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The Practicality of Evolution

In all parts of the world both in previous generations and today, mankind continues to seek an answer to how earth and its complex life forms came into existence. While many theories have surfaced, one has remained popular among scientists – evolution. Now taught through science textbooks and included in the curriculum of biology classes, concepts based in large part on Charles Darwin's theory regarding evolution and natural selection have generally been accepted by the scientific community. However, because no one was present during the commencement of the world, confirming our origin has been impossible. Although many textbooks seem to present evolutionary theory as fact, some scientists have pointed out both biological and physical evidence against evolution. This leaves Earth's beginning and life on it open to other theories, including Creationism and Intelligent Design, both of which hypothesize that the world was created by a Supreme Being; the former, by God; the latter by some unspecified greater force. Scientists continue to discuss the feasibility and practicality of both macro and microevolution.

Among those scientists, Neil A. Campbell, PhD in plant biology from the University of California, and Jane B. Reece, PhD in bacteriology also from the University of California, and their colleagues discuss evolution at length in their textbook *Biology*.

Included in their discussion is Charles Darwin, an English naturalist who committed his scientific career to studying the origins of earth's complex species. In 1831, Darwin journeyed to the Pacific Ocean's Galapagos Islands on the *H.M.S. Beagle*. There, he studied the many variations among plants and animals that were related to those on South America's mainland. "He observed the various adaptations of plants and animals that inhabited such diverse environments as the Brazilian jungles, the expansive grasslands of the Argentine pampas, the desolate lands of Tierra del Fuego near Antarctica, and the towering heights of the Andes Mountains" (qtd. in Campbell et al. 441). Darwin returned home in 1836, examined his findings, and wrote a book titled *On the Origin of Species By Means of Natural Selection, or, the Preservation of Favoured Races in the Struggle for Life* (Campbell et al. 441).

Campbell and Reece outlined Darwin's theory, based on four ideas: "one, evolution did occur; two, evolutionary change was gradual, requiring thousands to millions of years; three, the primary mechanism for evolution was a process Darwin called *natural selection* and four, the millions of species alive today arose from a single original life form through a branching process Darwin called *speciation*" (qtd. in Campbell and Reece 444). Darwin labeled his theory *descent with modification*, a phrase that summarized his view on the unity of life. He believed all organisms are related through an ancestor that lived millions of years ago. As the descendants of that organism moved into various habitats, they inherited naturally selected diverse traits developed through beneficial mutations that allowed them to adapt to a particular way of life. Campbell and Reece included three inferences based on five observations by Ernst Mayr, a leading 20th century biologist, listed below.

OBSERVATION #1: For any species, population sizes would increase exponentially if all individuals that are born reproduced successfully.

OBSERVATION #2: Nonetheless, populations tend to remain stable in size, except for seasonal fluctuations.

OBSERVATION #3: Resources are limited.

INFERENCE #1: Production of more individuals than the environment can support leads to a struggle for existence among individuals of a population, with only a fraction of their offspring surviving each generation.

OBSERVATION #4: Members of a population vary extensively in their characteristics; no two individuals are exactly alike.

OBSERVATION #5: Much of this variation is heritable.

INFERENCE #2: Survival depends in part on inherited traits. Individuals whose inherited traits give them a high probability of surviving and reproducing in a given environment have higher fitness and are likely to leave more offspring than less fit individuals.

INFERENCE #3: This unequal ability of individuals to survive and reproduce will lead to a gradual change in a population, with favorable characteristics accumulating over generations.

While many call Darwin the “father of evolution,” scientists have modified and updated his theory as technology becomes increasingly more advanced and new information surfaces. Thus, the modern evolutionary theory is an amalgamation of both Darwin’s findings and those who have followed him.

The modern theory contains two categories: microevolution and macroevolution. Microevolution is change within the species level, change that alters the genetic makeup of a population from generation to generation. It is the result of four different phenomena: natural selection, mutation, genetic drift, and gene flow. Macroevolution, on the other hand, is change beyond the species level, including the appearance of major evolutionary developments that scientists use to define new *taxa*. Macroevolution includes the process of speciation, which, as hinted by the name, creates new species (Campbell et al. 472). The debate of the accuracy of evolution is focused not on microevolution, but rather on macroevolution. In order for macroevolution to occur,

however, an environment must first have microevolution because it drives macroevolution. Thus, understanding both concepts is important.

