hoyle, Fred [former Professor of Astronomy, Cambridge University], "Mathematics of Evolution," [1987], Acorn Enterprises: Memphis TN, 1999, pp.8-9)

"Some contemporary biologists, as soon as they observe a mutation, talk about evolution. They are implicitly supporting the following syllogism: mutations are the only evolutionary variations, all living beings undergo mutations, therefore all living beings evolve. This logical scheme is, however, unacceptable: first, because its major premise is neither obvious nor general; second, because its conclusion does not agree with the facts. No matter how numerous they may be, mutations do not produce any kind of evolution." "Panchronic species, which like other species are subject to the assaults of mutations remain unchanged. Their variants are eliminated except possibly for neutral mutants. In any event, their stability is an observed fact and not a theoretical concept. ... What is the use of their unceasing mutations, if they do not change? In sum, the mutations of bacteria and viruses are merely hereditary fluctuations around a median position; a swing to the right, a swing to the left, but no final evolutionary effect. ... It is important to note that relict species mutate as much as others do, but do not evolve, not even when they live in conditions favorable to change (diversity of environments, cosmopolitianism, large populations)." "Bacteria, the study of which has formed a great part of the foundation of genetics and molecular biology, are the organisms which, because of their huge numbers, produce the most mutants. This is why they gave rise to an infinite variety of species, called strains, which can be revealed by breeding or tests. Like Erophila verna, bacteria, despite their great production of intraspecific varieties, exhibit a great fidelity to their species. The bacillus Escherichia coli, whose mutants have been studied very carefully, is the best example. The reader will agree that it is surprising, to say the least, to want to prove evolution and to discover its mechanisms and then to choose as a material for this study a being which practically stabilized a billion years ago!"

(Grasse, Pierre-P. [former editor of the 28-volume "Traite de Zoologie," holder for 30 years of the Chair of Evolution, Sorbonne University, and ex-president of the French Academie des Sciences], "Evolution of Living Organisms: Evidence for a New Theory of Transformation," Academic Press: New York NY, 1977, p.88, 87)

"Some of the underlying emotional reasons for rejecting natural selection were later vividly expressed by the playwright George Bernard Shaw: `[T]he Darwinian process may be described as a chapter of accidents. As such, it seems simple, because you do not at first realize all that it involves. ... if this sort of selection could turn an antelope into a giraffe, it could conceivably turn a pond full of amoebas into the French academy.' ... George Bernard Shaw, Back to Methusaleh: A Metabiological Pentateuch (New York: Brentano's, 1929), p. xlvi. The last sentence is in fact the modern evolutionary point of view."

(Sagan C. & Druyan A., "Shadows of Forgotten Ancestors: A Search for Who We Are," [1992] Arrow: London, 1993, reprint, pp.63-64, 428n.)

"What gambler would be crazy enough to play roulette with random evolution? The probability of dust carried by the wind reproducing Durer's 'Melancholia' is less infinitesimal than the probability of copy errors in the DNA molecule leading to the formation of the eye; besides, these errors had no relationship whatsoever with the function that the eye would have to perform or was starting to perform. There is no law against daydreaming, but science must not indulge in it."

(French zoologist Pierre-Paul Grasse in _Evolution of Living Organisms_ (New York: Academic Press, 1977), 104)

"The problem was, as so often, that adaptive explanations were just too powerful. They could explain anything. If they are, in Daniel Dennett's phrase, 'a universal acid', capable of eating through everything, they will eventually consume even the subjects we want them to illuminate. It's not much use having a magic substance that will unblock your intellectual drains if it eats out the bottom of the sink as well."

(Brown A., "The Darwin Wars: How Stupid Genes Became Selfish Gods," Simon & Schuster: London, 1999, p.119)

"It is thus hardly surprising that the vast majority of biologists have accepted it [the theory of natural selection] as *the* theory of evolution. Yet there have always been those who are dissatisfied with the theory. The issue is not whether natural selection does occur; the question is whether the basic framework of neo-Darwinism-the natural selection of random mutations-is sufficient to account for most, if not all evolutionary change; for such is the claim of the modern "synthetic" theory.."

(Ho M.W. & Saunders P.T., "Beyond neo-Darwinism - An Epigenetic Approach to Evolution", Journal of Theoretical Biology, Vol. 78, pp.573-591, 1979, p.574. Emphasis in original.)

"It is our contention that if 'random' [chance] is gieven a serious and crucial interpretation from a probabilistic point of view, the randomness postulate is highly implausible and that an adequate scientific theory of evolution must awaite the discovery and elucidation of new natural laws, physical, chemical and biological."

(Murray Eden [at the time prof. of electrical engingeering at MIT] in his paper, "Inadequacies of Neo-Darwinian Evolution as a Scientific Theory" in "Mathematical Challenges to the Neo-Darwinian Interpretation", pg. 109)

"Morgan, Goldschmidt, Muller, and other geneticists have subjected generations of fruit flies to extreme conditions of heat, cold, light, dark, and treatment by chemicals and radiation. All sorts of mutations, practically all trivial or positively deleterious, have been produced. Man-made evolution? Not really: Few of the geneticists' monsters could have survived outside the bottles they were bred in. In practice mutants die, are sterile, or tend to revert to the wild type."

(Michael Pitman, Adam and Evolution, London: River Publishing, 1984, p. 70.)

"We add that it would be all too easy to object that mutations have no evolutionary effect because they are eliminated by natural selection. Lethal mutations (the worst kind) are effectively eliminated, but others persist as alleles. ...Mutants are present within every population, from bacteria to man. There can be no doubt about it. But for the evolutionist, the essential lies elsewhere: in the fact that mutations do not coincide7 with evolution."

(Pierre-Paul Grassé (University of Paris and past-President, French Academie des Sciences) in Evolution of Living Organisms, Academic Press, New York, 1977, p. 88)

"In the midst of his outpouring of anger at and dismissal of Goldschmidt, Dobzhansky neglected to consider the fact that while Goldschmidt's systemic mutations may not have been observed, neither had the mechanisms of speciation that he, or anyone else, for the matter, had proposed. Rather, Dobzhansky, as others did and would do, took for granted that, with enough time, the kinds of small mutations and changes that were observed in laboratory experiments on fruit-fly population genetics were also capable of producing the degrees of differences that seem to characterize species in the wild. To be sure, there was a certain logic in the belief that it was unnecessary to postulate another mechanism for evolutionary change when one already appeared to exist. This logic also seemed to benefit from the assertion that not only had no other mechanism been observed but that no other mechanism had yet produced species. Nevertheless, it was and still is the case that, with the exception of Dobzhansky's claim about a new species of fruit fly, the formation of a new species, by any mechanism, has never been observed."

(Schwartz J.H., "Sudden Origins: Fossils, Genes, and the Emergence of Species," John, Wiley & Sons: New York NY, 1999, pp.299-300)

"Mutation does not introduce new levels of complexity, and it cannot be shown that it is a step in the right direction. Most observed mutations are harmful, and there is no experimental evidence to show that a new animal organism or even a novel structural features has ever been produced from the raw material produced by mutation."

(Davis, P., and Kenyon, D., Of Pandas and People, Haughton Publishing Company, Dallas, TX (1993)

"... it is a considerable strain on one's credulity to assume that finely balanced systems such as certain sense organs (the eye of vertebrates, or the bird's feather) could be improved by random mutations. This is even more true of some ecological chain relationships (the famous Yucca moth case, and so forth). However, the objectors ot random mutations have so far been unable to advance any alternative explanation that was supported by substantial evidence."

(Mayr, Ernst (1942), Systematics and the Origin of Species, p. 296)

"It is entirely in line with the accidental nature of natural mutations that extensive tests have agreed in showing the vast majority of them to be detrimental to the organism in its job of surviving and reproducing, just as changes accidentally introduced into any artificial mechanism are predominantly harmful to its useful operation."

(Muller, H. J. [Nobel Laureate and radiation and mutation expert] , "How Radiation Changes the Genetic Constitution,", Bulletin of the Atomic Scientists, Vol. 11, No. 9, November 1955, p. 331. *Important note on this quote: Some have in the past stated that this article by Muller also contains the phrase, "good ones [mutations] are so rare that we can consider them all bad." THAT STATEMENT DOES NOT EXIST IN THIS ARTICLE. IDEA Staff have checked the original article and found that is is not there. The quoted section above this tagline is the correct reference for this quote. Also, for what it is worth, some may argue that it should be noted Muller's full view is that the occasional mutation is not disadvantageous, or at least later turns out to be advantageous. Perhaps this almost goes without saying since Muller is after all an evolutionist, and it is pretty hard to imagine an evolutionist who never believed there was the occasional favorable mutation, even if extremely rare. We make this amendment to this quote solely out of courtesy, because, and please note, that we are not trying to argue any particular points through these quote collections, as seen in our Quote Disclaimer and Explanation Page. Their official purpose is that they are here for you to "read, consider, and hopefully spur you on to your own further research." Thus, as always, if you use this quote, it would behoove you to look it up in its original context to make sure you are quoting the author correctly.*

"What's in a word? Several nucleotides, some researchers might say. By applying statistical methods developed by linguists, investigators have found that 'junk' parts of the genomes of many organisms may be expressing a language. These regions have traditionally been regarded as useless accumulations of material from millions of years of evolution. 'The feeling is,' says Boston University physicist H. Eugene Stanley, 'that there's something going on in the noncoding region.'" Junk DNA got its name because the nucleotides there (the fundamental pieces of DNA, combined into so-called base pairs) do not encode instructions for making proteins, the basis for life. In fact, the vast majority of genetic material in organisms from bacteria to mammals consists of noncoding DNA segments, which are interspersed with the coding parts. In humans, about 97 percent of the genome is junk. Over the past 10 years, biologists began to suspect that this feature is not entirely trivial."

(Yam, Philip, "Talking Trash," Scientific American, vol. 272 (March 1995)

"`Mount Improbable' is a metaphor for adaptation occurring gradually, in increments. The metaphor is that of a mountain which has an absolutely sheer cliff face. If we relate this cliff to adaptation, to the most complicated piece of biological machinery you can think of, which for many people is an eye, then you say to yourself that it's impossible to leap from the bottom of this mountain to the top, which indeed it is. Leaping from the bottom of the cliff to the top would correspond to having the sheer luck to get that eye coming into place in one fell swoop. Many people wrongly think that Darwinism is a theory of chance, that it means that eyes and other complex organs come about by sheer luck. So no wonder these people don't believe natural selection. Of course an eye couldn't possibly come about like that. But on the other side of the mountain, you've got a slow, gradual slope. and it is very easy to get to the top of the mountain if you go around the other side and just walk up the slope. Relating this to adaptation, you have gradual, incremental improvement. You begin with hardly any eye at all and then each step of the way up the mountain gradual improvement. It may not be much but it's enough to be better than your predecessors, who didn't have even that improvement. Climbing Mount Improbable emphasizes that evolution of complex adaptations has got to be gradual."

(Dawkins R., "Interview," in Campbell N.A., Reece J.B. & Mitchell L.G., "Biology," [1987], Benjamin/Cummings: Menlo Park CA, Fifth Edition, 1999, p.412. Note: This is a good quote if trying to prove how in Darwinism, you must change things slowly!)

"On one point all biologists are agreed: the basic concept of organic evolution has, for a century, stood unrivalled as a contribution to biological thought. As a working hypothesis it opened up and exploited vast new fields of paleontological, anatomical and embryological inquiry. The status of natural selection is not quite so high. True, it is the only theory we have; but when judged as a working hypothesis it is disappointing to find so little advance in a hundred years."

(Gray, Sir James [late Professor of Zoology, Cambridge University], "The Case for Natural Selection." Review of "Evolution in Action," by Julian Huxley, Chatto & Windus: London, 1953, in Nature, Vol. 173, No. 4397, February 6, 1954, p.227)

"The essence of Darwinism lies in a single phrase: natural selection is the creative force of evolutionary change. No one denies that natural selection will play a negative role in eliminating the unfit. Darwinian theories require that it create the fit as well."

(Stephen Jay Gould (Professor of Geology and Paleontology, Harvard University),
"The return of hopeful monsters". Natural History, vol. LXXXVI(6), June-Jule 1977, p. 28.)

"No matter how numerous they may be, mutations do not produce any kind of evolution."

(Pierre-Paul Grasse, Evolutionist)

"The Darwinian theory is wrong because random variations tend to worsen performance, as indeed common sense suggests they must do."

(Sir Fred Hoyle, well-known British mathematician, astronomer and cosmologist in *The Intelligent Universe*)

"there is no chance (< 10^-1000) to see this mechanism [mutation-selection] appear spontaneously and, if it did, even less for it to remain...Thus, to conclude, we believe there is a considerable gap in the neo-Darwinian theory of evolution, and we believe this gap to be of such a nature that it cannot be bridged within the current conception of biology."

(Marcel P. Schutzenberger, formly with University of Paris in "Algorithms an the Neo-Darwinian Theory of Evolution" in "Mathematical Challenges to the Neo-Darwinian Intepretation", pg. 75)

"The facts of microevolution do not suffice for an understanding of macroevolution."

(Goldschmidt, Richard B. (1940), The Material Basis of Evolution, New Haven Connecticut: Yale University Press, p. 8)

"The basic framework of the theory is that evolution is a two-stage phenomenon the production of variation and the sorting of the variants by natural selection. Yet agreement on this basic thesis does not mean that the work of the evolutionist is completed. The basic theory is in many instances hardly more than a postulate and its application raises numerous questions in almost every concrete case."

(Mayr, Ernst [Emeritus Professor of Zoology, Harvard University], "Populations, Species and Evolution," [1963], Harvard University Press: Cambridge MA, 1974, reprint, p6)

"Because there are no alternatives, we would almost *have* to accept natural selection as the explanation of life on this planet even if there were no evidence for it. Thankfully, the evidence is overwhelming. I don't just mean evidence that life evolved (which is way beyond reasonable doubt, creationists notwithstanding), but that it evolved by natural selection. Darwin himself pointed to the power of selective breeding, a direct analogue of natural selection, in shaping organisms. ... Natural selection is also readily observable in the wild. In a classic example, the white peppered moth gave way in nineteenth-century Manchester to a dark mutant form after industrial soot covered the lichen on which the moth rested, making the white form conspicuous to birds. When air pollution laws lightened the lichen in the 1950s, the then-rare white form reasserted itself. There are many other examples, perhaps the most pleasing coming from the work of Peter and Rosemary Grant. ... The Grants painstakingly measured the size and toughness of the seeds in different parts of the Galapagos at different times of the year, the length of the finches' beaks, the time they took to crack the seeds, the numbers and ages of the finches

in different parts of the islands, and so on-every variable relevant to natural selection. ... Selection in action is even more dramatic among fasterbreeding organisms, as the world is discovering to its peril in the case of pesticide-resistant insects, drug-resistant bacteria, and the AIDS virus in a single patient."

