

EVOLUTION ADDENDUM
For Chapters 1, 13, 14, 15, 16, 19
In the Textbook

BIOLOGY: Concepts
and Connections

by

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Why an addendum?

An addendum is necessary because the authors have written the text around the idea that evolution is an essential part of biology as is evidenced by the textbook statement on page 9, “*Indeed, evolution is biology’s core theme, - the one idea that makes sense of all we know about life.*” It should be remembered that biology is the study of living things. It is not necessary to know about an organism's origin to determine how it functions internally and externally, to how it relates to other organisms and to make predictions about other organisms. Origin of and similarity to other organisms, while interesting, is not necessary to understand the detail functioning of a specific organism.

The term evolution has more than one meaning which leads to many misunderstandings and unsupported conclusions. Sometimes “evolution” means evidence for small-scale changes within species which we can observe in the present day. At other times, claims of “evolution” are based upon extrapolation and speculation about the deep past. Read the first section on Chapter 15 of this addendum (page 4) for an understanding of the problem

This presentation will provide additional facts concerning evolution so that the student can clearly see problems not answered by the theory of evolution. This addendum presents facts that the student should consider when judging the soundness of the theory of evolution.

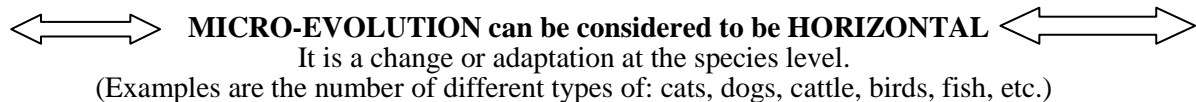
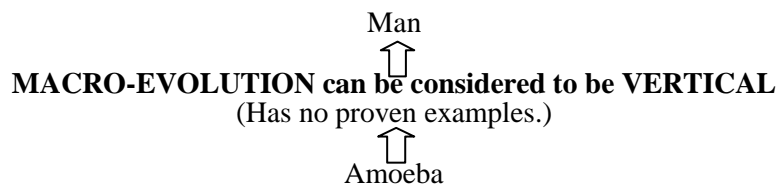
Should the student learn about the theory of evolution? Definitely! It is the dominant thinking of today in the fields related to biology.

This paper presents information only on the sections of the text where it is felt that additional information would be helpful. The information is presented as simply and briefly as possible since time is crucial in the classroom. Reference to the textbook will be necessary to completely understand this material.

Chapter 1

What is Evolution? Section 1.6, Page 8. (Unity and Diversity of Life)

The textbook authors loosely define evolution in this section and then precede to discuss natural selection. Unfortunately the definition used by Darwin and quoted here is so broad that it leads the reader to conclusions that are not true. In Darwin’s word, species arise through a process of “*descent with modification.*” On page 257 this textbook defines evolution as, “*...inherited change in organisms over time, the process that has transformed life on Earth from its earliest forms to the vast diversity that we see today.*” These definitions are very misleading in that they ignore the fact that there are varying degrees of *modification* or change which are often spoken of as micro and macro evolution. The authors define these terms in Chapters 13 (p.268) and 15 (p. 296). Darwin’s definition above is basically referring to micro evolution and the second definition on page 257 to macro evolution. The two figures below will help you understand the differences.



Charles Darwin observed that species change and adapt to their surroundings. He observed that natural selection was a very strong driving force that can and does cause these kinds of changes. He then assumed that these small changes meant that all living organisms could be accounted for through this adaptive process. Wherein this assumption is held by many scientists there is a large number that do not

agree with Darwin's assumption. Darwin observed the ability of organisms to adapt (micro evolution) and assumed that on this basis macro evolution was true. Macro evolution could be said to occur if a dog became a cat or a dinosaur became a bird. It occurs at the genus or higher level (see page 306) and implies that all life on Earth descended from a few types of cells that somehow came into being in the past. Based upon these definitions it is easy to see that micro-evolution is true but the truth of macro-evolution has not been established. Using the term "evolution" without specifying which type is being discussed is misleading and unfortunate and has caused much misunderstanding among scientists and the public. The terms micro or macro (molecules to man) evolution should be used in order to clarify the problem.

Natural Selection Section 1.6, Page 9 and Section 13.4 Page 264-7

In his travels Darwin observed what he called natural selection. It has taken place over the centuries and is an observable fact. Living organisms do adapt to their environment. This is what is called natural selection and operates only at the species level or in some cases the genus level due to classification difficulties. It must be recognized that natural selection has no direct effect upon the DNA. The authors point this out on page 9 with the statement, "*Here we see that natural selection is not a creative process, but an editing mechanism.*" It simply selects from the existing gene pool. It definitely cannot directly add DNA to that that already exists, a very necessary happening if macro evolution is to take place. **It only affects micro evolution.** Actually, natural selection restricts or removes information from the gene pool and acts to stabilize a species and provide for its survival.

The Fossil Record Section 13.2, Page 260 Section 15.1, Page 296 and Figure 15.1.

Many gaps exist in the fossil record (see discussion of punctuated equilibrium). Are these gaps real? Darwin was aware of this problem when he wrote, "*Why then is not every geologic formation and stratum full of such intermediate links? Geology assuredly does not reveal any such finely graduated organic change, and this is perhaps the most obvious and serious objection which can be urged against the theory [of macro-evolution].*"¹ Professor Stephen J. Gould of Harvard University confirmed Darwin's doubts are still valid when he stated, "*All paleontologists know that the fossil record contains little in the way of intermediate forms; transitions between major groups.*"²

1. Darwin, Charles R, *The Origin of Species*. Harvard University Press, 1964, p. 280.

2. Gould, Stephen J., *The Return of the Hopeful Monsters*, Natural History, Vol.86, No.6, June-July 1977, p.24.

Cambrian Fossils Page 297

The authors fail to comment on one of the most unusual happenings in geology - the fossil record in Cambrian strata. In this strata there is a literal explosion of life. This is called the Cambrian Explosion and is one of the mysteries of geology in that most animal phyla appeared during about ten million years of this time period. They fail to comment that this is a most unusual happening. The real problem is that these organisms seem to appear suddenly without any ancestors. Richard Dawkins, author of *The Blind Watchmaker*, puts it this way, "*...the Cambrian strata of rocks, vintage about 600 million years, are the oldest in which we find most of the major invertebrate groups. And we find many of them already in an advanced state of evolution, the very first time they appear. It is as though they were just planted there, without any evolutionary history.*"¹ For instance, the trilobite is an extremely complex organism with a segmented body and legs including a complex nervous system and one of the most complex eyes known. Science News puts it this way regarding trilobite eyes, "*...the most sophisticated eye lenses ever produced by nature.*"² There are trilobites in the pre-Cambrian strata but they show no signs of being related to the Cambrian trilobites. Even Charles Darwin recognized the Cambrian Explosion problem and had this to say on the subject, "*The case at present must remain inexplicable; and may be truly urged as a valid argument against the views here entertained.*"³

1. Dawkins, Richard, *The Blind Watchmaker*. New York: W. W. Norton, 1987, p. 229.
- Stephen J. Gould of Harvard. *A Short Way to Big Ends*, Natural History, Vol. 95 #1 (January 1986), p. 18 - 28.
2. Shawver, Lisa J., *Trilobite Eyes: An Impressive Feat of Early Evolution*. Science News, Vol. 105, (2 February, 1974), p. 72.
3. Darwin, Charles, *On the Origin of Species*. Harvard University Press, 1964, p. 308.