According to Campbell and Reece, natural selection and mutation are the driving forces behind evolution. “Natural selection is the differential success in reproduction among individuals that vary in their heritable traits. Over time, natural selection can increase the adaptation of organisms to their environment. If an environment changes, or if individuals of a particular species move to a new environment, natural selection may result in adaptations to these new conditions, sometimes giving rise to new species in the process (speciation)” (qtd. in Campbell et al. 445). It is important to note three points about natural selection. The first is the smallest unit that can evolve is a population or “a group of interbreeding individuals belonging to a particular species and sharing a common geographic area” (qtd. in Campbell et al.). The second aspect is natural selection deals only with heritable traits. Although an organism can learn to adapt to its environment through its own interactions, such “self-learned” traits cannot be inherited by its offspring, thus not being effective in natural selection. The third point is environmental factors may vary in different places and times, making one trait favorable in one habitat and detrimental in another (Campbell et al. 445).

Twentieth century paleontologist Stephen Jay Gould, educator at Harvard University, refers to natural selection as follows: “The essence of Darwinism lies in a single phrase - natural selection is the creative force of evolutionary change. No one denies that selection will play a negative role in eliminating the unfit. Darwinian theories require that it create the fit as well” (qtd. in Gould 28).

Another part of the evolutionary theory involves genetic drift, the unpredictable fluctuation of allele frequencies from one generation to the next because real populations are finite rather than infinite in size. Alleles are alternative forms of a gene that occupy the same spot on a chromosome but control different traits. Over time, genetic drift tends to reduce genetic variation because it facilitates the loss of alleles from a population's gene pool. Two situations can increase the likelihood of drift: the "bottleneck effect" and the "founder effect" (qtd. in Campbell and Reece 460). The bottleneck effect is a sudden change in the environment (catastrophe) that drastically decreases the size of a population. The survivors have essentially passed through a "bottleneck" such that their gene pool may no longer reflect the original population's gene pool. Certain alleles may be overrepresented among the survivors, while others may be underrepresented, and still others may be eliminated altogether (Campbell et al. 460). Clearly, under environmental pressure, the diversity of the genetic pool may shrink.

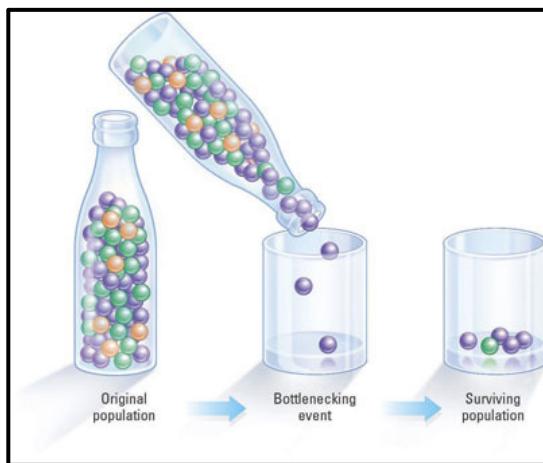


Figure1:
Bottleneck Effect. Digital image. Karen Minot Illustration. Web. 13 Jan. 2011. <http://www.kminot.com/html_docs/bottleneck.html>.

The founder effect occurs when a few individuals become isolated from a larger population and establish a new population whose gene pool is not reflective of the source population (Campbell et al. 460). This is another way that the diversity of the genetic pool may be reduced, thus facilitating microevolution.

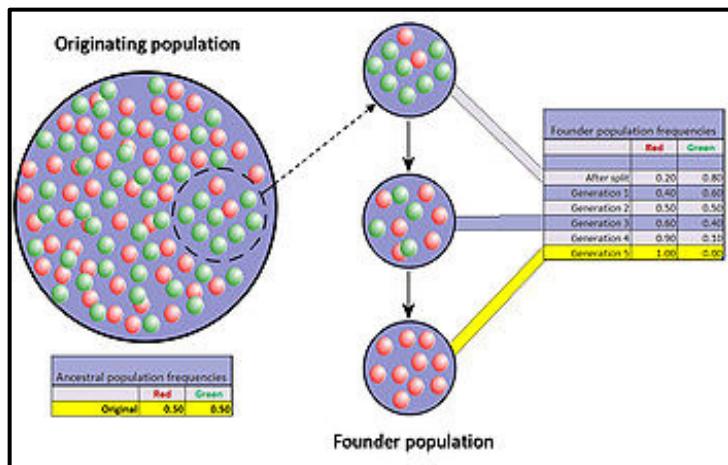


Figure 2:
Random Genetic Drift - The Full Wiki. Digital image. *The Full Wiki - Get the Full Picture on Any Topic*. Web. 13 Jan. 2011.
[<http://www.thefullwiki.org/Random_genetic_drift>](http://www.thefullwiki.org/Random_genetic_drift).