(Pinker S., "How the Mind Works," [1997], Penguin: London, 1998, pp.162-163. Emphasis in the original.)

"Two shafts of criticism struck Darwin more directly than the outside world was allowed to know. They touched his particular theory that evolution took place by natural selection, a process analogous to the artificial selection which plant and animal breeders were practicing with such great success at that time. The first criticism asserted that Darwin's thesis was not true; the second, that it was not new. Such criticisms are raised against all revolutionary hypotheses, but both of these were serious and well informed."

(Darlington, Cyril D. [late Professor of Botany, Oxford University], "The Origin of Darwinism," Scientific American, Vol. 201, May 1959, p.60)

"We conclude-unexpectedly-that there is little evidence for the neo- Darwinian view: its theoretical foundations and the experimental evidence supporting it are weak, and there is no doubt that mutations of large effect are sometimes important in adaptation."

(Orr, H. Allen [Center for Population Biology, University of California, Davis], & Coyne, Jerry A. [Department of Ecology and Evolution, University of Chicago], "The Genetics of Adaptation: A Reassessment," The American Naturalist, Vol. 140, No. 5, November 1992, p.726)

"The role assigned to natural selection in establishing adaptation, while speciously probable, is based on not one single sure datum. Paleontology (cf. the case of the transformation of the mandibular skeleton of theriodont reptiles) does not support it; direct observations here and now of the genesis of a hereditary adaptation is nonexistent, except, as we have sated, in the case of bacteria and insects preadapted to resist virusses or drugs. The formation of the eye, the inner ear, of cestodes and the whale, ec., does not seem possible by way of preadapation."

"We are in the dark concerning the origin of insects."

(Pierre-Paul Grasse (University of Paris and past-President, French Acadamie des Sciences) in Evolution of Living Organisms, Academic Press, New York, 1977, pg. 170, 30)

"Panchronic species [i.e. `living fossils'], which like other species are subject to the assaults of mutations remain unchanged. Their variants are eliminated except possibly for neutral mutants. In any event, their stability is an observed fact and not a theoretical concept. ... What is the use of their unceasing mutations, if they do not change? In sum, the mutations of bacteria and viruses are merely hereditary fluctuations around a median position; a swing to the right, a swing to the left, but no final evolutionary effect. ... It is important to note that relict species mutate as much as others do, but do not evolve, not even when they live in conditions favorable to change (diversity of environments, cosmopolitianism, large populations)."

(Grasse P.-P., "Evolution of Living Organisms: Evidence for a New Theory of Transformation," [1973], Academic Press: New York NY, 1977, p.87)

" 'Survival of the fittest' and 'natural selection.' No matter what phraseology one generates, the basic fact remains the same: any physical change of any size, shape or form is strictly the result of purposeful alignment of billions of nucleotides (in the DNA). Nature or species do not have the capacity for rearranging them, nor adding to them. Consequently no leap (saltation) can occur from one species to another. The only way we know for a DNA to be altered is through a meaningful intervention from an outside source of intelligence: one who knows what it is doing, such as our genetic engineers are now performing in their laboratories."

(Cohen, I.L. (1984), Darwin Was Wrong:A Study in Probabilities, New York: NW Research Publications, Inc., p. 209)

"The essence of Darwinism lies in a single phrase: natural selection is the creative force of evolu-tionary 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."

(Gould, Stephen J. (1977), "The Return of Hopeful Monsters", Natural History, Vol. 86, June/July, p. 28)

"The occurrence of genetic monstrosities by mutation ... is well substantiated, but they are such evident freaks that these monsters can be designated only as 'hopeless.' They are so utterly unbalanced that they would not have the slightest chance of escaping elimination through stabilizing selection .... the more drastically a mutation affects the phenotype, the more likely it is to reduce fitness. To believe that such a drastic mutation would produce a viable new type, capable of occupying a new adaptive zone, is equivalent to believing in miracles .... The finding of a suitable mate for the 'hopeless monster' and the establishment of reproductive isolation from the normal members of the parental population seem to me insurmountable difficulties."

(Mayr, Ernst (1970), Populations, Species, and Evolution, Cambridge, Mass: Belknap Press, p. 235)

"The opportune appearance of mutations permitting animals and plants to meet their needs seems hard to believe. Yet the Darwinian theory is even more demanding: a single plant, a single animal would require thousands and thousands of lucky, appropriate events. Thus, miracles would become the rule: events with an infinitesimal probability could not fail to occur .... There is no law against day dreaming, but science must not indulge in it."

(Grasse, Pierre-Paul (1977), Evolution of Living Organism, Academic Press, New York, N.Y., p. 103)

"To have any hope of success the neo-Darwinian theory must therefore appeal to a reproductive model quite different from the model mostly adopted by single-celled organisms. This is already an immense climb down from what is usually claimed for the theory. Gone is its "obvious" status. Only if a model can be found that contrives to uncouple the selective properties of one gene from another, permitting the occasional good mutation to survive and prosper in a sea of bad mutations, can evolution be made to

work at all. How exquisitely complex the model needs to be to achieve such a remarkable result will be discussed in the next chapter."

(Hoyle, Fred [former Professor of Astronomy, Cambridge University], "Mathematics of Evolution," [1987], Acorn Enterprises: Memphis TN, 1999, p.10)

"And as Darwinists and neo-Darwinists have become ever more adept at finding possible selective advantages for any trait one cares to mention, explanation in terms of the all-powerful force of natural selection has come more and more to resemble explanation in terms of the conscious design of the omnipotent Creator."

(Ho, Mae-Wan [Biologist, The Open University, UK] & Saunders, Peter T. [Mathematician, University of London], eds., "Beyond Neo- Darwinism: An Introduction to the New Evolutionary Paradigm," Academic Press: London, 1984, pp.ix-x)

"To propose and argue that mutations even in tandem with 'natural selection' are the root-causes for 6,000,000 viable, enormously complex species, is to mock logic, deny the weight of evidence, and reject the fundamentals of mathematical probability."

(Cohen, I.L. (1984), Darwin Was Wrong: A Study in Probabilities, New York: New Research Publications, Inc., p. 81)

Homologies, Molecular, and Genetic Evolution:

"The average vertebrate cell expresses ~10,000-20,000 genes. The existence of significant overlaps between the messenger populations in different cell types would suggest that the total expressed gene number for the organism should be within a few fold of this, in the range (say) of 50,000-100,000."

(Lewin, B. 2000. Genes VII. Oxford University Press, Oxford. pg. 76)

"If we can be convinced that 30,000 genes might be compatible with our perception of human complexity, this number has still to be reconciled with the much higher number of mRNA species--at least 85,000--as inferred from various assemblies of expressed sequence tags (ESTs) (12-14). Alternative polyadenylation is an obvious explanation for this discrepancy. However, the latest estimate (15) only predicts about 39,000 different "endings" from 30,000 genes (16). Alternative splicing is the next mechanism that can be invoked and could account for up to 48,000 different cDNAs (16) according to published statistics (17). Combining the detailed probabilities of both mechanisms in a simultaneous and independent manner could account for a maximum of 66,000 total different transcripts (albeit unlikely to generate as many nonoverlapping EST clusters)..."

(Jean-Michel Claverie, Science February 16 2001 -- please note: this quote came out just after initial results of the Human Genome Project had first been published in a scientific journal)

"The fragmentary nature of the fossil record prevents the paleontologist from using the taxonomic approach or any other method for calculating evolutionary rates in specific phyletic lines"

(Barbara Stahl, Vertebrate History, Dover 1985, pg. 129)

"Absolute rates of molecular evolution ahve been estimated using fossils or biogeographic events toghter with pairwise distance measure, to provide a minimum ages for the divergence of pairs of taxa. Such estimates must presume 1) that the rate is constant over time and across taxa for species involved in the pairwise distance comparison and 2) that the fossils or biogrographic dates accurately reflect lineage divergence times. Unfortunately these are not safe presumptions."

(Mindell and Thacker, "Rates of Molecular Evolution"Annual Review of Ecology and Systematics, vol 27 pg 280-281)

"Even with the appropriate genes, the molecular tree of life is difficult to interpret"

(Erwin, Valentine, Jablonski, American Scientist, vol 85, 1997, pg. 127)

"Thus, there is no more reason to imagine only a single first kind of cell as the progenitor of all contemporary life..."

(W. Ford Doolittle, “The nature of the universal ancestor and the evolution of the proteome,” Current Opinion in Structural Biology 10 (2000):355-358)

"Animal relationships derived from these new molecular data sometimes are very different from those implied by older, classical evaluations of morphology. Reconciling these differences is a central challenge for evolutionary biologists at present."
"The critical question is whether current models of 18S rRNA evolution are sufficiently accurate … current models of DNA substitution usually fit the data poorly."

(Maley, Laura E. and Charles R. Marshall. 1998. The Coming of Age of Molecular Systematics. Science 279:505-506)

“The cytochrome c phylogeny disagrees with the traditional one in several instances, including the following: the chicken appears to be related more closely to the penguin than to ducks and pigeons; the turtle, a reptile, appears to be related more closely to birds than to the rattlesnake, and man and monkeys diverge from the mammals before the marsupial kangaroo separates from the placental mammals.

(Ayala, Francisco J. 1978. The Mechanisms of Evolution. Scientific American 239:56-69)

"Some biologists find these notions confusing and discouraging. It is as if we have failed at the task that Darwin set for us: delineating the unique structure of the tree of life. But in fact, our science is working as it should. An attractive hypothesis or model (the single tree) suggested experiments, in this case the collection of gene sequences and their

analysis with the methods of molecular phylogeny. The data show the model to be too simple. Now new hypotheses, having final forms we cannot yet guess, are called for."

(W. Ford Doolittle, “Uprooting the Tree of Life,” Scientific American, February 2000, pp. 90-95.)

"When biologists talk of the ‘evolution wars’, they usually mean the ongoing battle for supremacy in American schoolrooms between Darwinists and their creationist opponents. But the phrase could also be applied to a debate that is raging within systematics. On one side stand traditionalists who have built evolutionary trees from decades of work on species’ morphological characteristics. On the other lie molecular systematists, who are convinced that comparisons of DNA and other biological molecules are the best way to unravel the secrets of evolutionary history." (Trisha Gura, “Bones, molecules...or both?”

Nature 406 (2000):230-233)

"Molecular clocks need to be calibrated, and this can be done only by direct recourse to (hopefully reliable) dates in the fossil record. Calibration of clocks indirectly through use of dates inferred from other molecular clock studies (which in turn are ultimately based on the fossil record) is less desirable, as it adds an extra layer of uncertainty, especially if these molecular inferences are highly controversial"

"Even if one makes the bold assumption that molecular clock models have little error, there seems little objective reason for accepting as sacrosanct a few fossil dates used in calibrations and rejecting as unreliable the much more numerous fossil dates that contradict the resultant molecular estimates. ... Unfortunately, molecular clock studies have yet to provide a set of rigorous criteria for justifying which fossil dates are to be used in calibrations and which are to be treated with skepticism."

(Michael S. Y. Lee, “Molecular Clock Calibrations and Metazoan Divergence Dates,” Journal of Molecular Evolution 49 (1999): 385-391)

"...the mitochondrial cytochrome b gene implied...an absurd phylogeny of mammals, regardless of the method of tree construction. Cats and whales fell within primates, grouping with simians (monkeys and apes) and strepsirhines (lemurs, bush-babies and lorises) to the exclusion of tarsiers. Cytochrome b is probably the most commonly sequenced gene in vertebrates, making this surprising result even more disconcerting."

(Michael S. Y. Lee, “Molecular phylogenies become functional,” Trends in Ecology and Evolution 14 (1999): 177-178)

"DNA replication is an essential, central feature of cellular life....It is therefore surprising that the protein sequences of several central components of the DNA replication machinery, above all the principal replicative polymerases, show very little or no sequence similarity between bacteria and archaea/eukaryotes."

"The hypothesis of an independent evolution of DNA replication ... offers a parsimonious explanation for the strange assortment of apparently unrelated, homologous but not orthologous and orthologous components in the DNA replication machineries of bacteria and archaea/eukaryotes"

(Detlef D. Leipe, L. Aravind, and Eugene V. Koonin, “Did DNA replication evolve twice independently?” Nucleic Acids Research 27 (1999): 3389-3401)

"molecular and morphological data have suggested strikingly different phylogenetic relationships among corbiculate bee tribes"

"Disagreement exists because analyses of [DNA] sequences and morphology suggest different hypotheses, and not because researchers have used different criteria for building and testing evolutionary trees"

(Peter J. Lockhart and Sydney A. Cameron, “Trees for bees,” Trends in Ecology and Evolution 16 (2001): 84-88)

"Our finding of multiple independent origins for a particular mtDNA gene order among diverse birds ... and findings by others of convergent evolution for mt sequence duplications in snakes and lizards...suggests that some constraints on gene order mutation are in effect"

(David P. Mindell, Michael D. Sorenson, and Derek E. Dimcheff, “Multiple independent origins of mitchondrial gene order in birds,” Proceedings of the National Academy of Sciences USA 95 (1998): 10693-10697.)

"With anatomical data ... structural identity in molecules is not always indicative of relatedness. Molecules can be highly structurally and functionally constrained. In proteins, this may require a demonstration of homology beyond sequence identity"

(Paul Morris and Emily Cobabe, “Cuvier meets Watson and Crick: the utility of molecules as classical homologies,” Biological Journal of the Linnean Society 44 (1991): 307-324)

"proteins generate different phylogenetic tree topologies"
"different proteins can generate different apparent tree topologies [evolutionary histories], strongly suggesting that historical phylogenies should not be inferred based on a single protein-coding gene"

(Arcady R. Mushegian, James R. Garey, Jason Martin, and Leo X. Liu, “Large-Scale Taxonomic Profiling of Eukaryotic Model Organisms: A Comparison of Orthologous Proteins Encoded by the Human, Fly, Nematode, and Yeast Genomes,” Genome Research 8 (1998):590-598)

"Given the breadth and the compelling nature of the data supporting [the expected] phylogeny, relatioships supported by the mitochondrial sequence comparisons are almost certainly incorrect, despite their being supported by equally weighted parsimony, distance, and maximum-likelihood analyses. The incorrect groupings probably result in part from convergent base-compositional similarities among some of the taxa, similarities that are strong enough to overwhelm the historical signal."

(Gavin J. P. Naylor and Wesley M. Brown, “Amphioxus Mitochondrial DNA, Chordate Phylogeny, and the Limits of Inference Based on Comparisons of Sequences,” Systematic Biology 47 (1998): 61-76)

"the phylogenetic distribution of the whole group of oxygen transport proteins cannot easily be reconciled with many current models of metazoan evolution."