Transitional Fossils Section 13.2, Page 261.

The authors state that, *“Indeed, paleontologists (scientists who study fossils) have discovered many fossils that link past and present.”* The discussion on the fossil record just completed points out that reputable paleontologists and the evidence strongly disagree with this statement. As pointed out above, Darwin had difficulty with this concept and recognized that the gaps are real. They still exist today and in fact are responsible for the hypothesis of punctuated equilibrium discussed in the next chapter on page 290 and page 10 of this addendum. Molecular biology also confirms that the gaps are real as will be discussed shortly regarding this chapter.

The textbook discussion concerning the idea that whales evolved from four-legged land animals is very presumptive. The statement that modern day whales have *“small functionless hind-leg and foot bones that do not extend from the body”* is incorrect in that the bones are now known to be anchor points for specific organs. In the male whale they serve as an anchorage for the male reproductive organ and in the female serve as an anchorage point for the vaginal expulsion muscles. Does this sound like these bone structures could have ever been any part of a leg? The answer should be obvious.

In a similar fashion the authors describe the *Basilosaurus* whale which is shown in Figure 13.2F. It is said that this animal *“actually had hind legs.”* The so called legs are said to be *“about half a meter long, and included bones similar to those of land mammals.”* It should be noted that these so called legs do not attach to the backbone as they do in all other organisms which do have legs. In actuality they are only about 3% of the animal's length so that from a leg and swimming viewpoint they are useless. The authors do however state the actual use of these appendages. They are used for positioning and grasping during the copulation act.

Comparative Anatomy and Homologous Structures Section 13.3, Page 262, Figure 13.3A and Page 307.

The textbook makes the statement, *“Anatomical similarities among many species give signs of common descent.”* Homology is one of the proofs proposed for macro evolution. The real question is whether things that look similar **necessarily** have the same origin. Would you consider the bones of the same color shown in Figure 13.3A (p. 262) as being similar if you were given all of them in a bag with no labeling? Upon close examination of the differences in the animal structures presented in the figure it should be noted that there are bones located in the same relative location on the limbs but this does not mean that they have the same length, bony heads and size. Examination reveals they are not similar after all. The bone lengths, diameters and knobby protrusion locations, shape and size are all different. The information in the DNA must be very different to direct the formation of each of these different bone structures.

To further confuse the picture, Sir Gavin deBeer, Director of the British Museum of Natural History, said back in 1971 that, *“Has Dobzhansky explained it when he stresses that there is no one to one relation between a gene and a trait, that evolution does not consist of independent changes of organs or traits; but what changes is the genetic system. Is this also why organs can be homologous in spite of the genes controlling them being different.”*¹ The genes reveal that just because a structure is serving a similar purpose in different animals **it may not have come from an identical gene** and therefore have the same ancestor. Even if the genes were similar it is inconceivable that the many mutations required to produce these differences could have occurred by random chance happenings. For instance, the divisions of the fertilized egg (zygote) up to the stage where a complete sphere is formed (blastula) in reptiles and mammals are so different that it is impossible to conceive of the idea that they descended from the same ancestor even though the forelimbs look similar (homologous).² Also, the fore limbs of the newt, lizard and man develop from different parts of the embryo.³ There are so many instances where similar

structures obviously do not mean descent from a common ancestor that biologists call these **analogous structures**. What is it about a structure which determines common ancestry? There is no clearly defined set of guidelines so that, basically, the decision depends upon what the observer is attempting to prove. What is this unnamed ancestor? Does it exist?

Another consideration regarding similarity of structures is whether there is an alternative way to perform a needed function. How many different ways can an appendage like a leg that serves to support an organism be attached to an organism? The requirement that the appendage must have stiffness can only be done in a living organism by bone or cartilage located either in the appendage or on the outside such as insects have. Can you think of another way? Except for the way they are connected together, shouldn't the bones used for support look approximately the same?

1. Sir Gavin deBeer, *Homology: An Unsolved Problem*, 1971, p. 16 (from Readings in Genetics and Evolution, No. 8.)

2. Denton, Michael, *Evolution: A Theory in Crisis*, 1986, p. 145 and Figure 5.4.

3. Ibid. # 2, p. 146

Comparative Embryology Section 13.3, Page 262

The textbook authors are very misleading in their statement, "*One sign that vertebrates evolved from a common ancestor is that all of them have an embryonic stage in which structures called gill pouches appear on the sides of the throat.*" Advances in embryology have shown that the slits (more properly creases or skin folds) seen under the head of the various embryos do not have anything to do with gills but rather develop into organs that do not even remotely resemble gills. As the authors point out, all of the so called gill slits on the fish do not develop into gills. If this is so then how can gill slits be compared on different organisms. The idea that the human embryo is similar to that of a fish has been rejected by many scientists.¹ It is now known that the bulge just below the head on a human embryo develops into the thymus gland, the second bulge becomes the parathyroid gland, the next one becomes the middle ear and the fourth becomes the tonsils. Keith Thomson, Chairman of the Yale University Biology Department, said, "*Surely the biogenetic law is as dead as a doornail. It was finally exorcized from biology textbooks in the fifties. As a topic of serious theoretical inquiry it was extinct in the twenties.*"²

The whole idea of gill slits was established in 1891 by Ernst Haeckel when he produced a series of drawings of vertebrate embryos proposing that they represent a kind of tree of life.³ The drawings supposedly showed that all vertebrates pass through all of their evolutionary history in arriving at its final state. He used the drawings to prove what he called the Biogenetic Law. Haeckel was such an enthusiastic evolutionist that he altered his drawings in order to prove his point. These errors were discovered before he died and he was tried in a court of his fellow professors at the University of Jena in Germany and found guilty of fraud.⁴

Even though it has been known for almost one hundred years that the drawings of Haeckel and the Biogenetic Law are not true very little effort was made to find out exactly what the truth is. Michael Pitman in 1984 reported⁵, "*Had he (Haeckel) started at the logical place, the zygote, he would have realized that different classes of egg differ greatly in yolk content, size and shape, cleavage patterns, blastula, and in the organization which prepares them for gastrulation. Haeckel's series begins at the point when these diverse early stages converge, just before organ formation. This seems, for reasons unknown, to be the only tolerable intermediate stage. Thereafter, divergence again occurs into the diverse adult types.*" In the middle 1990's Dr. Michael Richardson of St. George's Medical School conducted a large scale investigation to determine the truth. He found that Pitman was right and that there was little resemblance between Haeckel's drawings and the truth. What he did find was that **some** embryos "*pass through an intermediate stage in which some of them superficially resemble each other (Haeckel's first stage)*"⁴ as reported by Pitman. It is important to recognize that this one appearance of similarity is true for this case only and therefore indicates nothing since the embryos are very different for earlier and later development stages.

1. E Beck, DB. Moffat and D.P. Davies, *Human Embryology*, 1985, p.172.

2. K. S. Thomson, *Ontogeny and Phylogeny recapitulated*. American Scientist, May/June 1988, pp. 273-275

3. Wells, Jonathan, *Haeckel's Embryos & Evolution: Setting the Record Straight*. The American Biology Teacher,

- Vol. 61, (May 1999), Num. 5, p. 345.
 4. Pitman, Michael, *Adam and Evolution*. London, Rider, 1984, p. 120.
 5. *Ibid.* for reference 1, p. 345.