(Kensal E. van Holde, “Respiratory proteins of invertebrates: Structure, function and evolution,” Zoology: Analysis of Complex Systems 100 (1998): 287-297)

"No consistent organismal phylogeny has emerged from the many individual protein phylogenies so far produced,”

"Phylogenetic incongruities can be seen everywhere in the universal tree, from its root to the major branchings within and among the various taxa to the makeup of the primary groupings themselves."

(Carl Woese, “The universal ancestor,” Proceedings of the National Academy of Sciences USA 95 (1998): 6854-6859)

"Most important of all, the discoveries of molecular biologists, far from strengthening Darwin's claims, are throwing more and more doubt on traditional Darwinism. At a fundamental level of molecular structure, each member of a class seems equally representative of that class, and no species appear to be in any real sense "intermediate" between 2 classes."

(Michael Denton, Evolution: A Theory in Crisis)

"Even with DNA sequence data, we have no direct access to the processes of evolution, so objective reconstruction of the vanished past can be achieved only by creative imagination"

(N. Takahata, "A genetic perspective on the origin and history of humans'" Annual Review of Ecology and Systematics, 1995, speaking on the molecular biology of people)
"[m]olecular phylogenists will have failed to find the 'true tree,' not because their methods are inadequate or because they have chosen the wrong genes, but because the history of life cannot properly be represented as a tree"

(Doolittle, W. F. Phylogenetic Classification and the Universal Tree. Science, Vol 284:2124-2128 (June 25, 1999)

"the wealth of competing morphological, as well as molecular proposals [of] the prevailing phylogenies of the mammalian orders would reduce [the mammalian tree] to an unresolved bush, the only consistent clade probably being the grouping of elephants and sea cows."

(De Jong, W. W. Molecules remodel the mammalian tree. Tree Vol 13, No 7, pg. 270-274 (July 7, 1998)

"The hypothesis of the molecular evolutionary clock asserts that informational macromolecules (i.e., proteins and nucleic acids) evolve at rates that are constant through time and for different lineages. The clock hypothesis has been extremely powerful for determining evolutionary events of the remote past for which the fossil and other evidence is lacking or insufficient. I review the evolution of two genes, Gpdh and Sod. In fruit flies, the encoded glycerol-3-phosphate dehydrogenase (GPDH) protein evolves at a rate of 1.1 x 1010 amino acid replacements per site per year when Drosophila species are compared that diverged within the last 55 million years (My), but a much faster rate of 4.5 x 1010 replacements per site per year when comparisons are made between mammals (70 My) or Dipteran families (100 My), animal phyla (650 My), or multicellular kingdoms (1100 My). The rate of superoxide dismutase (SOD) evolution is very fast between Drosophila species (16.2 x 1010 replacements per site per year) and remains the same between mammals (17.2) or Dipteran families (15.9), but it becomes much slower between animal phyla (5.3) and still slower between the three kingdoms (3.3). If we assume a molecular clock and use the Drosophila rate for estimating the divergence of remote organisms, GPDH yields estimates of 2,500 My for the divergence between the animal phyla (occurred 650 My) and 3,990 My for the divergence of the kingdoms (occurred 1,100 My). At the other extreme, SOD yields divergenc times of 211 My and 224 My for the animal phyla and the kingdoms, respectively. It remains unsettled how often proteins evolve in such erratic fashion as GPDH and SOD.

("Vagaries of the molecular clock," by Francisco J. Ayala, from Proc. Natl. Acad. Sci. USA Vol. 94, pp. 7776-7783, July 1997)

"Molecular phylogenetics has provided new insights into human evolution by many of its findings and interpretations have been vigorously challenged. The controversy surrounding molecular phylogenetics is now so heated that the field cannot be discussed without also considering the controversy surrounding it. In their efferts ot resolve a paleontological debate regarding modern human origins, molecular biologists have generated much of the controversy"

(Long, J. C. "Human molecular phylogenetics", Annual Review of Anthropology, 1993, 22:251-272

"...biochemistry is handicapped, even more than is the comparative anatomy of living species in being unable to fill out the story of human evolution with the names, or the appearances, or the environments and adaptations of our various ancestors: only the fossil record can do that. Moreover, there's no prospect that useful molecular data will be extractable from higher primate fossils of any ancientness in the near future"

(Ian Tattersal, "The Fossil Trial" Oxford University Press 1995, pg. 125-126)

"Partly because of morphology's long history, congruence between morphological phylogenies is the exception rather than the rule. With molecular phylogenies, all generated within the last couple of decades, the situation is little better. Many cases of incongruence between molecular phylogenies are documented above; and when a consensus of all trees within 1% of the shortest in a parsimony analysis is published, structure or resolution tends to evaporate."

(Patterson C, Williams D, Humphries C. Congruence Between Molecular and Morphological Phylogenies. Annu. Rev. Ecol. Syst. 1993;24:153-88.)

"molecular and morphological data have suggested strikingly different phylogenetic relationships among corbiculate bee tribes"

"Disagreement exists because analyses of [DNA] sequences and morphology suggest different hypotheses, and not because researchers have used different criteria for building and testing evolutionary trees."

(Lockhart P, Cameron S. Trees for Bees. Trends in Ecology and Evolution. 2 Feb 2001;16(2):84-8.)

"...here [molecular data] was no magic silver bullet for systamatists. Indeed, to this very day there is among the primates a whole variety of molecular phylogenies on offer. Most of these different principally in detail, though in some cases there is profound disagreement; and molecular systematists argue among themselves at least as much as morphologists do."

(Ian Tattersal, "The Fossil Trial" Oxford University Press 1995, pg. 125)

"The usefulness of 12S rRNA to aid in solving Archonta relationships and others of similar time depth is found to be suspect."

(McNiff, B. E. and Allard, M. W. "A test of Archonta monophyly and the phylogentic utility of the mitochondrial gene 12S rRNA", American Journal of Physical Anthropology 107:225-241)

"Given the dfficulties associated with alignement and with the establishing the conditions of consistency and convergence, it is clear that molecular phylogenies should not be accepted uncritically as accurate representations of the degree of relatedness between organisms."

(Raff, Marshall and Turbeville, Using DNA sequnces to unravel the Cambrian radiation of the animal phyla", Annual Review of Ecology and Systamics 25:351-375)

"The molecular support for a turtle-crocodilian clade is surprising considering that it seems to have virtually no support from morphology. These results highlight a significant discordance between morphological and molecular estiamtes of phylogeny for a major group of organisms.

(S. Blair Hedges and Laura L. Poling, "A molecular phylogeny of reptiles, Science. v. 283 pg. 998-1001)

"These molecular data thus are partially congruent with the morphological characters that also support the diapsid, rather than anapsid, turtle relationships. However, the moleculer data conflict with paleontoligcal data as to where exactly turtles fit with diapsis. The DNA data also support a highly controversial relationship of the Tuatara, and it will be a challenge not only to paleontologists, as suggested by Hegdes and Poling, but also to molecular systematists to resolve these conflicts."

(Rieppel, O. "Turtle Origins". Science. v. 283 Feb 12, 1999, pgs. 945-946)

"As discussed earlier, the matter ultimately comes down to choosing between sparse protein data and uncertainties about the molecular clock on the one hand and an incomplete fossil record with the considerable difficulties of attempting to estimate divergence times from comparative morphology of extant plants on the other hand."

(D. J. Crawford, "Cytochrome C: Angiosperm Origins and Phylogeny", in Plant Molecular Systematics, 1999, pgs. 178-179.)

"The interrelationships of the three Domains are still subject to discussion, as is their monophyly. Further data, drawn from various protein sequences, suggest conflicting schemes, and resolution may not be straightforward"

(Williams, D. M. and Embley, T.M., "Microbial Diversity: Domains and Kingdoms", Annual Review of Ecology and Systematics 27:569-95)

"As morphologists with high hopes of molecular systematics, we end this survey with our hopes dampened. Congruence between molecular phylogenies is as elusive as it is in morphology and as it is between molecules and morphology"

(Patterson et al., "Congruence between Molecular and Morphological Phylogenies", Annual Review of Ecology and Systematics, vol 24, pg. 179)

"With respect to molecular evolution, more work on sequences and with more organisms is needed, as the number and branching patterns of the main branches of organisms are still in dispute"

(Dyer, B. D. and Obar. R. A., "Tracing the History of Eukaryotic Cells", Columbia University Press, 1994)

"New genome sequences are mystifying evolutionary biologists .. . on one front the study of evolution-the information pouring out in the genome sequences has so far proved more confusing than enlightening. Indeed, it threatens to overturn what researchers though they already knew about how microbes evolved and gave rise to higher organisms"

(Science V. 280, May 1, 1998 pg. 672)

"Molecular systematics has not yet produced phylogenetic tress of broad phylum relationships more robust than those based on morphology"

(Turbeville, J. M., Schulz, J. R., and R.A. Raff (1994) Deuterostome phylogeny and the sister group of the chordates: Evidence from molecules and morphology. Mol. Biol. Evol. 11:648-655.)

"In the last 25 years, new data from genetics have dealt some profound surprises to the evolutionary biology community. Perhaps the most striking discovery is the extent to which major patterning genes and regulatory interactions are deeply conserved across vast expanses of time and phylogeny....Indeed, in many cases, the developmental role of these homologous genes is also conserved in creatures with different body plans. Strikingly, many homologous genes appear to perform the same function in structures that share functional similarities but lack a common evolutionary origin."
"“The disconnect between rates of genetic and morphological change ... is as vexing a problem for population geneticists as it is for paleontologists.”

(Neil H. Shubin and Charles R. Marshall, “Fossils, genes, and the origin of novelty,” in Deep Time (2000, The Paleontological Society), pp. 324-340.)

"The origin of angiosperms, an abominable mystery to Dawrwin ... is little better today"

(Patterson et al., "Congruence between Molecular and Morphological Phylogenies", Annual Review of Ecology and Systematics, vol 24, 1993)

"[T]he principle conclusions are that individual gene sequences are not sufficient samples from which to infer the phylogeny of these taxa [10 essentially random vertebrate species through mtDNA analysis]"

("Genes and other samples of DNA sequence data for phylogenetic inference." Michael P. Cummings; Sarah P. Otto; John Wakely, The Biological Bulletin, June 1999, v196 i3 p345(6)

"Our simultaneous analysis of multiple orthologous proteins shows that different proteins can generate different apparent phylogenetic tree topologies, strongly suggesting that historical phylogenies should not be inferred basd on a single protein-coding tree."

(Mushegian A, Garey J, Martin J, Liu L. Large-Scale Taxonomic Profiling of Eukaryotic Model Organisms: A Comparison of Orthologous Proteins Encoded by the Human, Fly, Nematode, and Yeast Genomes. Genome Research 1998;8:590-8)

"The interpretation of evolution is in a state of upheaval: the rapid advancement of Molecular Biology has led into question many of the tenets of Darwinism and neo-Darwinism which, although valuable approaches at the time they were formulated, never fulfilled the criteria demanded by real scientific theories... In the author's opinion, no real theory of evolution can be formulated at present."

(From the publishers' advertising of a recent evolutionary book, Evolution Without Selection, by A. Lima-de Faria, Esevier Science publishing Co. Inc., New York (NY) USA, 1988 372)

"In spite of these conceptual problems connected with natural selection as an evaluative principle, the most serious deficiencies in neo-Darwinism relate to its generative aspect. As a generative principle, providing the raw material for natural selection, random mutation is inadequate both in scope and theoretical grounding. It provides little insight into the creative, anamorphic character of evolution or into the problem of "origins" alluded to previously."

(Jeffrey S. Wicken (Biochemistry Dpt, Behrend Colege, Pennsylvania State University, USA), 'The generation of complexity in evolution: a thermodynamic and information-theoretical discussion.'. Journal of Theoretical Biology, vol. 77, April 1979, p. 351-352)

"It is true that both genuine homologous resemblance, that is, where phenomenon has a clear genetic and embryological basis (which as we have seen above is far less common than is often presumed), and the hierarchic patterns of class relationships are suggestive of some kind of theory of descent. But neither tell us anything about how the descent or evolution might have occurred, as to whether the process was gradual or sudden, or as to whether the causal mechanism was Darwinian, Lamarckian, vitalistic or even creationist. Such a theory of descent is therefore devoid of any significant meaning and equally compatible with almost any philosophy of nature."

(Denton M.J. [Senior Research Fellow in Human Molecular Genetics, University of Otago, New Zealand], "Evolution: A Theory in Crisis," Burnett Books: London, 1985, pp154-155)

"Phylogenetic trees are common in today's scientific journals, but there it is seldom realized how speculative they are because they look so real. This rhetorical power was significant in the popularization and triumph of evolutionary theory. Yet phylogenies are only sketches of historical hypotheses, constructed from imperfect historical evidence: fossils; morphological and anatomical similarity; biogeographic patterns; and, recently, comparison of different molecular sequences. Some phylogenetic trees are certainly more probable than others, but the inherently imperfect nature of the evidence seems to guarantee that we will never be able to reconstruct, except perhaps by accident, the true phylogeny of life on Earth."

(Temptations of the tree by GEIR HESTMARK [Department of Biology, University of Oslo] in *Nature* 21/28th December 2000, (408):911)

"Their report...is a case study in how evolution can dupe casual observers- building similarities into unrelated species and surprising differences into close cousins."

(Holden, Constance [staff writer], "When Is a Mandrill Not a Baboon?" Science, Vol. 283, 12 February 1999, p931)

"Quirks, by definition, are exceptions to the rule; facts that do not fit into an otherwise perfect hypothesis. The word quirk has been employed by the pro-tagonists of any prevailing hypothesis, so as to render contradictions innocuous. A short excursion into history tells us that the quirk may really be a gift of nature. Thus, black body radiation was a quirk in an otherwise perfect theory of elec-tromagnetic radiation until the quirk became the rule in form of the quantum thoery. The relativity theory -an aberration as far

as the Nobel Committee was concerned, at least until Einstein's death* -is presently our key to the universe. Boltzmann's constant, mobile genes and evolution itself, all took time to evolve from that dreaded minority status to legitimacy.

Not every quirk, when attended to, pays off that handsomely but more often than not they help uncover the deeper realms of natural laws, and in that sense, the original hypothesis that created these exceptions at its fringes has also fulfilled an important function. The quirks I want to elaborate upon are being excoriated at every opportunity by their unwitting creators, the protagonists of the New Synthesis or neo-darwinian hypothesis of evolution.

The hypothesis states that the primary structures2,3 (sequences of homologous proteins) can be used to construct phylogenetic trees, and indeed the branching sequence of taxa deduced from some proteins appears to coincide within reasonable limits with the tree structure proposed by paleontologists4,s. Why would one expect this to be so? Consider species A suddenly divided into AI, A2 and A3 by insurmountable obstacles. Population Al accumulates mutations different from those spreading through the population A2 and A3 and if millions of years later, for example, their insulin molecules are compared, they should differ from one another proportionately to the time of specia-tion, which is a single event in this case. If instead of the expected equal distribu-tion of differences one were to observe that the insulins of Al and A2 differ by four residues whereas the insulin of A3 differs by 25 residues from both Al and A2 then one would have discovered an exception to the neo-darwinian hy-pothesis. There are virtually no degrees of freedom in this scenario so that contradiction can be smoothed over only by ad hoc arguments such as faster rates of evolution2, lateral gene migra-tion6 or gross errors committed by paleontologists in determining the time of branching of AI, A2 and A3. Without such corrections, the insulins in this example will appear to give rise to different geneologies whereas the paradigm, by its very nature, can only accommodate one branching sequence. Thus cats and dogs branched from each other either at time X or at time Y but not at both times."

("On the validity of molecular evolution" by Christian Schwabe (TIBS 11 - July 1986 pg. 280-283)

"Molecular evolution is not based on scientific authority. There is no publication in the scientific literature in prestigious journals, specialty journals, or books that describes how molecular evolution of any real, complex, biochemical system either did occur or even might have occurred. There are assertions that such evolution occurred, but absolutely none are supported by pertinent experiments or calculations."

(Behe, Michael J. (1996), Darwin's Black Box, The Free Press, p. 185)

"Exceptions to the topology of the rRNA tree [the standard tree based on ribosomal genes] such as these are sufficiently frequent and statistically solid that they can be neither overlooked nor trivially dismissed on methodological grounds."

(Woese C. The Universal Ancestor. PNAS June 1998;95:6854-9)

"That molecular evidence typically squares with morphological patterns is a view held by many biologists, but interestingly, by relatively few systematists. Most of the latter know that the two lines of evidence may often be incongruent."

(Masami Hasegawa, Jun Adachi, Michel C. Milinkovitch, "Novel Phylogeny of Whales Supported by Total Molecular Evidence," Journal of Molecular Evolution 44 (Supplement 1, 1997): S117-S120)

"Critique of Current Theories of Evolution. We believe that it is possible to draw up a list of basic rules that underlie existing molecular evolutionary models: 1. All theories are monophyletic, meaning that they all start with the Urgene and the Urzelle which have given rise to all proteins and all species, respectively. 2. Complexity evolves mainly through duplications and mutations in structural and control genes. 3. Genes can mutate or remain stable, migrate laterally from species to species, spread through a population by mechanisms whose operation is not fully understood, evolve coordinately, splice, stay silent, and exist as pseudogenes. 4. Ad hoc arguments can be invented (such as insect vectors or viruses) that can transport a gene into places where no monophyletic logic could otherwise explain its presence. This liberal spread of rules, each of which can be observed in use by scientists, does not just sound facetious but also, in our opinion, robs monophyletic molecular evolution of its vulnerability to disproof, and thereby of its entitlement to the status of a scientific theory."

(Schwabe, Christian [Department of Biochemistry, Medical Universoty of South Carolina, USA] & Warr, Gregory, "A Polyphyletic View of Evolution: The Genetic Potential Hypothesis," Perspectives in Biology and Medicine, Vol. 27, No. 3, pp.465-485, Spring 1984, p.467. Footnotes omitted.)

Speciation--patterns, mechanisms:

"The definition widely adopted in recent decades-"Evolution is the change of gene frequencies in populations"-refers only to the transformational component. It tells us nothing about the multiplication of species nor, more broadly, about the origin of organic diversity. A broader definition is needed which would include both transformation and diversification."

(Mayr, Ernst [Emeritus Professor of Zoology, Harvard University], "The Growth of Biological Thought: Diversity, Evolution, and Inheritance," Belknap Press: Cambridge MA, 1982, p400)

"Micro-evolution involves mainly changes within potentially continuous populations, and there is little doubt that its materials are those revealed by genetic experimentation. Macro-evolution involves the rise and divergence of discontinuous groups, and it is still debatable whether it differs in kind or only in degree from microevolution. If the two proved to be basically different, the innumerable studies of micro-evolution would become relatively unimportant and would have minor value in the study of evolution as a whole."

(Simpson G.G. (1949), Tempo and Mode in Evolution, p97)

"There is a theory which states that many living animals can be observed over the course of time to undergo changes so that new species are formed. This can be called the "Special Theory of Evolution " and can be demonstrated in certain cases by experiments. On the other hand there is the theory that all the living forms in the world have arisen from a single source which itself came from an inorganic form. This theory can be called the "General Theory of Evolution" and the evidence that supports it is not sufficiently strong to allow us to consider it as anything more than a working hypothesis. It is not clear whether the changes that bring about speciation are of the same nature as those that brought about the development of new phyla. The answer will be found by future experimental work and not by dogmatic assertions that the General Theory of Evolution must be correct because there is nothing else that will satisfactorily take its place."

(Kerkut, G.A. [Department of Physiology and Biochemistry, University of Southampton, UK], "Implications of Evolution," in Kerkut G.A., ed. "International Series of Monographs on Pure and Applied Biology, Division: Zoology," Volume 4, Pergamon Press: New York NY, 1960, p.157)

"The known fossil record fails to document a single example of phyletic evolution..."

(Steven Stanley, Macroevolution: Pattern and Process, 1979, page 39.)

"According to the modern theory (called neo-Darwinism), changes occur in organisms by mutations of genes. This leads to the existence of variation amongst individuals. Some of these individuals may survive more successfully than others (called natural selection), thus producing more offspring with their new features. Gradually these new features will extend throughout the population. If, however, the population is isolated from others differences cannot spread, and over a period of time two varieties come to exist. Only small changes to organisms have been actually observed to occur by this mechanism. e.g. Industrial melanism, resistance to antibiotics and insecticides. Evidence for larger changes must be deduced from the fossil record.

("evolution," in Heffernan D.A., "The Australian Biology Dictionary," [1987], Addison Wesley Longman Australia: Melbourne, Australia, 1996, reprint, p.87)

"When we view Darwinian gradualism on a geological timescale, we may expect to find in the fossil record a long series of intermediate forms connecting phenotypes of ancestral and descendant populations. This predicted pattern is called phyletic gradualism. Darwin recognized that phyletic gradualism is not often revealed by the fossil record. Studies conducted since Darwin’s time likewise have failed to produce the continuous series of fossils predicted by phyletic gradualism. Is the theory of gradualism therefore refuted? Darwin and others claim that it is not, because the fossil record is too imperfect to preserve transitional series...Others have argued, however, that the abrupt origins and extinctions of species in the fossil record force us to conclude that phyletic gradualism is rare. "

"A number of contemporary biologists, however, favor various hypotheses of the punctuated equilibrium theory...They base their hypotheses on fossil records which have large “chains” of missing organisms. Although missing-link fossils are occasionally

discovered, the record does little to support Darwin's concept of gradual, long-term change...Others opposed to hypotheses of evolution through sudden change argue that because such a tiny percentage of organisms becomes fossilized...drawing definite conclusions from fossil evidence about evolution through either gradual or sudden change is not warranted."

(Hickman, C.P. [Professor Emeritus of Biology at Washington and Lee University in Lexington], L.S. Roberts [Professor Emeritus of Biology at Texas Tech University], and A. Larson. 2000. Animal Diversity. McGraw Hill, NY. 429pp.; (p. 23)

"The theories of gradualism and natural selection are controversial among evolutionists, although both are strongly advocated by a large portion of the evolutionary community and are important components of the Darwinian evolutionary paradigm. Gradualism and natural selection are clearly part of the evolutionary process, but their explanatory power might not be as widespread as Darwin intended.

(Hickman, C.P. [Professor Emeritus of Biology at Washington and Lee University in Lexington], L.S. Roberts [Professor Emeritus of Biology at Texas Tech University], and A. Larson. 2001. Integrated Principles of Zoology. McGraw Hill, NY. 899pp.; pg. 14)
"Palaeobiologists flocked to these scientific visions of a world in a constant state of flux and admixture. But instead of finding the slow, smooth and progressive changes Lyell and Darwin had expected, they saw in the fossil records rapid bursts of change, new species appearing seemingly out of nowhere and then remaining unchanged for millions of years-patterns hauntingly reminiscent of creation."

(Pagel M. [Research fellow, Department of Zoology and Hertford College, Oxford University], "Happy accidents?" Nature, Vol 397, 25 February 1999, p.665)

"Despite a close watch, we have witnessed no new species emerge in the wild in recorded history. Also, most remarkably, we have seen no new animal species emerge in domestic breeding. That includes no new species of fruitflies in hundreds of millions of generations in fruitfly studies, where both soft and harsh pressures have been deliberately applied to the fly populations to induce speciation. And in computer life, where the term "species" does not yet have meaning, we see no cascading emergence of entirely new kinds of variety beyond an initial burst. In the wild, in breeding, and in artificial life, we see the emergence of variation. But by the absence of greater change, we also clearly see that the limits of variation appear to be narrowly bounded, and often bounded within species."

(Kelly, Kevin [Executive Editor of Wired Magazine], "Out of Control: The New Biology of Machines," [1994], Fourth Estate: London, 1995, reprint, p.475).

"The neo-Darwinian synthesis is effectively dead, despite its continue presence as textbook orthodoxy"

(Stephen Jay Gould, Is a New and General Theory of Evolution Emerging, Paleobiology, 119, 119-120 (1980)

"We all know that many apparent evolutionary bursts are nothing more than brainstorms on the part of palaeontologists. One splitter in a library can do far more than millions of years of genetic mutation."

(Derek V. Ager (Dpt of Geology, Oceanography, Universtiy College, Swansea, UK), "The nature of the fossil record". Proceedings of teh Geologists' Association, vol. 87(2), 1976, pg. 132)

"Then the mathematical properties of the complex model will be investigated .... Thereafter ... we shall be in a position to discuss the extent to which the neo-Darwinian theory can be considered to work and the extent to which it cannot. To anticipate the eventual outcome it will be found that, subject to the choice of a highly sophisticated reproductive model, the theory works at the level of varieties and species, just as it was found empirically to do by biologists from the mid-nineteenth century onward. But the theory does not work at broader taxonomic levels; it cannot explain the major steps in evolution. For them, something not considered in the Darwinian theory is essential."

(Hoyle, Fred [former Professor of Astronomy, Cambridge University], "Mathematics of Evolution," [1987], Acorn Enterprises: Memphis TN, 1999, p.10)

"Although the comparative study of living animals and lants may give very convincing circumstantial evidence, fossils provide the only historical, documentary evidence that life evolved from simpler to more and more complex forms."

(Carl O. Dunbar, PhD. (geology) (Professor Emeritus of Paleontology and Stratigraphy, Yale University, and formerly Asst. Editor, American Journal of Science) in Historical Geology, John Wiley & Sons, Inc., New Yourk, 1960, pg. 47)

"Evolution at the level of populations and species might, in some cases, appear as nearly continuous change accompanied by divergence to occupy much of the available morphospace. However, this is certainly not true for long-term, large-scale evolution, such as that of the metazoan phyla, which include most of the taxa that formed the basis for the evolutionary synthesis. The most striking features of large-scale evolution are the extremely rapid divergence of lineages near the time of their origin, followed by long periods in which basic body plans and ways of life are retained. What is missing are the many intermediate forms hypothesized by Darwin, and the continual divergence of major lineages into the morphospace between distinct adaptive types."

(Carroll, Robert L. (2000). Towards a new evolutionary synthesis. Trends in Ecology & Evolution 15:27-32)

"The Eldredge-Gould concept of punctuated equilibria has gained wide acceptance among paleontologists. It attempts to account for the following paradox: Within continuously sampled lineages, one rarely finds the gradual morphological trends predicted by Darwinian evolution; rather, change occurs with the sudden appearance of new, well-differentiated species. Eldredge and Gould equate such appearances with speciation, although the details of these events are not preserved. They suggest that change occurs rapidly, by geologic standards, in small, peripheral populations. They believe that evolution is accelerated in such populations because they contain a small,

random sample of the gene pool of the parent population (founder effect) and therefore can diverge rapidly just by chance and because they can respond to local selection pressures that may differ from those encountered by the parent population. Eventually some of these divergent, peripheral opulations are favored by changed environmental conditions (species selection) and so they incrase and spread rapidly into fossil assemblages.

The punctuated eqilibrium model has been widly accepted, not because it has a compelling theoretical basis but because it appears to resolve a dilemma. ... apart from its intrinsic circularity (one could argue that speciation can occur only when phyletic change is rapid, not vice versa), the model is more ad hoc explanation than theory, and it rests on shaky ground."

(Robert E. RIcklefs (Dpt. Biology, University of Pennsylvania) "Paleontologists confronting macroevolution.' Science, vol. 199, 6 Jan 1978, p. 59)

"Paleontologists (and evolutionary biologists in general) are famous for their facility in devising plausible storie; but they often forget that plausible stories need not be true." (Stephen Jay Gould (Prof. of Geology and Paleontology, Harvard University), Dr. David M Raup (Curator of Geology, Field Museum of Natural History, Chicago), J. John Sepkoski, Jr, (Dpt of Geological Sciences, University of Rochester, New York), Thomas J.M. Schoph (Dpt of Geophysical Sciences, University of Chicago), and Daniel S. Simberloff (Dpt of Biology, Florida State University), 'The shape of evolution: a comparison of real and random clades'. Paleobiology, vol 3(1), 977, pp 34-35)
"It is sometimes suggested that Darwin's theory is systematically irrefutable (and hence scientifically vacuous), but Darwin was forthright about what sort of finding it would take to refute his theory. "Though nature grants vast periods of time for the work of natural selection, she does not grant an indefinite period" (Origin, p. 102), so, if the geological evidence mounted to show that not enough time had elapsed, his whole theory would be refuted. This still left a temporary loophole, for the theory wasn't formulatable in sufficiently rigorous detail to say just how many millions of years was the minimal amount required, but it was a temporary loophole that made sense, since at least some proposals about its size could be evaluated independently."

(Dennett D.C., "Darwin's Dangerous Idea," 1996, p.46)

"These evolutionary happenings are unique, unrepeatable, and irreversible. It is as impossible to turn a land vertebrate into a fish as it is to effect the reverse transformation. The applicability of the experimental method to the study of such unique historical processes is severely restricted before all else by the time intervals involved, which far exceed the lifetime of any human experimenter. "

(Dobzhansky, Theodosius [late Professor of Genetics, University of California, Davis], "On Methods of Evolutionary Biology and Anthropology," Part I, "Biology," American Scientist, Vol. 45, No. 5, December 1957, p.388)

"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."