Molecular Biology

Section 13.3, Page 262, Figure 13.3B and Page 308.

The authors state that, "*The universality of the genetic code is strong evidence that all life is related.*" Indeed it should be "related" because all organisms must live and function in the same environment. It is to be expected that all organisms use DNA, RNA, ribosomes, the same genetic code, the same 20 amino acids, ATP, the same essential life cycles and similar proteins. All of these same components can and do indicate that living organisms are the result of design and not the result of random chance happenings. Since all organisms must operate in the same environment a good engineer would use the same components for reliability of operation.

Molecular biology yields some very unexpected and contradictory results when used in trying to prove evolutionary concepts. Figure 13.3B seemingly points out what the authors want to prove: the human ancestry comes up from the lamprey. The graph uses data from one of the two polypeptides of the hemoglobin molecule (p. 201). What is not presented is that when all of the data is considered a different conclusion will be reached.

Consider the following when the whole hemoglobin molecule is used for comparison purposes. The percent differences in the order of the amino acids is as follows compared to the lamprey:¹ human 73; kangaroo 76; chicken 78; frog 81; carp 75. These results indicate that the lamprey is just as close to another fish, like the carp, as to a human. There is no evolutionary order indicated. Quite to the contrary the results indicate gaps. If the carp is used as the reference the result is: horse 13; rabbit 13; chicken 14; turtle 13; bullfrog 13. Once again the confirmation of gaps, not evolution, between the various vertebrates is apparent.

Cytochrome C differences (see section 15.12, page 308) show the same relationships. The general order of macro evolution is: bacteria, algae, yeast, plant, insect, lamprey, fish, amphibian, reptile, bird, mammal. Cytochrome c differences strongly disagree with this order. If the cytochrome C of the various organisms are compared to the bacteria *Rhodospirillum rubrum* C₂ where the numbers indicate the number of amino acids that are not in the same place in the cytochrome c:

(yeast) bakers yeast-69, (plant) wheat-66, (insect) silkworm moth-65, lamprey-66, (fish) carp-64, (amphibian) bullfrog-65, (reptile) turtle-64, (bird) pigeon-64, (mammal) horse-64, (Mammal) human-65.

Isn't it logical that these numbers should get progressively larger as one progresses up the macro evolutionary ladder? This result is even more startling when it is recognized that in each case there is a different arrangement of the amino acids. If the silkworm moth is compared to its supposed evolutionary descendants the results are:

lamprey-30, carp-25, turtle-26, pigeon-25, horse-27.

If the carp is compared to its evolutionary descendants the results are:

lamprey-12, bullfrog-13, turtle-13, pigeon-14, horse-13.

Note once again that the silkworm moth and the carp are almost equally separated from all of their supposed evolutionary descendants so that the similar numbers in the bacterial comparison do not represent identical amino acid differences. It does not appear that any of these vertebrates descended from its supposed ancestor. The conclusion is that bacteria are a separate entity with no intermediate forms between them and man. Based upon this data cytochrome c does not agree with the concept of macro evolution.

The other thing that studies of cytochrome c produces is that there are gaps at the molecular level just like there are in the fossil record. The gaps between fish, amphibian, reptile, bird and mammal exist at the molecular level and the fossil record.¹

1. A table that more clearly shows these relationships can be seen in Michael Denton's book *Evolution: A Theory in Crisis*. Adler & Adler, Bethesda, Maryland, 1986, p. 277-293.

The Peppered Moth Section 13.5, Page 266, Figure 13.5B.

The authors rightfully discuss the peppered moth in terms of adaptation. This is a clear illustration of how natural selection can operate to change the characteristics of an organism. It is important to recognize that the moths are still recognizable as peppered moths. All that has happened is that the moths have adapted to their environment. This example of micro evolution provides no proof or data regarding macro evolution.

Since Kettlewell performed his experiment several facts have come to light that cast a shadow on his results. First, the moths are nocturnal so that release of the moths in the daylight possibly distorted the data. Second, it is now known that peppered moths do not normally rest upon tree trunks.¹ The normal resting place is beneath small reasonably horizontal branches probably high up in the tree canopy.² What this means is that the drawings (Figure 19.2) and pictures showing the moths resting on tree trunks have been staged.

1. Wells, Jonathan, *Icons of Evolution*. 2000, pp. 146,149.

2. Mikkola, Kauri, *Biological Journal of the Linnean Society*. Vol.21 (1984), pp. 409-421.

Genetic Mutations Section 13.14, Page 273.

The text starts this section with the statement, "*Mutations and sexual recombinations, which are both random processes, produce genetic variation. As we saw in Module 10.16, page 201, mutations can actually create new alleles.*" This statement, which is correct, implies that the phenomena is deceptively simple. Recognize that the definition concerns changes in genetic information but that meaningful coherent information "must be added to the DNA" in order to have more complex organisms. The question to keep in mind is, "Does the mutation actually increase the information contained in the DNA or decrease it." An increase in information is necessary for macro evolution while a decrease in information may allow micro evolution.

The rest of chapter 13 discusses different mutation mechanisms and forces that cause changes in genes and therefore changes in organisms. Sections 13.4 through 13.21 are concerned only with micro evolution. It must be remembered that just because mutational changes do occur at the species level this does not imply or prove that all organisms descended from a common ancestor. The textbook does not discuss some of the factors that give the reader an understanding of how difficult speciation is and the fact that it **cannot** explain the phenomena of molecules to man or even "amoeba to man" evolution.

First of all it must be remembered that the DNA in a living organism contains the complete information necessary to form an identical organism including the instructions of how to make a reader for its own code system. The amount of information stored in the DNA is staggering. Second, the amount of information stored in the DNA of man is 4166 times more than that of the H-39 Mycoplasma - one of the smallest bacteria now called a mollicute.¹ To put this in perspective the mollicute (H-39 mycoplasma) DNA 768,000 base pairs)² as the amount of information contained in the first 21 chapters of this text if every page were covered by nothing but print with **no** pictures, graphs or headings similar to this typed page. The information content in the DNA of man (3.2 billion base pairs)³ is the same as 500 books like this text (p. 242) with **nothing but text** on the pages as just described. Some might argue that the above numbers are highly exaggerated because of what some call "junk DNA" but it is now known that the so called "junk DNA" is not junk. It is made up of introns, promoters, terminators and telomeres⁴ which are functional parts of the DNA. These authors mention introns and telomeres (p. 242) as necessary parts of the DNA. A major question is where did all of this additional information come from to fill the 499½ additional books?

To understand the problem consider the following. There is no known mutational mechanism that will increase the information content of DNA in a meaningful manner. In other words, transposons, point and frameshift mutations, duplication errors, jumping genes, extra chromosomes, and viral or bacterial invasion do not add meaningful information to the DNA. Think about this problem with respect to this textbook. Does mixing sentences, letters, paragraphs, errors in copying, mixing up chapters or adding two or more identical chapters add information? The textbook may contain more pages but does it

contain more information? It is inconceivable that meaningful information can be added to accomplish the bacteria to man requirement of evolution by random chance happenings. It should be recognized that natural selection decreases the information in DNA.

It is hypothesized that these changes in species ultimately lead to changes at the genus level, the family level and on up to the kingdom level. The great complexity and preciseness found in the DNA and the tremendous increases in DNA information content necessary to evolve from "amoeba to man" make the hypothesis unlikely. When duplication errors, favorable mutations rates and the time necessary to establish a trait are considered this becomes apparent.