"The central question of the Chicago conference was whether the mechanisms underlying microevolution can be extrapolated to explain the phenomena of macroevolution. 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, R., "Evolutionary Theory Under Fire," Science, 210:883, 1980. Please note: There has been some controversy surrounding the legitimacy of this quote, as is described at "Another Creationist Misquote. We at IDEA feel this quote is legitimate, and our reasoning is described here. Please note that in the past we HAVE removed illegitimate quotes. We are not in the business of putting up illegitimate quotes, as is described on our Quote Disclaimer and Explanation page. And we encourage individuals who have been asked to refrain from the usage of this quote NOT to do so. For more information, click here.)

"The modern understanding of the principle of biological continuity can be traced to Darwin (at the morphological level; see Eigen, 1992); with the advent of molecular biology, it has become an integral part of biology at the molecular level. Orgel (1968) suggested that the process may be guided by a "principle of continuity which requires that each stage in evolution develops continuously from the previous one."

("Biogenesis - [Naturalistic] Theories of Life's Origins," Noam Lahav , page 102(Oxford University Press, 1999)

"[L]arge evolutionary innovations are not well understood. None has ever been observed, and we have no idea whether any may be in progress. There is no good fossil record of any."

(Wesson, R., 1991, Beyond Natural Selection, MIT Press, Cambridge, MA, p. 206)

"We are faced more with a great leap of faith that gradual, progressive adaptive change underlies the general pattern of evolutionary change we see in the rocks than any hard evidence."

(Eldredge, N. and Tattersall, I. (1982) The Myths of Human Evolution Columbia University Press, p. 570

"The Darwinian struggle does not extrapolate to the tree of life"

(Stephen J. Gould, in The New York Review of Books)

"For any postulated stage in biogenesis there must be a continuous path backward to the prebiotic state of the earth and forward to modern organisms. To introduce molecular structures or processes that are not subject to continuity is once again to violate Ockham's razor."

(Morowitz (1992, p 27)

"...we have proffered a collective tacit acceptance of the story of gradual adaptive change, a story that strengthened and became even more entrenched as the synthesis took hold. We paleontologists have said that the history of life supports that interpretation, all the while really knowing that it does not."

(Eldredge, Niles, [Chairman and Curator of Invertebrates, American Museum of Natural History], "Time Frames: The Rethinking of Darwinian Evolution and the Theory of Punctuated Equilibria," Simon & Schuster: New York NY, 1985, p144)

"The final result of all my investigations and study, namely that the idea of evolution, tested by experiments in speciation and allied sciences, always leads to incredible contradictions and confusing consequences, on account of which the evolution theory ought to be entirely abandoned, will no doubt enrage many; and even more so my conclusion that the evolution theory can by no means be regarded as an inocuous natural philosophy, but that it is a serious obstruction to biological research. It obstructs- as has been repeatedly shown- the attainment of consistent results, even from iniform experimental material. For everything must ultimately be forced to fit this speculative theory. An exact biology cannot, therefore, be built up."

(Nils Heribert-Nilsson, Synthetische Arbildung Lund Sweden: C.W.K. Glerups (1953)

"The absence of fossil evidence for intermediary stages between major transitions in organic design, indeed our inability, even in our imagination, to construct functional intermediates in many cases, has been a persistent and nagging problem for gradualistic accounts of evolution."

(Gould, 1982a, p 140)

"The Modern Synthesis is a remarkable achievement. However, starting in the 1970s, many biologists began questioning its adequacy in explaining evolution. Genetics might be adequate for explaining microevolution, but microevolutionary changes in gene frequency were not seen as able to turn a reptile into a mammal or to convert a fish into an amphibian. Microevolution looks at adaptations that concern only the survival of the fittest, not the arrival of the fittest. As Goodwin (1995) points out, "the origin of species -- Darwin's problem -- remains unsolved."

(Scott Gilbert, John Opitz, and Rudolf Raff (1996) "Resynthesizing Evolutionary and Developmental Biology," Developmental Biology 173, Article No. 0032, 1996, p. 361)

"New concepts and information from molecular developmental biology, systematics, geology and the fossil record of all groups of organisms, need to be integrated into an expanded evolutionary synthesis. These fields of study show that large-scale evolutionary phenomena cannot be understood solely on the basis of extrapolation from processes observed at the level of modern populations and species."

(Carroll R.L., "Towards a new evolutionary synthesis," Trends in Ecology and Evolution, 2000, Vol. 15, pp.27-32)

"A large number of well-trained scientists outside of evolutionary biology and paleontology have unfortunately gotten the idea that the fossil record is far more Darwinian than it is. This probably comes from the oversimplification inevitable in secondary sources: low-level textbooks, semipopular articles, and so on. Also, there is probably some wishful thinking involved. In the years after Darwin, his advocates hoped to find predictable progressions. In general these have not been found yet the optimism has died hard, and some pure fantasy has crept into textbooks."

(Raup, David M. [Professor of Geology, University of Chicago], "Evolution and the Fossil Record," Science, Vol. 213, No. 4505, 17 July 1981, p.289)

"Neo-Darwinism has failed as an evolutionary theory that can explain the origin of species, understood as organisms of distinctive form and behaviour. In other words, it is not an adequate theory of evolution. What it does provide is a partial theory of adaptation, or microevolution (small- scale adaptive changes in organisms)."

(Goodwin, Brian [Professor of Biology, Open University, UK], "Neo-Darwinism has failed as an evolutionary theory," The Times Higher Education Supplement, May 19, 1995)

"The heart of the problem is whether living things do indeed vary to an unlimited extent... The species look stable. We have all heard of disappointed breeders who carried their work to a certain point only to see the animals or plants revert to where they had started. Despite strenuous efforts for two or three centuries, it has never been possible to produce a blue rose or a black tulip.

(Norman Macbeth, Darwin Retried: An Appeal to Reason, Harvard Common Press, New York: 1971, p. 33.)

"there are limits to the development possible [via selective breeding], and these limits follow a law."

(Luther Burbank, famous breeder, in Norman Macbeth, Darwin Retried: An Appeal to Reason, p. 36.)

"Instead of finding the gradual unfolding of life, what geologists of Darwin's time, and geologists of the present day actually find is a highly uneven or jerky record; tha tis, species appear in the sequence very suddently, show little or no change during their existence in the record, then abruptly go out of the record. And it is not always clear, in fact it's rarely clear, that the descendants were actually better adapted than their predecessors. In other words, biological improvement is hard to find."

(Dr. David M. Raup (Curator of Geology, Field Museum of Natural History, Chicago), "Conflicts between Darwin and paleontology". Field Museum of Natural History Bulletin, vol. 50(1), Jan 1979, pg. 23)

"I well remember how the synthetic theory beguiled me with its unifying power when I was a graduate student in the mid-1960's. Since then I have been watching it slowly unravel as a universal description of evolution. The molecular assault came first, followed quickly by renewed attention to unorthodox theories of speciation and by challenges at the level of macroevolution itself. I have been reluctant to admit it-since

beguiling is often forever-but if Mayr's characterization of the synthetic theory is accurate, then that theory, as a general proposition, is effectively dead, despite its persistence as textbook orthodoxy."

(Gould, Stephen Jay [Professor of Zoology and Geology, Harvard University, USA], "Is a new and general theory of evolution emerging?," Paleobiology, Vol. 6, No. 1, January 1980, p.120)

"The principal problem is morphological stasis. A theory is only as good as its predictions, and conventional neo-Darwinism, which claims to be a comprehensive explanation of evolutionary process, has failed to predict the widespread long-term morphological stasis now recognized as one of the most striking aspects of the fossil record."

(Williamson, Peter G. [Assistant Professor of Geology, Harvard University], "Morphological stasis and developmental constraint: real problems for neo-Darwinism", Nature, Vol. 294, 19 November 1981, p.214)

"When discussing organic evolution the only point of agreement seems to be: "It happened." Thereafter, there is little consensus, which at first sight must seem rather odd."

(Conway Morris, Simon [palaeontologist, Department of Earth Sciences, Cambridge University, UK], "Evolution: Bringing Molecules into the Fold," Cell, Vol. 100, pp.1-11, January 7, 2000, p.11)

"So, we have stasis. What are we to make of it? How do we explain it? Some of us would say that the lineage leading to Latimeria [Coelacanth] stood still because natural selection did not move it. In a sense it had no 'need' to evolve because these animals had found a successful way of life deep in the sea where conditions did not change much. Perhaps they never participated in any arms races. Their cousins that emerged onto the land did evolve because natural selection, under a variety of hostile conditions including arms races, forced them to. Other biologists, including some of those that call themselves punctuationists, might say that the lineage leading to modern Latimeria actively resisted change, in spite of what natural selection pressures there might have been. Who is right? In the particular case of Latimeria it is hard to know . ... Let us, to be fair, stop thinking in terms of Latimeria in particular. It is a striking example but a very extreme one ... It is conceivable that coelacanths stopped evolving because they stopped mutating perhaps because they were protected from cosmic rays at the bottom of the sea! - but nobody, as far as I know, has seriously suggested this ... "

(Dawkins R., "The Blind Watchmaker," [1986], Penguin: London, 1991, reprint, pp.246,247)

"If we wish to keep to the substance of the matter, the new scientific Weltanschauung not only brings to mind the ideas of many distinguished men such as Goethe, Cuvier, Linnaeus, Vico, Leibniz, Paracelsus, Cusano and Aristotle, but . . . the traditional view of a cosmos or systema naturae perceived as a static whole. . . . The result we believe must be striven for can therefore only be the following: biology will receive no advantage from following the teachings of Lamarck, Darwin and the modern hyper-Darwinists; indeed, it must as quickly as possible leave the narrow straits and blind alleys of the evolutionistic myth and resume its certain journey along the open and illuminated paths of tradition."

(G. Sermonti and R. Fondi, Dopo Darwin:Critica all Evoluzionismo (1980), translated by Montalenti, Darwinism Today, 77 Scientia 21, 29 (1983) (italics in original). See also Sermonti and Sermonti, The null hypothesis in vertebrate evolution, 80 Rivista di Biologia (Biology Forum) 55 (1987)

"At the higher level of evolutionary transition between basic morphological designs, gradualism has always been in trouble, though it remains the "official" position of most Western evolutionists. Smooth intermediates between Bauplane are almost impossible to construct, even in thought experiments; there is certainly no evidence for them in the fossil record (curious mosaics like Archaeopteryx do not count). Even so convinced a gradualist as G. G. Simpson (1944) invoked quantum evolution and inadaptive phases to explain these transitions."

(Gould, Stephen Jay [Professor of Zoology and Geology, Harvard University, USA] & Eldredge, Niles [Chairman and Curator of Invertebrates, American Museum of Natural History], "Punctuated equilibria: the tempo and mode of evolution reconsidered," Paleobiology, Vol. 3, 1977, pp.115-147, p.147)

"Such a threshold model is in accord with Mayr's notion of the `genetic revolution' occurring in small, isolated, and inbreeding populations; merely the terms are different. But all such schemes suffer from the fundamental weakness of evolutionary biology: they are extremely difficult to test and therefore remain metaphors. We do not yet know enough about the developmental biology of organisms to know whether such ideas are consistent with the way in which development actually works."

(Thomson, Keith Stewart [Professor of Biology and Dean of the Graduate School, Yale University, USA], "The Meanings of Evolution," American Scientist, Vol. 70, pp.529-531, September- October 1982, p.531)

"Yet the Coelacanth Latimeria, and the three genera of lungfish, have scarcely changed in hundreds of millions of years. Surviving Lingula ('lamp shells') are classified in the same genus as their ancestors of 400 million years ago, and could conceivably interbreed with them if introduced through a time machine. The question that still faces us is this. How can evolution be both so fast and so leadenly slow? How can there be so much variance in rates of evolution? Is stasis just due to stabilizing selection and lack of directional selection? Or is there something remarkably special going on in the (non) evolution of living fossils? As William Blake might have written to a coelacanth: Did he who made the haplochromids make thee?"

(Richard Dawkins, in his response to What Questions have dissappeared? entiteld, "As William Blake might have written to a coelacanth: Did he who made the haplochromids make thee?"

"More recent scientific insights indicate that neo-Darwinism is at best a partial explanation of how biological evolution occurs. The demise of Darwinian theory as a *full* explanation in no way alters the firm consensus of science that the universe has evolved. There is at the moment not one competing theory which can account for the observed facts."

"To say that there is a complete consensus among scientists that evolution has occurred does not mean there is complete understanding of the underlying mechanisms, or ways, in which evolution has occurred. Far from it. While evolution is a fact, how it occurs will

always be the subject of debate. This is the fascination of science. To put it another way, there is no dispute about the fact that evolution has occurred but there is dispute among scientists about how it has occurred."

(Price, Barry [former Director, School Physics Project, Australian Academy of Science], "The Creation Science Controversy," Millennium Books: Sydney, 1990, p8. Italics in original. note: So, Evolutionists claim it is a `fact' that evolution has occurred even though they don't know how it occurred)

"The simple observation that life has evolved-that forms that existed in the past no longer exist, whereas those that live today were absent millions of years ago-is not the same as a theory of evolution. Fossils are a chronicle of past life; they are not a history of past events. Such a history demands a causal theory of how and why one form became another."

(Lewontin, Richard C. [Professor of Zoology and Biology, Harvard University], "Human Diversity," Scientific American Library: New York NY, 1995, p146.18)

"We've got to have some ancestors. We'll pick those. Why? Because we know they have to be there, and these are the best candidates. That's by and large the way it has worked. I am not exaggerating."

(Nelson, Gareth [Chairman and Curator of the Department of Herpetology and Ichthyology, American Museum of Natural History, New York], interview, Bethell T., The Wall Street Journal, December 9, 1986, in Johnson P.E., "Darwin on Trial," InterVarsity Press: Downers Grove Ill., Second Edition, 1993, p76)

"Evolutionary biologists can no longer ignore the fossil record on the ground that it is imperfect."

(David S. Woodruff, professor of Biology at UCSD, in SCIENCE, 5-16-80, p.717)

"Paleontologists had long been aware of a seeming contradiction between Darwin's postulate of gradualism ... and the actual findings of paleontology. Following phyletic lines through time seemed to reveal only minimal gradual changes but no clear evidence for any change of a species into a different genus or for the gradual origin of an evolutionary novelty. Anything truly novel always seemed to appear quite abruptly in the fossil record."

(Mayr, E., 1991, One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought, Harvard University Press, Cambridge, p. 138)

"Gradual evolutionary change by natural selection operates so slowly within established species that it cannot account for the major features of evolution."