Think Critically: It has been discovered that the largest bacteria *Epulopiscium fishelsoni* has 85,000 copies of one of its genes and contains approximately 25 times as much DNA as a human cell.⁵ Does this confirm the need for added DNA to be meaningful?

It is known that duplication (replication) errors are extremely rare. There is no more than one error in 1,000,000,000 base pairs when copying the DNA (p. 191). The textbook "Biology: The Dynamics of Life" by Biggs, Kapicka and Lundgren (Glencoe, 1995) further complicates the problem when it makes the following statements, "*Sometimes, there is no effect on an organism, but often mistakes in DNA can cause serious consequences for individual organisms*" (p.324). "*Sometimes, the errors caused by point mutations don't interfere with protein function, but often the effect is disastrous.*" (p.325) "*Proteins that are produced as a result of frameshift mutations seldom function properly.*" (p.325) "*Few chromosome mutations are passed on to the next generation because the zygote (several cells beyond conception) usually dies.*" (p.326) "*Mutations often result in sterility or the lack of normal development in an organism.*" (p.328) Other authors comment that only about one in 1000 mutations "might" be beneficial.⁶ Generally it takes about 5 mutations to make a significant physical change in an organism.⁶ Note that this does not mean a new species has been formed. Many more than five mutations at a time have been caused on fruit flies [*Drosophila melanogaster*] with only a deformed fruit fly as a result. Dodson proposes that it takes over 300,000 generations for a slightly beneficial recessive gene to increase in frequency from 1 in 1,000,000 to 2 in 1,000,000.⁷ **It must also be remembered that a mutation in any cell other than the reproducing cell does not have any influence on succeeding generations.** When all of these probabilities are combined, the question must be asked, "How can macro evolution occur from processes that produce many more negative results than positive results?"

The previous paragraph reads so easily that most people do not realize that these apparently simple statements mean that macro-evolution is extremely unlikely. To get an appreciation of this let us examine these probabilities in more detail.

First, consider the two statements that "*Many random mutations are harmful.*" (only one in one thousand is beneficial) and that "*it takes five mutations to cause a significant change in an organism.*" For the sake of discussion assume that information content can be increased by mutations (a false assumption as previously discussed). The question is, "Can progress be made up the evolutionary ladder of increasing complexity with odds that give predominately negative results?" To illustrate the point, use two pairs of dice to perform the following experiment. If a roll of the dice produces four ones, assume this represents a favorable mutation. The odds of doing this are 1295 to one. This is about the same as the odds mentioned above for a beneficial mutation. All other combinations on the dice represent unfavorable or neutral mutations. The textbook indicates that a majority of mutations are fatal so assume that any time four of any number, other than one, comes up on the dice the organism dies instantly. This means that only five out of the 1296 mutations are considered to be instantly fatal. Compared to the textbook statements this is a very generous assumption. The rest of the combinations represent unfavorable or neutral mutations which do not normally kill the organism but if enough of these mutations do occur then the organism will be weakened and die. Assume twenty unfavorable mutations will kill the organism so that if twenty rolls of the dice do not yield four ones or four of a kind then the organism dies and the evolutionary process must be started over. To keep track of your progress use the line below. The point A represents the original organism and point B represents the organism after 5 mutations. Remember that arriving at point B does not signify a new species.

number of bristles reached 56. Mayr concludes "*The most frequent correlated response of one-sided selection is a drop in general fitness. This plagues virtually every breeding experiment.*" This addendum's author can confirm this from his experience in raising peaches commercially. The peach trees that produce the prettiest and largest peaches will quickly die if not cared for. This is in direct contrast to wild trees that are seen flourishing around an old abandoned house for years without care. The selective crossbreeding of trees for large fruit with good flavor weakens the ability of the tree to survive. What does all of this mean? It means that when man deliberately introduces mutational changes into the DNA, the probable result is a organism that is not as environmentally adept at coping with the environment as it could originally. Why should an organism be stronger when undergoing random mutations if "controlled" mutations do not do the job?

1. Smith and Wood, *Cell Biology*. Chapman and Hall, 1996, p. 121.
2. Smith, *Cell Biology*. Academic Press (1971), p. 86.
3. Starr and Taggart, *Biology, The Unity and Diversity of Life*. Wadsworth Group, 2004, p. 254.
4. Campbell, N. A. and Reece, J. B., *Biology*. Benjamin Cummings, 2002 (Sixth Edition), pp. 300-309.
5. Randerson, J., Record Breaker. *New Scientist*, Vol. 174, 8 June 2002, p. 14
6. Ambrose, E., *The Nature and Origin of the Biological World*, (1982), p. 120-121.
7. Dodson, E., *Evolution: Process and Product*, (1960), p. 225.
8. Johnson & Raven, *Biology, Principles & Explorations*. Holt, Rinehart and Winston, 2001, p. 197.
9. Smith, *Cell Biology*. Academic Press (1971), p. 86.
- 10,11. Rifkin, Jeremy, *Algeny*. (1983), p. 134.

Chapter 14

This chapter deals solely with micro evolution since it deals with the means by which speciation occurs. It deals with the ability of an organism to adapt to different problems in its environment and does not substantiate or imply support for the concept of macro evolution.

Punctuated Equilibrium Section 14.8, Page 290

The need for the punctuated equilibrium hypothesis has been brought about by the recognized gaps in the fossil record. The Harvard paleontologist Stephen J. Gould, who along with Niles Eldridge and Steven Stanley originated the punctuated equilibrium hypothesis, said, "*The extreme rarity of transitional forms in the fossil record persists as the trade secret of paleontology. The evolution trees that adorn our textbooks have data only at the tips and nodes of their branches, the rest is inference, however reasonable, not the evidence of fossils.*"¹

The authors of the punctuated equilibrium hypothesis proposed it to explain the gaps in the fossil record at the species level. Note that this hypothesis has no factual evidence supporting it. The fact that there is no supporting evidence (the gaps) is the proof of the hypothesis. Contrary to the punctuated equilibrium authors wishes, some have extended the hypothesis to include the gaps at higher levels.

Two of the major objections to the hypothesis are:²

1. The lack of evidence as established by the gaps. The feeling is that it would be dangerous to let the idea of lack of evidence as proof get started in science.
2. There is no plausible mechanism or explanation for the genetic changes that occur.

1. Gould, S. J., *Evolution's Erratic Pace*. *Natural History*, Vol. 86 (May 1977), p. 14.

Chapter 15

Horse Evolution Section 15.8, Page 304.

The text and figure 15.8 propose that the supposed changes in the horse is an example of macro evolution. The use of the word macro evolution in this context is very misleading in that all of the animals except for the Hyracotherium are still horses (see #1 below) so that if they are thought to have evolved they are an example of micro evolution and do not truly imply macro evolution. Consider the following facts:

1. Hyracotherium has little or no resemblance to horses but is similar to the Hyrax which is alive today.¹

2. In South America the one and the recessed three-toed horses (Equus and Merychippus) were found together in the Miocene strata (13-25 million years) and the full three-toed horse (Mesohippus) above the other two in the Pliocene strata (2-13 million years).² This completely contradicts Figure 15.8.

3. Size cannot be used as an indicator of evolution because today's horses range in size from 16 to 80 inches tall.

4. As late as 1892 three toed horses were reported to be living with the one toed horse in the U.S.³

5. A volcano eruption in Nebraska buried a one-toed and a three-toed horse together proving that they lived together at the same time.⁴

6. David Raup, Curator of the Museum of Natural History, where approximately 20% of the world's fossils are housed, comments,⁵ ".....some of the classic cases of Darwinian change in the fossil record, such as the horse in North America, have had to be discarded or modified as a result of more detailed information." Note that this comment was made back in 1979.

1. Kerkut, G.A., *Implication of Evolution*. Pergamon Press, London, New York, 1960, p.149.

2. Roemer, A S., *Vertebrate Paleontology*. Third edition, Univ. of Chicago Press, Chicago, 1966, pp. 259-261.

3. Marsh, O.C., *Recent Polydactyle Horses*. American Journal of Science, Vol. 43, 1892, p. 339-354.

4. National Geographic. January, 1981, p.74.

5. Raup, David, *Conflicts Between Darwin and Paleontology*, Field Museum of Natural History Bulletin, Vol. 50, No.1 (1979), p. 25.

Darwin's Finches Section 15.9, Page 305 and Figure 15.9.

It must be remembered that the birds shown in Figure 15.9 are all finches so that the Figure is a picture of micro evolution and **not** macro evolution. Darwin observed micro evolution and not macro evolution. Micro evolution is not a proof of macro evolution.

Homology Section 15.11, Page 307.

This was discussed back in Section 13.3 on page 262. Refer back to page 4 of this addendum.

Molecular Biology Section 15.12 Page 308.

This topic was discussed back in Section 13.3 on page 262. Refer back to page 6 of this addendum for details. It should be noted that comparison of just one amino acid sequence between organisms can and usually is very misleading. For instance, the authors state, "*The sequences for humans and chimpanzees match perfectly for all 104 amino acid positions along the cytochrome c polypeptide chain,...*" Judging by this data it can be stated that the human and chimpanzee are identical. We know that this is not so. Actually a broader comparison of chimpanzee and human DNA reveal a difference of five percent.¹ As noted earlier, cytochrome c sequencing can lead to erroneous conclusions. For instance, the differences between the tuna² and the turtle is 17%, the Pigeon - 17%, the Duck - 16%, the horse - 18%. These indicate that the tuna is equally related to all of these vertebrates. Does this make sense?

1. Britten, R.J., *Divergence Between Samples of Chimpanzee and Human DNA Sequences Is 5% Counting Indels*.

Proceedings of the National Academy of Sciences, USA, Vol. 99, 2002, pp. 13633-13635.

2. Denton, Michael, *Evolution: A Theory in Crisis*. Alder & Alder, Bethesda, MD., 1985, p.279.

Chapter 16

How Did Life Originate Section 16.2, Page 320.

In order to bring this discussion of the origin of life into correct perspective several facts must be recognized and kept in mind:

(1) A carbon atom, an essential part of an amino acid, has four bonding sites. In forming an amino acid four different elements or compounds join to a central carbon atom as shown in Figure 1¹ below - a Hydrogen atom, a Carboxyl Group (COOH), an Amino Group (NH₂) and an R Group which is a

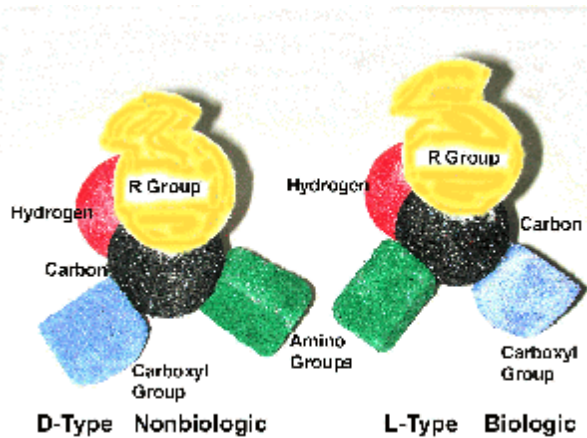


Figure 1. Amino Acid Types

carboxyl/hydrogen based unit. The composition of the “R Group” largely determines the particular characteristics of the amino acid and therefore its name. Note that the R Groups are very rarely symmetrical about an axis. The mock up shown in Figure 1 shows this. The number of compounds that can join to the carbon atom at this spot is very large. Estimates are as high as several thousand. In each case the result is called an amino acid. Of all the possible amino acids occurring naturally only 20 are found in living organisms and are called biologic amino acids. This means that the vast majority of amino acids are classified as non-biologic. If one of the non-biologic amino acids joins with one of the 20 biologic amino acids, the result is a compound that is not useful for biologic

purposes.

(2) To further complicate the situation, the exact order in which the Hydrogen atom, the Amino Group, the Carboxyl Group and the R Group join to the central carbon atom determines whether the amino acid formed can be used in forming a biologic protein. Amino acids are optical isomers and fall into two structural types --- dextro-rotary (D type) and laevo-rotary (L type). The L and D type molecules are identical chemically but are mirror images of each other just as our hands are. Notice that if the R Group and the H atom are taken as a reference by putting the H atom farthest from to the observer as shown in Figure 1 there are only two different ways the Amino and Carboxyl Groups can join the carbon atom - the Amino Group is either on the left or right of the reference. Only the order shown on the right of Figure 1 above (Amino Group to the left of the line proposed above) is used in forming a biologic protein. Very rarely are D amino acids found in living organisms.²

(3) It is important to recognize that the L and D amino acids like that shown in Figure 1 above occur in equal numbers in nature but no known life forms use both types of amino acids.³ In forming a polypeptide the amino acids join to each other by the Amino Group joining the Carboxyl Group. Since

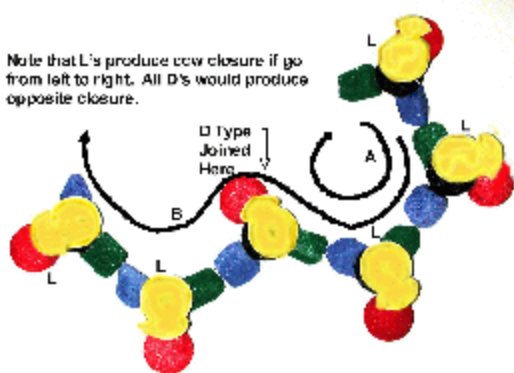


Figure 2. Effect of introducing a D molecule into an L molecule chain.

these are common to all amino acids this means that there is no preferential connections of biologic verses non-biologic amino acids in forming poly-peptides. As shown above the difference between the L and D molecules is that the Carboxyl Group and the Amino Group swap places on the central carbon atom. In each resultant molecule the chemical equation is the same even though the shapes of the molecule are different. This is most easily understood by looking at Figure 1 and connecting the Carboxyl and Amino Groups together. This makes the R Groups point in the opposite directions with respect to the polypeptide chain so that the shapes of the chain are different.

(4) If only L amino acids are connected in a chain they form a helix as shown by line “A” in Figure 2. If a single D amino acid is connected into a chain of L amino acids the resultant protein becomes non biologic. Note that not only is the R Group (yellow color) in the opposite direction from that of the L molecules but the shape of the polypeptide has also changed from the closed circular pattern of an all L chain to the shape shown by line “B”. If a single D type molecule

gets into the chain of “L”’s the shape of the molecule has changed even though the chemical equation is the same. It is very important to recognize that the shape of a molecule determines how it will interact with other molecules. Dr. Mader points this out in her Biology textbook when she says, “*Shape is very important in determining how molecules interact with one another*” and “*Once a protein loses its normal shape it is no longer able to perform its usual function.*”⁴

If a L type sugar were introduced into a chain of D sugars in the DNA strand it would not be able to coil without causing a tangle as illustrated by line “B”.. This would be a fatal mistake.