(Steven M. Stanley (Dept. of Earth and PLanetary Sciences, the Johns Hopkins University, Baltimore, USA), "A theory of evolution above the species level."
Proceedings of the National Academy of Sciences, USA, vol. 72(2) Feb 1975, pg. 646)

"The known fossil record is not, and has never has been, in accord with gradualism. What is remarkable is that, through a variety of historical circumstances, even the history of opposition has been obscured. ... 'The majority of paleontologists felt their evidence simply contradicted Darwin's stress on minute, slow, and cumulative changes leading to species transformation.' ... their story has been suppressed."

"[F]or more than a century biologists have portrayed the evolution of life as a gradual unfolding ... Today the fossil record ... is forcing us to revise this conventional view."

(Stanley, S. M., 1981, The New Evolutionary Timetable: Fossils, Genes, and the Origin of Species, Basic Books, Inc., Publishers, N.Y., p.71, 3)

"...Of course these things are marvels, and of course, the fossil record being what it is, no one can say with confidence exactly how any one of them came about."

(Deevey, Edward, Jr., Yale Review, 61, Summer (1967), pp.634-635.)

"For example, the assertion that populations of organisms can change in their genetic composition from one generation to another (i.e., evolve) is undisputed, even by the creationists. To say without qualification that "all present life has evolved from more primitive forms" is unscientific because such a statement is an absolute. A scientifically acceptable restatement is that `scientists have found a great deal of evidence from many sources which they have interpreted to be consistent with the theory that all present life has evolved from more primitive forms.'"

(Stansfield, William D. [Professor of Biological Sciences, California Polytechnic State University],"The Science of Evolution," [1977], Macmillan: New York NY, 1983, Eighth Printing, p9).

"If it is true that an influx of doubt and uncertainty actually marks periods of healthy growth in a science, then evolutionary biology is flourishing today as it seldom has flourished in the past. For biologists collectively are less agreed upon the details of evolutionary mechanics than they were a scant decade ago. Superficially, it seems as if we know less about evolution than we did in 1959, the centennial year of Darwin's on the Origin of Species."

(Eldredge, Niles [Chairman and Curator of Invertebrates, American Museum of Natural History], "Time Frames: The Rethinking of Darwinian Evolution and the Theory of Punctuated Equilibria," Simon & Schuster: New York NY, 1985, p.14)

"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 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..."

(M. Denton, in "Evolution:A Theory in Crisis", pg 16, 353 (1985)

"Each class at molecular level is unique, isolated and unlinked by intermediates. Thus, molecules, like fossils, have failed to provide the elusive intemediates so long sought by evolutionary biology... At a molecular level, no organism is "ancestral" or "primitive" or "advanced" compared with its relatives... There is little doubt that if this molecular evidence had been available a century ago... the idea of organic evolution might never have been accepted"

(Michael Denton. Evolution: A Theory in Crisis. London: Burnett Books, 1985, pp. 290-91.)

Functional intermediates:

"If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down."

(Charles Darwin, Origin of the Species)

"In The Origin of Species Darwin stated:

'If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down.'

A system which meets Darwin's criterion is one which exhibits irreducible complexity. By irreducible complexity I mean a single system which is composed of several interacting parts that contribute to the basic function, and where the removal of any one of the parts causes the system to effectively cease functioning. An irreducibly complex system cannot be produced gradually by slight, successive modifications of a precursor system, since any precursor to an irreducibly complex system is by definition nonfunctional. Since natural selection requires a function to select, an irreducibly complex biological system, if there is such a thing, would have to arise as an integrated unit for natural selection to have anything to act on. It is almost universally conceded that such a sudden event would be irreconcilable with the gradualism Darwin envisioned."

(Michael Behe, from "Molecular Machines: Experimental Support for the Design Inference" available at http://www.arn.org/docs/behe/mb_mm92496.htm)

"The response I have received from repeating Behe's claim about the evolutionary literature *which simply brings out the point being made implicitly by many others, such as Crick, Denton, Shapiro, Stanley, Taylor, Wesson *is that I obviously have not read the

right books. There are, I am assured, evolutionists who have described how the transitions in question could have occurred. When I ask in which books I can find these discussions, however, I either get no anser or else some titles that, upon examination, do not in fact contain the promised accounts. That such accounts exist seem to be something that is widely known, but I have yet to encounter someone who knows where they exist." David Griffin, Religion and Scientific Naturalism."

(David Griffith, *Religion and Scientific Naturalism*, SUNY Press, 2000., Footnote 23, p. 287)

"The following phenomena are of particular concern to biologists:

1. The origin of major new structures: 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. 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?

2. The extremely irregular occupations of the adaptive space as opposed to the nearly continuous spectrum of evolutionary change postulated by Darwin. Although an almost incomprehensible number of species inhabit earth today, they do not form a continous specrum 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, turles, insects, or jellyfish, and plants as conifers, ferns, or orchids. Even with millions of living species, here are only a very few that do not fit into recognizable taxonomic categories. Of all living mammals, only the tree shrews are difficult to classify....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.

One might hypothesize a very different pattern among extinct plants and animals: Fossils 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. In fact, most well-preserved fossils are as readily classified in a relatively small number of major groups as are living species....

Compared with the millions of specimens of trilobites that have been collected, there are very few that might be thought to bridge the gap between tribolites and any other group of extinct anthropods. The number of species that bridge the gaps between dinosaurs and

more primitive reptiles and between dinosaurs and birds is very small compared with the number that everyone recognizes as dinosaurs. How do we account for the extremely irregular distribution of basic body plans in space and time under a theory of evolution based on gradual and continuous change?"

(Robert Carroll, Patterns and Processes of Vertebrate Evolution, Cambridge: Cambridge University Press, 1997, pp. 8-10)

"There are a number of problems with hypothetical schemes capable of producing rapid, large, coherent changes in phenotypes. Equally large immediate changes in the genotype might be needed, and any large change in genotype or phenotype must surely be sufficiently disruptive to be lethal. And where would a large change in a phenotype or genotype come from? Moreover, suppose an oddity were to be produced, how would a population be established and maintained?"

(Thomson, Keith Stewart [Professor of Biology and Dean of the Graduate School, Yale University, USA], "The Meanings of Evolution," American Scientist, Vol. 70, pp.529-531, September-October 1982, p.530)

"The organism, being a functionally integrated whole each part of which stood in close relation to every other part, could not, under pain of almost immediate extinction, depart significantly from the norms established for the species by the first anatomical rule." "A major change, for example, a sharp increase in the heart beat or the diminution by half of the kidney and thus a reduction in renal secretion, would by itself have wrought havoc with the general constitution of the animal. In order that an animal might persist after a change of this magnitude it would be necessry that the other organs of the body be also proportionally modified. In other words, an organism must change en bloc or not at all. Only saltatory modification could occur, and this idea was to Cuvier, as it is to most modern zoologists, but for very different reasons, unverified and basically absurd. Transmutation by the accumulation of alterations, great or small, would thus be impossible."

(Coleman, W. (1964) Georges Cuvier: Zoologist Harvard University Press Cambridge, Mass, pp 172-73)

(Denton, 1986, p. 18)

"Gradualists and saltationists alike are completely incapable of giving a convincing explanation of the quasi-simultaneous emergence of a number of biological systems that distinguish human beings from the higher primates: bipedalism, with the concomitant modification of the pelvis, and, without a doubt, the cerebellum, a much more dexterous hand, with fingerprints conferring an especially fine tactile sense; the modifications of the pharynx which permits phonation; the modification of the central nervous system, notably at the level of the temporal lobes, permitting the specific recognition of speech. From the point of view of embryogenesis, these anatomical systems are completely different from one another. Each modification constitutes a gift, a bequest from a primate family to its descendants. It is astonishing that these gifts should have developed simultaneously. Some biologists speak of a predisposition of the genome. Can anyone actually recover the predisposition, supposing that it actually existed? Was it present in

the first of the fish? The reality is that we are confronted with total conceptual bankruptcy."

(Schutzenberger M-P, "The Miracles of Darwinism: Interview with Marcel-Paul Schutzenberger," Origins & Design, Vol. 17, No. 2, Spring 1996, pp.10-15. Also at http://www.arn.org/docs/odesign/od172/schutz172.htm)

"Biologists have an adolescent fascination with sex. Like teenagers, they are embarrassed by the subject because of their ignorance. What sex is, why it evolved and how it works are the biggest unsolved problems in biology. Sex must be important as it is so expensive. If some creatures can manage with just females, so that every individual produces copies of herself, why do so many bother with males? A female who gave them up might be able to produce twice as many daughters as before; and they would carry all her genes. Instead, a sexual female wastes time, first in finding a mate and then in producing sons who carry only half of her inheritance. We are still not certain why males exist; and why, if we must have them at all, nature needs so many. Surely, one or two would be enough to impregnate all the females but, with few exceptions, the ratio of males to females remain stubbornly equal throughout the living world."

(Jones, Steve, The Language of Genes (New York: Doubleday, 1993), pg. 84)

Eyes:

"The common trait of the eyes and the wings is that they can only function if they are fully developed. In other words, a halfway-developed eye cannot see; a bird with half-formed wings cannot fly. How these organs came into being has remained one of the mysteries of nature that needs to be enlightened."

(Engin Korur, "Gozlerin ve Kanatlarin Sirri"(The Mystery of the Eyes and the Wings), Bilim ve Teknik, No 203, October 1984, p. 25.)

"I remember well the time when the thought of the eye made me cold all over, but I have got over this stage of complaint..."

"... and now trifling particulars of structure often make me very uncomfortable. The sight of a feather in a peacock's tail, whenever I gaze at it, makes me sick!"

(Charles Darwin in a letter to Asa Gray on April 3, 1860 as recounted in Norman Macbeth, Darwin Retried: An Appeal to Reason. Boston, Gambit, 1971. s.101)

"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?"

("In the Minds of Men: Darwin and the New World Order", by researcher Ian Taylor Third Edition, TFE Publishing, Fourth Printing, 1992, p. 169)

"the trilobites used an optimal design which would require a welltrained and imaginative optical engineer to develop today"

(David Raup, "Conflicts Between Darwin and Paleontology", Bulletin, Field Museum of Natural History, Vol 50, January 1979, p. 24.)

"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"

(Frank Salisbury, "Doubts About the Modern Synthetic Theory of Evolution", American Biology Teacher, September 1971, p. 338.)

"To suppose that the eye with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light and for the correction of spherical and chromatic aberration, could have been formed by natural selection, seems, I freely confess, absurd in the highest degree."

"The observation that mammals and insects, which have evolved separately for more than 500 million years, share the same master control gene for eye morphogenesis indicates that the genetic control mechanisms for development are much more universal than anticipated"

(Halder, Georg; Patrick Callaerts and Walter J. Gehring. "Induction of Ectopic Eyes by Targeted Expression of the eyeless Gene in Drosophila" p 1788-1792 v 267 Science. 24 March 1995)

(Charles Darwin, Origin of Species, chapter "Difficulties")

"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."

(Gregory R.L., "Eye and Brain: The Psychology of Seeing," [1966], Weidenfeld & Nicolson: London, Second edition, 1972, p.25)

"How came the Bodies of Animals to be contrived with so much Art, and for what ends were their several parts? Was the Eye contrived without Skill in Opticks, and the Ear without Knowledge of Sounds? ... And these things being rightly dispatch'd, does it not appear from Phaenomena tha tthere is a Being incorporeal, living, intelligent omnipresent..."

(Sir Isaac Newton, Opticks, 369-370 (Dover PUblications 1952)

"A favorite example of those trying to find evidence of self-organization is the human eye. So exquisitely designed, with its adjustable lens and iris, with its retina capable of rendering images better than any camera- the eye surely could not have developed from the blind meanderings of evolution. Or so it seems to Darwin's critics. The eighteenth-century theologian William Paley considered the eye and other precisely engineered organs as proof of an intelligent creator. But, again, one doesn't have to be a creationist to have difficulty accepting that eyes arose purely from random variation and selection."

(Johnson, George [science writer], "Fire in the Mind: Science, Faith, and the Search for Order," [1995], Penguin Books: London, 1997, p267)

Mammals:

"All the members of [the class Mammalia] exhibit a number of unique features which are not found in any other group of organisms. They include: a hairy integument, each hair being a complex structure consisting of a keratinized cuticle, a cortex and a central medulla; mammary glands exhibiting alveoli surrounded by a network of myoepithelial cells responsive to the hormone oxytocin producing milk, a nutritious secretion containing fat globules and sugars; specialized sweat glands in the skin; a four-chambered heart with left ventricle delivering acreated blood to the aorta; discrete and reniform kidneys, with nephron form and function specialized to generate a concentrated urine containing a high concentrated of urea; a large cerebral cortex with distinctive six layers of cells; a diaphragm, a special muscle used by mammals for respiration; three highly specialized ear ossicles; the organ of corti, a specialized organ for reception and analysis of sound."

"...Each of these characteristics are exhibited by *all* mammals in essentially invariant form..."

(Denton states in _Evolution: A Theory in Crisis_ (Bethesda, MD: Adler & Adler, 1986), 105-106:)

". . . the fine control mechanisms of temperature regulation are necessary so that neither alterations in the rate of metabolic heat output during differing levels of activity, nor variations in ambient temperature are allowed to cause a change in body temperature. Thus hair, sweat glands, and specialized skin blood vessels must evolve. More indirectly, but equally important in the functioning of endothermy, are several other aspects of the biology of mammals. The locomotory apparatus must become capable of carrying the animal about in search of its some tenfold increase in food requirements.

"The feeding apparatus has to ingest at this greater rate and also assist in the breakdown of the food, a process which would be far too slow if left solely to the intestinal processes. The diaphragm is needed for the greater rate of external gas exchange that occurs. The potential increase in water loss that would result from the higher temperature and greater breathing rate must be combated by the kidney, and finally the sense organs and central nervous system must be designed to organize and control these activities."
"The blood pressure in the renal artery supplying the kidneys is high and the number of kidney tubules is large. The first point about the mammalian kidney, therefore, is that there is a very high ultrafiltration rate of the blood. The second point is the very long loop of Henle, which is associated with the production of a concentrated, hypertonic urine, the main means of water conservation. The third point of importance is that by producing hypertonic urine, sufficient water is conserved that the animal can afford to excrete liquid. There is therefore a flow of aqueous solution passing out of the body which gives the opportunity for very fine regulation of the plasma levels of ions and other soluble substances. By appropriate rates of excretion into or reabsorption from the fluid flowing through the kidney tubules, the level of each ion or molecule can be maintained constant in the blood."

"The heart and circulatory system must be designed to produce the high blood pressure needed by the kidney. There must also be a complex endocrine system in order to detect the level of each of the substances controlled and to initiate appropriate rates of secretion and reabsorption in the kidney tubules."