(5) It is also known that nucleotides (DNA) are formed from a deoxyribose sugar molecule bonded to a phosphate molecule and a nitrogen base. RNA has ribose sugars in the place of deoxyribose sugars. The sugars in these nucleotides also occur in L and D type molecules. The arrangement of the sugars in the DNA ladder is shown below in Figure 3. (More details are given in the chapter on DNA.) Two different bases join to form a base pair and make a ladder rung.

How proteins formed originally with only L type amino acids and how sugars in the nucleotides (DNA and RNA) formed originally with only D type sugars is an unanswered question. This is particularly puzzling when it is remembered that L and D type sugars occur in equal numbers naturally and show no preference in uniting with phosphates. The same holds true for amino acids. A human chromosome consists of about 65 million base pairs on average which means that

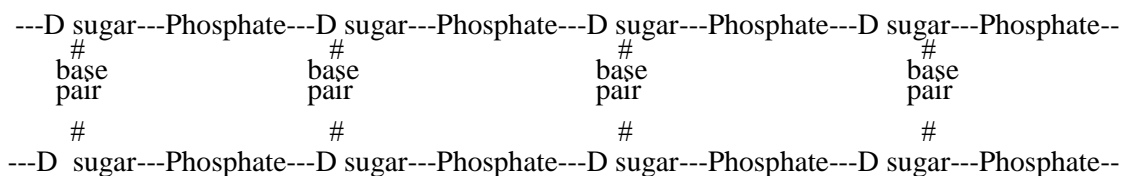


Figure 3. DNA Structure

there are 130 million D type sugars in the DNA of one chromosome. The human genome contains 6,000,000,000 D type sugars.. Logically, half of these should be L type sugars but there are none.

Think Critically: What do the L and D type molecules and the great number of possible amino acids do to the origin of life concept? Support your answer.

1. Idea suggested by Figure 2-16 (p.44) of G.J. Tortora, B.R. Funke, C.L. Case, *Microbiology: An Introduction*. Benjamin Cummings, 1989, Third Edition.
2. Tortora, G.J., Funke, B.R., Case, C.L., *Microbiology: An Introduction*. Benjamin/Cummings, 1989, Third edition, p. 44.
3. Cohen, J.. “Getting All Turned Around Over the Origins of Life on Earth.” *Science*, Vol. 267 (1995), pp. 1265-1266.
- ! Bonner, W., "Origins of Life." 1991,21, pp.59-111.
4. Mader, S.S., *Biology*. McGraw Hill, Seventh Edition, 2001, p. 37 and 47.

Early Atmosphere Section16.2, Page 320.

It is instructive to consider this and the next topics regarding the origin of life even though the previous discussion indicates molecular evolution is impossible,.

In the world as it presently exists, life could not have evolved. Why? The presence of oxygen in the atmosphere precludes the formation of amino acids and the formation of polypeptides, proteins, ATP, nucleic acids in DNA and lipids.² Alexander Oparin in 1923 attempted to solve this problem by proposing that if the atmosphere contained water vapor, hydrogen, methane and ammonia without any oxygen then energy from the sun and lightning would cause amino acids that would drop into the oceans and form a primordial soup from which life might have evolved. Oparin did not include oxygen as an atmospheric gas because amino acids react readily with oxygen to form non-biologic compounds. His hypothesis led to the Miller- Urey experiments. There is, however, abundant evidence that oxygen was in

the early atmosphere. Miller-Urey did prove by their experiment that the gases Oparin listed (methane, ammonia, hydrogen and water vapor) can be made to form amino acids. Most of the amino acids formed were not biologic. This makes the formation of a biologic compound impossible for reasons given in #4 below. Some more of the problems regarding the origin of life under this hypothesis are:

1. The geologic evidence indicates that the necessary atmosphere **without any oxygen** was **not** present. Many primordial sediments contain red minerals which are metallic compounds of oxygen indicating oxygen was present at the time of their formation. There is geologic evidence that the earliest rocks (dated at 3.7 b.y.) existed in an oxygenic atmosphere¹ so that the formation of amino acids in any significant concentration in the atmosphere and therefore in the ocean was not possible.³
2. Ultraviolet light breaks down the gases methane and ammonia, two of the three necessary building blocks of amino acids. The concentrations of these building blocks would have been reduced quickly to such a low level that they could not have played an important part in amino acid formation because the no oxygen hypothesis implies there was no ozone layer to reduce the ultraviolet intensity.
3. Ultraviolet light breaks down water, the third building block of amino acids, into oxygen and hydrogen. The presence of oxygen minimized the formation of any amino acids in the atmosphere.

These first three problems point out that any significant amino acid concentration in water could not come from the reaction of gases in the atmosphere. Even if amino acids could somehow be formed in a pool, lake or sea as proposed on page 322 there are factors such as those listed below that make the formation of life unlikely. Consider the following problem areas:

4. There are two structural types of amino acids and sugars as discussed earlier--- dextro- rotary (D type) and laevo-rotary (L type). Whenever amino acids and sugars are being formed these two types are formed in equal numbers. No known life forms use both types of sugars and amino acids.⁴ Both types of molecules will easily combine chemically with each other but only one of the wrong type of amino acid in a protein or sugar in the DNA will make it biologically useless from a functional viewpoint as pointed out earlier. The proteins of living organisms are made up of L type amino acids and the DNA strands from D type sugars. The duplication process of the cell assures use of only the right type of molecule. There is no other known process for separating and isolating L and D molecules. DNA produces tRNA which promotes the synthesis of L type proteins. There is no evidence that such a separating mechanism was present until the first replicating life form came into existence.
5. Water is a diluting and reacting agent so the question must be answered as to how the amino acids can be concentrated to form polypeptides (chains of amino acids), proteins and, ultimately, organisms. The evaporating pool hypothesis, that evaporation will concentrate the amino acids, has the problem that some of the compounds necessary for protein synthesis evaporate⁵ along with the water. Insulin, the smallest protein, requires fifty one L type amino acids (17 different types). It is inconceivable that this many amino acids could be assembled on a molecular basis without the detrimental effects of water, D type or other type of amino acids or other non-biologic compounds interacting. Even if insulin is obtained this does not verify that life could have come about because many more proteins are needed to have even the simplest living organism.
6. Natural selection only takes place in living organisms.
7. Amino acids are quick to combine with other compounds, including those from which they were formed, to form non-biologic compounds.
8. When two or more amino acids unite by the addition of energy to form a polypeptide, a water molecule is produced. This water molecule must be removed immediately because it will unite with the polypeptide. This means that the polypeptide is not stable unless the water is removed.⁶ How can the water be removed when everything is in water. Ferris states this scientifically as,⁷ *"But it has not proved possible to synthesize plausibly pre-biotic polymers this long (30 to 60 monomers) by condensation in aqueous solution, because hydrolysis competes with polymerization."*

9. Biochemical compounds tend to break down (decay) when not combined within a living organism. When living organisms die they decompose back into their simplest molecular components. The chemical tendency is away from life.⁸ Thus even if a protein were formed it would not have been stable and would not have waited around for a spontaneous combination at some later time with other proteins.