(T. S. Kemp, a leading expert on the evolutionary origin of mammals, stating the following about some of the necessary changes in going from a reptile to a mammal. (Quotes taken from Duane Gish, _Evolution the Fossils Still Say NO!_ [El Cajon, CA: Institute for Creation Research, 1995], 155-157, who is quoting from T. S. Kemp, _Mammal-like Reptiles and the Origin of Mammals_ [New York: Academic Press, 1982], 306, 309-310.)

"The problem for Darwinians is in trying to find an explanation for the immense number of adaptions [sic] and mutations needed to change a small and primitive earthbound mammal, living alongside and dominated by dinosaurs, into a huge animal with a body uniquely shaped so as to be able to swim deep in the oceans, a vast environment previously unknown to mammals. Notable complexities in whale evolution concern the eye, subtly changed so that light rays through the sea water are brought to focus on the retina; the skin, which has a curious outer surface helping to streamline the flow of water; the replacement of sweat glands by a thick layer of blubber fat to control the body temperature; the superb hearing system; the way in which a female whale suckles her young under water without them drowning; and the plates of baleen which hang like curtains, instead of teeth, from the roof of the mouth of whalebone whales, acting as perfectly designed sieves for the tiny crustaceans which form their food (panel 13). All this has to evolve in at most five to ten million years - about the same time as the relatively trivial evolution of the first upright walking apes into ourselves."

(Hitching F., "The Neck of the Giraffe," 1982, p.90)

Birds:

"The fact that birds may be descended from dinosaurs does not in the least make birds dinosaurs. Yet in a recent classification one author has designated all of the birds as dinosaurs. How silly can one be? Here is a case of allowing logic to run away with the logician into a never-never land of unreality. It is the kind of exercise that so delighted W.S. Gilbert of Gilbert and Sullivan fame (take note especially of such works as Iolanthe and The Pirates of Penzance)."

(Colbert E.H., "Digging Into the Past: An Autobiography," Dembner: New York NY, 1989, p.435. Note: And if it isn't a "fact" that birds descended from dinosaurs, such nomenclature is even more ridiculous!)

"Is Archaeopteryx the ancestor of all birds? Perhaps yes, perhaps no: There is no way of answering the question. It is easy enough to make up stories of how one form gave rise to another, and to find reasons why the stages should be favored by natural selection. But such stories are not part of science, for there is no way of putting them to the test." (Sunderland, Luther D. (1984), Darwin's Enigma, San Diego, Master Books, p.89)
"Feathers are unique to birds, and no known structure intermediate between scales and feathers has been identified."

(J. Alan Feduccia, The Age of Birds, Harvard University Press, 1980, pg. 52)

"Every feature from gene structure and organization, to development, morphogenesis and tissue organization is different [in feathers and scales]. "

"feathers appear suddenly in the fossil record, as an 'undeniably unique' character distinguishing birds"

(A.H. Brush, "On the Origin of Feathers" Journal of Evolutionary Bioglogy, vol.9, 1996, s.132)

"Feathers are features unique to birds, and there are no known intermediate structures between reptilian scales and feathers. Notwithstanding speculations on the nature of the elongated scales found on such forms as Longisquama ... as being featherlike structures, there is simply no demonstrable evidence that they in fact are. They are very interesting, highly modified and elongated reptilian scales, and are not incipient feathers."

(Feduccia, Alan (1985), "On Why Dinosaurs Lacked Feathers", The Beginning of Birds, Eichstatt, West Germany: Jura Museum, p. 76)

"The origin of birds is largely a matter of deduction. There is no fossil evidence of the stages through which the remarkable change from reptile to bird was achieved."

(W.E. Swinton, Chapter 1, in Biology & Comparative Physiology of Birds, A.J. Marshall (editor), Academic Press, New York, Vol. 1, 1960, pg. 1)

"I cannot really understand how an organ perfectly designed for flight may have emerged for another need at the beginning"

(Douglas Palmer, "Learning to Fly", (review of The Origin of and Evolution of Birds by Alan Feduccia, Yale University press, 1996) New Scientist, cilt 153, 1 March 1997, s. 44)

"Well, I've studied bird skulls for 25 years and I don't see any similarities whatsoever. I just don't see it... The theropod origins of birds, in my opinion, will be the greatest embarrassment of paleontology of the 20th century."

(Alan Feduccia as quoted in Pat Shipman, "Birds Do It... Did Dinosaurs?", p. 28.)

"To tell you the truth, if I had to support the dinosaur origin of birds with those characters, I'd be embarrassed every time I had to get up and talk about it."

(Larry Martin as quoted in Pat Shipman, "Birds Do It... Did Dinosaurs?", p. 28)

"It is not difficult to imagine how feathers, once evolved assumed additional functions, but how they arose initially presumably from reptilian scales, defies analysis."

(Stahl, Barbara J. [Professor of Biology, Saint Anselm College, USA], "Vertebrate history: Problems in Evolution," Dover: New York, 1985, p349)

Cambrian Explosion:

"Zircon dating, which calculates a fossil's age by measuring the relative amounts of uranium and lead within the crystals, had been whittling away at the Cambrian for some time. By 1990, for example, new dates obtained from early Cambrian sites around the world were telescoping the start of biology's Big Bang from 600 million years ago to less than 560 million years ago. Now, with information based on the lead content of zircons from Siberia, virtually everyone agrees that the Cambrian started almost exactly 543 million years ago and, even more startling, that all but one of the phyla in the fossil record appeared within the first 5 million to 10 million years. "We now know how fast fast is," grins Bowring. "And what I like to ask my biologist friends is, How fast can evolution get before they start feeling uncomfortable?"

(Nash J.M., "When Life Exploded", Time, December 4, 1995, p74, also found at http://www.time.com/time/magazine/archive/1995/951204/cover.html Please also note that some scientists have estimated that the Chienjang site containing Cambrian explosion fossils shows an explosion happening in as short as 2 million years! E-mail the the author (idea@ucsd.edu)of this page for more info.)

"If numerous species, belonging to the same genera or families, have really startedinto life all at once, the fact would be fatal to the theory of descent with slow modification through natural selection."

(Charles Darwin, The Origin of Species: A Facsimileof the First Edition, Harvard University Press, 1964, p. 302.)

"The appearance of many novel morphologies, frequently expressed taxanomically as new phyla, classes, or orders, occurs with such rapidity in evolutionary time that microevolutionary substitutions involving structural genes seem and implausible mechanism."

("Hopeful monsters," transposons, and Metazoan radiation by Douglas H. Erwin and James W. Valentine in Proc Natl Acad. Sci. USA, Vol 81, pp 5482-5483, September 1984)

"The drawback for scientists is that nature's shrewd economy conceals enormous complexity. Researchers are finding evidence that the Hox genes and the non-Hox homeobox genes are not independent agents but members of vast genetic networks that connect hundreds, perhaps thousands, of other genes. Change one component, and myriad others will change as well--and not necessarily for the better. Thus dreams of tinkering with nature's toolbox to bring to life what scientists call a "hopeful monster"- such as a fish with feet--are likely to remain elusive."

(Nash J.M., "Where Do Toes Come From?," Time, Vol. 146, No. 5, July 31, 1995. Also at http://www.time.com/time/magazine/archive/1995/950731/950731.science.html.)

"Schwartz ignores the fact that homeobox genes are selector genes. They can do nothing if the genes regulated by them are not there. It is these genes that specify in detail the adaptive structure of the organs. To be sure, turning on a homeobox gene at the wrong place can result in the appearance of an ectopic organ, but only if the genes for that organ are present in the same individual. It is totally wrong to imply that an eye could be produced by a macromutation when no eye was ever present in the lineage before. Homeotic mutations that reshuffle parts do happen, and sometimes they may have led to fixation of real evolutionary novelties, but this does not mean that such changes are implied in the majority of speciations. In fact, macromutations of this sort are probably frequently maladaptive, in contrast to the vast number of past and present species-not to mention the fact that morphological differences between related species can be minute."

(Book review of *Sudden Origins: Fossils, Genes, and the Emergence of Species* by Jeffrey H. Schwartz (Wiley: 1999). by Eors Szathmary in NATURE VOL 399 24 JUNE 1999 745)

"A record of pre-Cambrian animal life, it appears, simply does not exist. Why this lamentable blank? Various theories have been proposed; none is too satisfactory. It has been suggested, for example, that all the Pre- Cambrian sediments were deposited on continental areas, and the absence of fossils in them is due to the fact that all the older animals were sea- dwellers. But that all these older sediments were continental is a theory which opposes, without proof, everything we know of deposition in later times. Again, it is suggested that the Pre-Cambrian seas were poor in calcium carbonate, necessary for the production of preservable skeletons; but this is not supported by geochemical evidence. Yet again, it is argued that even though conditions were amenable to the formation of fossilizable skeletal parts, the various phyla only began to use these possibilities at the dawn of the Cambrian. But it is, a priori, hard to believe that the varied types present in the early Cambrian would all have, so to speak, decided to put on armour simultaneously. And, once again, it has been argued that the whole evolution of multicellular animals

took place with great rapidity in late Pre-Cambrian times, so that a relatively short gap in rock deposition would account for the absence of any record of their rise. Perhaps; but the known evolutionary rate in most groups from the Cambrian on is a relatively leisurely one, and it is hard to convince oneself that a sudden major burst of evolutionary advance would be so promptly followed by a marked 'slowdown'. All in all, there is no satisfactory answer to the Pre- Cambrian riddle."

(Romer A.S., "The Procession of Life," The World Publishing Co: Cleveland OH, 1968, pp.19-20)

"Since the identification of the Lower Cambrian "Yunnanozoon" as a chordate in 1995, large numbers of complete specimens of soft-bodied chordates from the Lower Cambrian Maotianshan Shale is central Yunnan (southern China) have been recovered. Here we describe a recently discovered craniate-like chordate, Haikouella lanceolata, from 305 fossil specimens in Haikou near Kunming. This 530 million-year-old (Myr) fish-like animal resembles the contemporaneous "Yunnanozoon" from the Chengjkiang fauna (about 35km southeast of Haikou) in several anatomic features. But Haiouella also has several additional anatomic features: a heart, ventral and dorsal aorta, an anterior branchial arterial, gill filaments, a caudal projection, a nerural cord with a relatively large brain, a head with possible lateral eyes, and a ventrally situated buccal cavity with short tentacles. These findings indicate the Haikouella probably represents a very early craniate-like chordate that lived near the beginning od the Cambrian period during the main burst of the Casmbrian explosion. These findings will add to the debate on the evolutionary transition from invertebrate to vertebrate."

(Jun-Yuan Chen, Di-Ying Huang and Chia-Wei Li "An early Cambrian craniate-like chordate" 2 December 1999, Vol.402, No. 6761, p.518, http://www.natureasia.com/)

"How this earliest chordate stock evolved, what stages of development it went through to give rise eventually to truly fish-like creatures we do not know."

(F. D. Ommanney, The Fishes, Life Nature Library, Time Inc, pg. 60)

Embryology:

"The wide variation in morphology among vertebrate embryos is difficult to reconcile with the idea of a phylogenetically-conserved tailbud stage, and suggests that at least some developmental mechanisms are not highly constrained"

(Michael K. Richardson et al., “There is no highly conserved stage in the vertebrates: implications for current theories of evolution and development,” Anatomy and Embryology 196 (1997): 91-106)

"If ontogeny repeated phylogeny exactly, then an ancestor of man would have lived on milk all his life and a more remote ancestor would have spent his days attached to his mother by the umbilical cord!"

(Cohen, Jack & Massey, Brendan [embryologist, University of Birmingham], "Living Embryos," [1963], Pergamon Press: Oxford, Third Edition, 1982, p149. Note: this is just a funny quote, please don't take this quote too seriously!)

"Haeckel misstated the evolutionary principle involved. It is now firmly established that ontogeny does not repeat phylogeny"

(G. G. Simpson, W. Beck, An Introduction to Biology, New York, Harcourt Brace and World, 1965, p. 241)

"The earliest cell divisions in zebrafish, turtle, and chick embryos are somewhat similar, but in most frog; they penetrate the yolk. Mammals are completely different, however, since one the second cleavage planes is at a right angle to the other. (Figure 5-3, second row) Continued cleavage in the other four classes produces a stable arrangement of cells, but mammalian embryos become a jumbled mass. At the end of cleavage, the cells of the zebrafish embryo form a large cap on top of the yolk; in the frog they form a ball with a cavity, in the turtle and chick they form a thin, two-layered disc on top of the yolk; and in humans they form a disc within a ball. (Figure 5-3, third row) Cell movements during gastrulation are very different in the five classes: In zebrafish the cells crawl down the outside of the yolk; in frogs they move as a coherent sheet through a pore into the inner cavity; and in turtles, chicks, and humans they stream through a furrow into the hollow interior of the embryonic disc. (Figure 5-3, fourth row) If the implications of Darwin's theory for early vertebrate development were true, we would expect these five classes to be most similar as fertilized eggs; slight differences would appear during cleavage, and the classes would diverge even more during gastrulation. What we actually observe, however, is that the eggs of the five classes start out noticeably different from each other; the cleavage patterns in four of the five classes show some general similarities, but the pattern in mammals is radically different."

(Wells J., "Icons of Evolution: Science or Myth? Why Much of What We Teach About Evolution is Wrong," Regnery: Washington DC, 2000, p.97)

"It was expected that the embryo would recapitulate the features of its ancestors from the lowest to the highest forms in the animal kingdom. Now that the appearance of the embryo at all stages are known, the general feeling is one of disappointment; the human embryo at no stage is anthropoid in its appearance."

(Sir Arthur Keith, The Human Body (1932), p. 94. Cited by Wysong, ref [7], p. 399)

"Surely the biogenetic law is as dead as a doornail. It was finally exercised from biology textbooks in the fifties. As a topic of serious theoretical inquiry, it was extinct in the twenties."

(Keith S. Thompson, "Ontogeny and Phylogeny Recapitulated," American Scientist (Vol. 76, May/June, 1988), p. 273.)