1. Clemmy & Badham, *Oxygen in the Precambrian Atmosphere: An Evaluation of the Geologic Evidence*, Geology, Vol.10 (1982), p. 141
2. Fox, S., & Dose, K., *Molecular Evolution and the Origin of Life*, Freeman and Co., 1972, p. 44.
- Miller, *Production of Some Organic Compounds under Possible Primitive Earth Conditions*, Journal of Am. Chemical Society, Vol.77, (1955), pp. 2351,1361.
3. Clemmy & Badham, *Oxygen in the Precambrian Atmosphere: An Evaluation of the Geologic Evidence*, Geology, Vol.10 (1982), p. 141.
4. Cohen, J. "Getting All Turned Around Over the Origins of Life on Earth." Science, Vol. 267 (1995), pp. 1265-1266.
5. Horowitz & Hubbard, *The Origin of Life*, Annals of Genetics, 8 (1974), p. 393.
6. Thaxton, Bradley, & Olsen, *The Mystery of Life's Origin: Reassessing Current Theories*, New York: Philosophical Library, (1984), p. 56.
7. Ferris, et al., *Synthesis of Long Prebiotic Oligomers on Mineral Surfaces*, Nature, Vol. 381, 2 May 1996, pp. 59.
8. Abelson, *Chemical Events on the Primitive Earth*, Proc. National Academy of Sciences, Vol.55 (1966), pp. 1365,1369.

The Miller Experiment Section 16.3, Page 320.

The famous Miller-Urey experiment supposedly proved that life could have evolved. The apparatus is shown in Figure 16.3B on p.321. One of the problems of this experiment was that the experiment produced both D and L type amino acids plus other non-biologic amino acids and polymers which were capable of reacting with the desirable biologic amino acids to produce non-biologic compounds.¹ Miller had to use a trap to isolate the products of his experiment and keep them from getting back to the original gases since the biologic amino acids formed would react readily with the excess gases and form non-biologic compounds. As necessary as it is, there is no mechanism in nature that can perform this needed isolation.

Their experiment came up with a total of only 10 biologic amino acids and 25 non-biologic amino acids, sugars and other compounds all mixed together. Insulin, one of the smallest of proteins, consists of 51 amino acid bonds and requires 17 different biologic amino acids. This simplest of proteins could not have been formed had there been nothing but the Miller biologic amino acids present. Other scientists² have done similar experiments with other sources of energy and formed many other biologic and non-biologic compounds but with similar results. As Dr. Mader reports, still other scientists have devised experiments which have produced still other compounds in living organisms. All of the cited experimenters results still involve L and D amino acids and sugars plus other non-biologic amino acids and sugars so that the peptides formed are not indicative of life.

1. Thaxton, Bradley, & Olsen, *The Mystery of Life's Origin: Reassessing Current Theories*, New York: Philosophical Library, (1984), pp. 52-54.
2. Thaxton, Bradley, Olsen, *The Mystery of Life's Origin: Reassessing Current Theories*, New York: Philosophical Library, (1984), pp. 20-39.

Polymers Evolve Section 16.4, Page 322.

The origin of life is discussed in such a manner that the textbook reader might believe that it was very simple and obvious. Nothing could be further from the truth. The rest of chapter 16 discusses the appearance of the different organisms as though man came about through the random assembly of many chemical compounds. There is no clear evidence that macro evolution has ever occurred when all of the previously cited facts are considered. The evidence is that it is impossible.

It is very easy to over simplify the idea of early life being primitive. The complexity of even the simplest life form is far from simple or primitive. One of the smallest prokaryotes (H-39 strain of mycoplasma, a bacterium) consists of 640 proteins whose average length is 400 amino acid bondings.¹ This means that it has 256,000 amino acids arranged in a very specific order. These amino acid bonds are coded in the DNA by means of 768,000 base pair bondings in a specific order and 1,536,000 sugar-phosphate pairs. If we add all of this together, we find that there are 4,864,000 individual chemical

entities that must come together to form this "simple" bacterium (2x768,000 bases+1,536,000 sugars+1,536,000 phosphates+ 256,000 amino acids). Under ideal conditions, the odds of this many amino acids coming together in the right order are approximately the same as winning the Power Ball Lottery every week for the next 640 years. This neglects the L and D factors and other chemical compounds. How could this have happened accidentally? The step from inanimate organic compounds to a living organism is beyond man's ability to create.

It is further noted in the textbook that even though science has demonstrated other ways in which vital organic compounds might have been formed there is a vast gap between the forming of individual compounds and their assembly into the precise order necessary to obtain a living organism. As just stated, the H-39 mycoplasma has 4,864,000 compounds which have to be assembled in a precise way. This assumes there are no wrong L or D amino acids or sugars, no non-proteinous amino acids and other compounds such as were formed in the Miller-Urey experiments present. The addition of these unusable compounds greatly increases the already astronomical odds that organic compounds did not form spontaneously so that the Miller-Urey experiment added additional problems for the evolutionist.

Recent experiments concerning the formation of polypeptides do not enhance the chances of macro evolution taking place unless the polypeptide is one that can be used in the particular organism. If it cannot be used then it is only making macro evolution less likely since it introduces an additional non-usable compound. If it is usable then it must be included in exactly the right place in the protein being formed - a very unlikely scenario.

1. Smith, *Cell Biology*, Academic Press (1971), p. 86.

RNA Chain Formation Section 16.5, Page 322.

As discussed earlier an RNA nucleotide consists of a base, a phosphate and a ribose sugar. The sugar can be in either the "L" or "D" form which considerably complicates the problem because only "D" or right handed sugars are present in living organisms. If a left handed ribose sugar appears in the chain then the RNA chain that might be formed is non-biologic. Since RNA chains have been observed to form as reported in the text but the real question is whether the initial conditions of the experiment truly represent conditions that would actually occur in a real life situation. It should also be recognized that chains of RNA may be able to make copies of themselves but are of no use unless they are able to make a biologic protein. The formation of a biologic polypeptide is of no consequence compared to the complexity of the first living organism. The authors on page 323 put it this way, "*Life as we know it requires a great number of complex organic molecules, and the molecules must interact and cooperate in precise ways. Put another way, life depends on intricate metabolic machinery that derives from the cooperation of many complex organic molecules.*"

The Unbreakable Cycle.

There is an unbreakable cycle in all cells and bacteria that makes any possibility of macro evolution impossible. Part of the problem is that DNA by itself is useless unless the information can be read and acted upon. Another problem is that a cell without any DNA cannot duplicate itself and so does not lead anywhere. The fact that the mechanisms (enzymes) for duplication of cells and reading DNA is contained in the organism but the instructions on how they are to operate and how to form these mechanisms is in the DNA poses another difficulty. In other words, if the reading enzymes somehow came into existence without something to read (the DNA) plus instructions on what to do with the information obtained, they would be useless. They should have been eliminated according to standard evolutionary theory. In a similar manner, what good are the replication enzymes if operating instructions are not present. All of this information is in the DNA but serves no purpose by itself without some means to read it. The net result is that the DNA and the rest of the organism had to form at the same time. Any one by itself is a dead end. This means that the formation of the first living organism could not have occurred in steps. There is no theory of evolution which can account for the origin of biological structures which have multiple interdependent parts. Darwin recognized this for living organisms when he said, "*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.*"¹ If this

is true for living organisms it is also true for nonliving organisms where natural selection does not function.