"Rotational holoblastic cleavage. It is not surprising that mammalian cleavage has been the most difficult to study. Mammalian eggs are among the smallest in the animal kingdom ... knowledge of mammalian cleavage was worth waiting for, as mammalian cleavage turned out to be strikingly different from most other patterns of embryonic cell division. ... There are several features of mammalian cleavage that distinguish it from other cleavage types. ... The second fundamental difference is the unique orientation of mammalian blastomeres with relation to one another. The first cleavage is a normal meridional division; however, in the second cleavage one of the two blastomeres divides meridionally and the other divides equatorially (Figure 5.21). This type of cleavage is called rotational cleavage (Gulyas, 1975). The third major difference between mammalian cleavage and that of most other embryos is the marked asynchrony of early division. Mammalian blastomeres do not all divide at the same time. Thus, mammalian embryos do not increase evenly from 2- to 4- to 8-cell stages, but frequently contain odd numbers of cells. Also, unlike almost all other animal genomes, the mammalian genome is activated during early cleavage and the genome produces the proteins necessary for cleavage to occur. ... "

(Gilbert S.F., "Developmental Biology," Sinauer Associates: Sunderland MA, Fourth Edition, 1994, pp.177-178)

"Compaction. Perhaps the most crucial difference between mammalian cleavage and all other types involves the phenomenon of compaction. As seen in Figure 5.22, mammalian blastomeres through the 8-cell stage form a loose arrangement with plenty of space between them. Following the third cleavage, however, the blastomeres undergo a spectacular change in their behavior. They suddenly huddle together, maximizing their contact with the other blastomeres and forming a compact ball of cells (Figures 5.22 C,D and 5.23). This tightly packed arrangement is stabilized by tight junctions that form between the outside cells of the ball, sealing off the inside of the sphere (Figure 5.24). The cells within the sphere form gap junctions, thereby enabling small molecules and ions to pass between the cells..."

(Gilbert, 1994, pp.178-179)

"In fact, the most obvious structural characteristics of either the eggs or the cleavage stages of a shark, a salmon, a frog, a bird, or a mammal are unique each to its own class, not generally shared. We would not consider them very much alike unless we had been taught so at a very early age. Very few vertebrates pass through a stage which can strictly be called a blastula. The embryo in its period of most active morphogenetic movements is usually called a gastrula, but as all agree this word has no morphologic meaning anymore. Each class of vertebrates (in mammals we might almost say each particular

order) develops and then loses its own set of temporary structures-like the parade ground "formations of maneuver"- during this period."

(Ballard W.W., "Problems of Gastrulation: Real and verbal," BioScience, Vol. 26, No. 1., January 1976, pp.36-39, p.38)

"Homologous structures are often specified by non-homologous genetic systems and the concept of homology can seldom be extended back into embryology."

(Michael Denton, Evolution: A Theory in Crisis. London, Burnett Books, 1985, p. 145.)

Insects:

"Given that so many insects play off chemical "artillery" in defense, there can be no question that diverse spray-aiming mechanisms remain to be discovered among insects. Photography and cinematography could prove helpful in elucidating how these mechanisms operate. Questions remain, however, even about S. insignis itself. Although we know that the males of this species also aim their discharges, they appear to do so with an apparatus that differs somewhat from that of the female. Thus, for instance, for ejecting forward over the back, males make use of a single broad reflective shield, instead of the pair of devices used by the female (data not shown). We are also ignorant about whether S. insignis always discharges from both glands simultaneously or whether it does so from one gland at a time. And, of course, there is the vexing problem of how the beetle, which inevitably drenches itself when discharging, withstands the heat and irritancy of its own spray."

(Proceedings of that Natonal Academy of Sciences, Vol. 96, Issue 17, 9705-9709, August 17, 1999, Ecology Spray aiming in the bombardier beetle: Photographic evidence (chemical defense / quinones / Carabidae / Formicidae), Thomas Eisner, and Daniel J. Aneshansley, can be read at "http://www.pnas.org/cgi/content/full/96/17/9705. Note: not only do the male and female spray differently, but there are lots of other spray mechanisms among insects. Must it be convergent evolution once again?)

"The better we understand the functioning of insect wings, the more subtle and beautiful their designs appear. Structures are traditionally designed to deform as little as possible; mechanisms are designed to move componant parts in predictable ways. They have few if any technological parallels yet."

(Robin J. Wootton, "The Mechanical Design of Insect Wings", Scientific American, v. 263, November 1990, p.120)

Peppered Moths Machines:

"[T]he species probably only exceptionally rests on tree trunks. . . . [Thus] it can be emphasized that the results of Kettlewell fail to demonstrate the qualitative predation of the morphs [i.e., varieties] of the Peppered Moth by birds or other predators in natural conditions."

(Kauri Mikkola, Biological Journal of the Linnean Society 21, 1984, p. 416)

"We agree with Mikkola's critique of field experiments to estimate the relative fitness of the phenotypes of B. betularia [the scientific name for peppered moths] by using moths exposed on tree trunks. Such predation experiments must take into account the full range of the moth's resting sites in more, or less exposed positions."

(Tony G. Liebert and Paul M. Brakefield, Biological Journal of the Linnean Society 31, 1987, p. 145)

"We are, however, convinced that exposed areas of tree trunks are not an important resting site for any form of B. betularia."

(Rory J. Howlett and Michael E. N. Majerus, Biological Journal of the Linnean Society 30, 1987, p. 40)

"[P]eppered moths do not naturally rest in exposed positions on tree trunks."

(Michael E. N. Majerus, ,Melanism: Evolution in Action, Oxford, 1998, p. 121)

Molecular Machines:

"Cells have hundreds of different types of molecular motors, each specialized for a particular function. Many biological motor-like proteins have been discovered and characterized in recent years (see, for example, ref 1). Although there is much variation in design and performance among them, several lines of evidence suggest that many such "mechanochemical" proteins share fundamental underlying features that can be understood with the same basic concepts and theories. Such theories seek to describe the physical principles that govern the behavior of molecular motors, to explain the role of fluctuations in their operation, to describe the nature of the coupling between chemical reaction and physical coordinates, and to understand specific aspects of this conversion, such as its efficiency and reversibility."

(The Physics of Molecular Motors, in Accounts of Chemical Research, written by Carlos Bustamante of UC-Berkeley, David Keller of the University of New Mexico and George Oster of Berkeley. No. 5, May 15, 2001)

"the most elementary type of cell constitutes a 'mechanism' unimaginably more complex than any machine yet thought up, let alone constructed, by man."

(W. H. Thorpe [evolutionist scientist] as quoted in W. R. Bird, The Origin of Species Revisited., Nashville: Thomas Nelson Co., 1991, pp. 298-99)

"The-eukaryotic flagellum is a complex biochemical machine that moves cells or moves materials over the surface of cells, such as in the mammalian esophagus, oviduct or in protozoa. It is composed of over 250 polypeptides that must be assembled into a number of different structures and each structure must be attached with an exact periodicity along the microtubules. Once the flagellum is assembled, each of the components must act in concert and in three dimensions to produce a complex waveform. This review provides an outline of the composition and function of the different structures found in the flagella of Chlamydomonas."

(Susan Dutcher, "Flagellar assembly in two hundred and fifty easy-to-follow steps" Trends in Genetics Volume 11, Issue 10)

"The post-reductionist era has been with us for some time, and cell biologists are now accomplished reconstructionists, building pictures of cellular structures from proteins identified through biochemistry and genetics. Understanding the beauty of cellular structures requires a knowledge of their inner architecture and engineering." "The complexity of Millennium domes, Eiffel towers and 'Ferris wheels' are likely just pale reflections of life at the heart of the cell."

("The nano-scale architecture of the nucleus" Paul Ko Ferrigno, Trends in Cell Biology 2000, 10:366)

"More so than other motors, the flagellum resembles a machine designed by a human"

(David J. DeRosier, Cell 93, 17 (1998)

"As a final comment, one can only marvel at the intricacy in a simple bacterium, of the total motor and sensory system which has been the subject of this review and remark that our concept of evolution by selective advantage must surely be an oversimplification. What advantage could derive, for example, from a "preflagellum" (meaning a subset of its components), and yet what is the probability of "simultaneous" development of the organelle at a level where it becomes advantageous"

(Macnab, R. (1978), "Bacterial Mobility and Chemotaxis: The Molecular Biology of a Behavioral System", CRC Critical Reviews in Biochemistry, vol. 5, issue 4, Dec., pp. 291-341)

"But the level of sophistication within the 'simplest' living cell goes far beyond this. We need to think in terms of what modern engineers call high technology. A spade is an example of low technology. To function for digging a garden all that a spade requires is a 'willing' and hard working gardener, to take it up and use it; the spade's function to turn over the earth is so fulfilled. But after finishing the digging, the gardener decides to relax by going for a drive in the car. All that is required is to sit at the wheel, operate the starter and move forwards. The car represents high technology; it contains many components which function together, for example a steering wheel, road wheels, internal combustion engine, fuel system, ignition system, etc. Each of these components is interesting and requires skill to make, but each has no meaning in terms of function by itself unlike the spade whose function is complete in itself. This interdependency of parts is what is meant by high technology.... As we encounter high technology, in the articles we use everyday, we immediately think in terms of engineering design."

(Mirrors of Creation," by E.J. Ambrose, Emeritus Professor of Cell Biology at the University of London)

"The rotary motor of E. coli. The rotor is attached rigidly to the inner end of the shaft, the outer end of which connects to the hook (a universal joint) which attaches to the inner end of the flagellar filament. The stator and the bearing are fixed rigidly to the inner and outer membranes of the cell. The rotor, hook and flagellum rotate at approximately 100 revolutions per second."

(Adapted from Bruce Alberts et al., Molecular Biology of the Cell (Garland Publishing, New York, 1983), p. 758, by Bible-Science News, Vol. 32, 1994, No. 2, p. 11. Alberts is present President of the National Academy of Science)

"The evolution of the genetic machinery is the step for which there are no laboratory models; hence one can speculate endlessly, unfettered by inconvenient facts. The complex genetic apparatus in present-day organisms is so universal that one has few clues as to what the apparatus may have looked like in its most primitive form."

(Dickerson, Richard E. [Professor of Molecular Biology, University of California, Los Angeles]., "Chemical Evolution and the Origin of Life," Scientific American, Vol. 239, No. 3, September 1978, p.77)

"Since there appear to be so few good sequences for a unique structure, the probability that there is any good sequence for any single novel backbone structure may be very small."

"Remarkably, in the designed sequences 51% of the core residues and 27% of all residues were identical to the amino acids in the corresponding positions in the native sequences....Taken together, these results suggest that the volume of sequence space optimal for a protein structure is surprisingly restricted to aregion around the native sequence."

(B. Kuhlman & D. Baker, "Native protein sequences are close to optimal for their structures", Proc. Natl. Acad. Sci. USA 97 (12 Sep 2000), 10383-8. Please note: If the above quotes made no sense, that's because they're speaking protein biochemistry. The implications of what they seem to be saying is that functional proteins cannot be generated at random, but must be specifically tied to a pre-existing pattern. This could imply that the random evolution of many proteins in biochemical pathways would be very unlikely, perhaps design is needed)

"The amino acid sequences of enzymes like alcohol dehydrogenase and glyceraldehyde-3-phosphate dehydrogenase are strongly conserved across all phyla. We suggest that the amino acid conservation of such enzymes might be a result of the fact that they function as part of a multi-enzyme complex. The specific interactions between the proteins involved would hinder evolutionary change of their surfaces."

"Of its [histone H4] 103 residues, only two differ between human and pea"

"But as we shall demonstrate, the time passed or the different importance of the proteins in question for the survival of the cell are clearly not sufficient as an explanation."

"We reasoned that there could be two possible explanations for such an extensive conservation: (1) recent horizontal gene transfer, or (2) conservation of an unknown function."

(Trends in Biochemical Sciences, 1 September 2000, vol. 25, no. 9, pp. 419-421. Kisters-Woike B.; Vangierdegom C.; Muller-Hill B.)

"A pool of 5 x 10^14 different random sequence RNAs was generated... On average, any given 28-nucleotide sequence has a 50% probability of being represented... Remarkably, a single sequence accounted for more than 90% of the selected pool... This result indicates that there are relatively few solutions to the problem of binding biotin."

(C.Wilson, J.W.Szostak, Nature 374 (1995), 777)

"Based on their fundamental roles in genome transmission and in determining patterns of gene expression, it can be proposed that repetitive DNA elements set the "*system architecture*" of each species. The use of the term "*system architecture*" is meant to draw the analogy with computers, where programs with the same functionality (e.g. Microsoft Word (c)) are encoded differently according to the requirements of the underlying hardware an operating system (e.g. MacOS (c) or Windows (c)). From the *system architecture* perspective, what makes each species unique is not the nature of its proteins (a Windows (c) desktop resembles a Macintosh (c) desktop) but rather a distinct "specific" organization of the repetitive DNA elements that must be recognized by nuclear replication, segregation and transcription functions. In other words resetting the genome system architecture through reorganization of the repetitive DNA content is a fundamental aspect of evolutionary change."

(Shapiro J.A., "Genome system architecture and natura genetic engineering in evolution," Annals of the New York Academy of Science, 1999, May 18, Vol. 870, pp.23-35, emphasis added)

Antibiotic resistance:

"As a biologist, I disagree. Of course, Darwin's theory works at some simple levels, such as antibiotic resistance and minor changes in finch beaks. ... But Darwinian evolution purports to explain how all living things are descended from a common ancestor, and how the obvious differences among them arose through random mutations and natural selection. These larger claims are not consistent with the evidence."

(Paul Nelson, in "Darwin vs. Science Conflict is Real" *Human Events*, Sept 15, 2000)
"Many bacteria possessed resistance genes even before commercial antibiotics came into use. Scientists do not know exactly why these genes evolved and were maintained."
(Stuart B. Levy, "The Challange of Antibiotic Resistance", Scientific American, March 1998, p. 35.)

"The genetic variants required for resistance to the most diverse kinds of pesticides were apparently present in every one of the populations exposed to these man-made compounds"

(Francisco J. Ayala, "The Mechanisms of Evolution", Scientific American, Vol 239, September 1978, p. 64.)

Vestigial Organs:

"Since it is not possible to unambiguously identify useless structures, and since the structure of the argument used is not scientifically valid, I conclude that "vestigial organs" provide no special evidence for the theory of evolution."

(S. R. Scadding, "Do 'Vestigial Organs' Provide Evidence for Evolution?", Evolutionary Theory, Vol 5, May 1981, p. 173)

"Other bodily organs and tissues-the thymus, liver, spleen, appendix, bone marrow, and small collections of lymphatic tissue such as the tonsils in the throat and Peyer's patch in the small intestine-are also part of the lymphatic system. They too help the body fight infection."

(The Merck Manual of Medical Information, Home edition, New Jersey: Merck & Co., Inc. The Merck Publishing Group, Rahway, 1997.)

"Apes possess an appendix, whereas their less immediate relatives, the lower apes do not; it appears again among the still mammals such as the opossum. How can the evolutionists account for this?"

(H. Enoch, Creation and Evolution, New York: 1966, pp. 18-19)

"...This [the appendix] is frequently cited as a vestigial organ supposedly proving something or other about evolution. This is not the case; a terminal appendix is a fairly common feature in the cecum of mammals, and is present in a host of primates and a number of rodents. Its major importance would appear to be in the financial support of the surgical profession."

(Alfred Romer, The Vertebrate Body (W.B. Saunders Co., Philadelphia, 1962), p. 358.)