Thinking Critically: If all of modern science and technology have been unable to create life, are we to believe it happened by purely natural processes? Support your answer.

1. Darwin, Charles, *The Origin of Species*. Harvard University Press, 1964, p. 179.

Molecular Cooperatives Section 16.6, Page 323.

The reader of the textbook is encouraged to consider the great number of “hedge words” used in describing the various scenarios proposed in the rest of this chapter. In this one section alone there are at least 23 such words used. This indicates that the proposed scenario is pure conjecture based upon supposition.

Bacterial Flagella Section 16.13, Page 328, Figure 16.13A.

The rotary bacterial flagella of prokaryotes poses a difficult problem for micro evolution. Darwin said, “*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.*”¹ Research has shown that the motor that drives these flagella and the accompanying control mechanisms require about forty different proteins beyond what is found in eukaryotic flagella. The motor has two bearings, is reversible, varies in speed between 9000 and 18000 rpm but the flagellum only rotates between 300 and 600 rpm. The motor is almost 100% efficient and yet is so small it cannot be clearly seen in a light microscope.²

Thinking Critically: Could this motor and its control system been formed by random single steps or must it have come about by multiple steps occurring at the same time?

1. Darwin, Charles, (1872) *On the Origin of Species*. Sixth Edition, New University Press, New York, 1988, p. 154.

2. Behe, Michael, *Darwin's Black Box*. Touchstone Press (Simon & Schuster), 1996, pp.69-73.

! Lipkin, R. *A New Twist on Bacterial Rotary Engines*. Science News, Vol. 144, December 1993, P. 388.

! Blair, David, *Testing the Limits of Flagellar Motors*. Biophysical Journal, Vol. 65, November 1993, pp. 1751-1752.

Apes Are Our Closest Relatives Section 19.2, Page 402.

The authors point out the following: “*Recent biochemical evidence indicates that the chimpanzee and the gorilla are more closely related to humans than they are to other apes. Humans and chimpanzees are especially closely related: human DNA differs from chimpanzee DNA by less than 3%.*” Chapter 19 is entirely devoted to pointing out similarities between humans and other primates. Just because two animals look somewhat alike and have similar characteristics does not necessarily mean they came from a common ancestor. This is a repeat of the homology argument discussed earlier.

Consider the following facts in deciding whether or not man and chimpanzee evolved from the same apelike ancestor. A recent article in the Proceedings of the National Academy of Sciences suggests that there is approximately a 5% difference between the DNA of chimpanzees and humans¹; rather than the 3% reported above. This information was obtained by comparing approximately 1% of the genome and considered substitutions, insertions and deletions. As more of the genome is considered the difference has risen to 7.7%² and even 13.3%. It has even been estimated to be as high as 20%.³ The much publicized number of 1.4% was obtained by considering only substitutions.

Any of these numbers amounts to a staggering amount of information in the DNA. If the human and chimpanzee genomes are both considered to have 3,200,000,000 base pairs (in spite of the chimp having 2 more chromosomes than the human and 10% more DNA)⁴ the 7.7% amounts to 246,000,000 bases. This is the amount of information contained in a book whose thickness is equivalent to about 46 books such as this textbook if it contained nothing but full pages of print from cover to cover. This is a lot of informational difference in the DNA and does not include the 10% additional DNA and two chromosomes the chimp has more than the human. Remember that all of these mutations had to occur

in the zygote (one cell) that actually takes place in reproduction.

Critical Thinking: If the chimp has 10% more DNA than a human how can it be said that there is only a 7.7% difference? Which of the differences given above is the most reasonable?

If this much information difference exists in the DNA between the chimpanzee and the human the difference between man's ancestor and man must be much larger. Where and how did this vast amount of additional information come about when, as stated earlier, it is recognized by the SETI project that additional coherent information does not come about by accident? It is completely inconceivable that this much coherent information could have been accidentally changed in the DNA of a member of the ape family to get man when the mutational problems discussed earlier are considered. If the transition from ape to man is to be accomplished by mutations, it is apparent that there should be plenty of fossil evidence. Where is the fossil evidence?

There is much disagreement over whether or not "Lucy" is in the ancestral lineage of man. Many reputable paleontologists maintain that she is only a pygmy chimpanzee similar to ones alive today. Paleontologist Adrienne Zihlman, University of California at Santa Cruz says, "*Lucy's fossil remains match remarkably well with the bones of a pygmy chimp.*"⁵ Evolutionists such as Charles Oxnard, Sir Solly Zuckerman, William L. Jungers, Jack T. Stern, Jr and Randall L. Susman all concur.⁶⁻⁹

1. Britten, R.J., *Divergence Between Samples of Chimpanzee and Human DNA Sequences Is 5% Counting Indels*. Proceedings of the National Academy of Sciences, USA, Vol. 99, 2002, pp. 13633-13635.
2. Watanabe, H. et al, *DNA Sequence and Comparative Analysis of Chimpanzee Chromosome 22*. Nature, Vol. 429, 27 May 2004, pp. 382-388.
3. Weissenbach, Jane, *Differences With Relatives*. Nature, Vol, 429, 27 May 2004, pp. 353-354.
4. Hacia, J. G., *Genome of the Apes*. Trends in Genetics, Vol.17 #11, 2001, pp. 637-645.
5. Zihlman, A.L., "*Pygmy Chimps, People, and the Pundits*," New Scientist, Vol.104, No.1430, Nov.1984, pp. 39.
6. Oxnard, Charles E., *University of Chicago Magazine*, Winter 1974, p. 11.
7. Zuckerman, Solly, "*Beyond the Ivory Tower*," London: Taplinger Press, 1970, p. 78.
8. Jungers, "*Lucy's Limbs: Skeletal Allometry and Locomotion in Australopithecus Afarensis*," Nature, Vol. 297, 24 June 1982, pp. 676-678..
9. Stern and Susman, "*The Locomotor Anatomy of Australopithecus Afarensis*," American Journal of Physical Anthropology, Vol. 60, March 1983, pp. 279-317.

Conclusions

What has been covered in this addendum should be kept in mind as one reads through the rest of the textbook. As stated at the beginning of this addendum the authors assume that macro-evolution is true and use this assumption occasionally to make unsubstantiated statements addressing the origin of different organisms. The reader should always keep in mind the problem of increasing the information content of the DNA when thinking about whether or not these changes are reasonable and/or possible.

Several conclusions should be obvious:

1. It is very misleading to use the term evolution without specifying whether it is micro or macro evolution being discussed.
2. Adaptation or micro evolution occurs at the species level and is provable using conventional scientific tests and principles. It is a fact.
3. The fact that adaptation of species (micro evolution) is true does not imply or prove that molecules to man evolution (macro evolution) occurs any more than the first cool days of October imply or prove that an ice age is beginning or because a person learns something from watching PBS for an hour imply or prove that watching PBS continuously will produce a genius. The major problems that Darwin recognized with his hypothesis are still true plus new ones as science has advanced. Some of these are:
 - Gaps in the fossil record.
 - Cambrian explosion
 - The fossilization process demands catastrophic happenings more violent than what we see today.
 - Similar genes do not necessarily produce similar structures.
 - How new meaningful information can be added to the DNA by random chance happenings.
 - Optical isomers preclude life evolving.

4. Other explanations for what is observed on earth should be examined.