The final aspect of microevolution that Campbell and Reece discuss is gene flow, “the process by which a population may gain or lose alleles via the additions to and/or subtractions from population that result from the movement of fertile individuals or gametes” (qtd. Campbell et al. 460). If extensive enough, gene flow tends to reduce differences between populations and may even merge genes from neighboring populations into a single pool, thus establishing genetic variation within the new population (Campbell et al. 460).

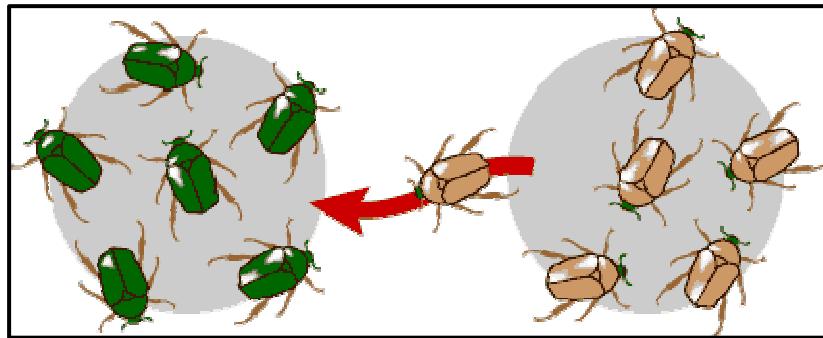


Figure 3:

Gene Flow. Digital image. *Understanding Evolution*. University of California, Berkeley.

Web. 13 Jan. 2011.

<<http://evolution.berkeley.edu/evo101/IIC4Geneflow.shtml>>.

Evolutionary theory must explain not only how adaptations evolve in populations (microevolution), but also how new species originate through the subdivision of gene pools (macroevolution). Campbell and Reece further explain that speciation can be broken into two patterns: “anagenesis” and “cladogenesis” (qtd. Campbell and Reece 472). “Anagenesis is the accumulation of changes that gradually transform a species into one with different characteristics. Cladogenesis is the splitting of a gene pool into two or more separate pools, which each give rise to one or more new species” (qtd. in Campbell et al. 472).

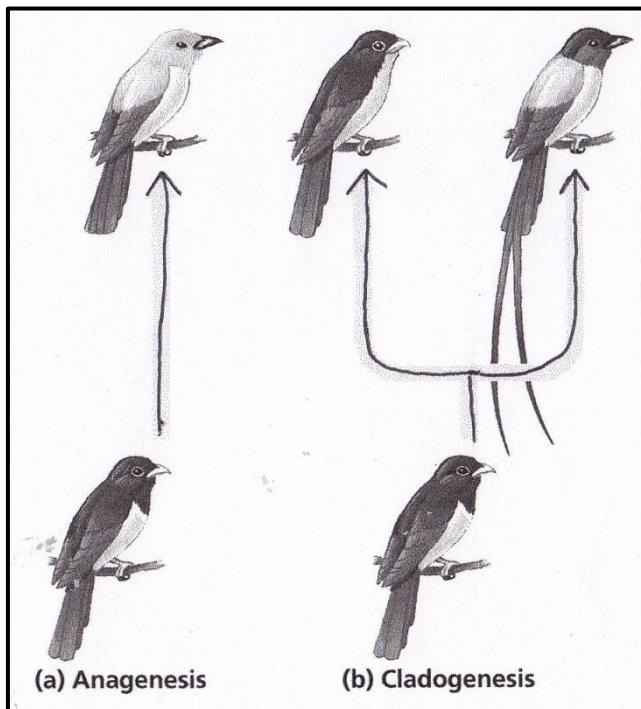


Figure 4:

Two Patterns of Evolutionary Change. *Biology*. 7th ed. San Francisco:

Benjamin Cummings, 2005. 472. Print.

Thus, according to evolutionary theory, random, beneficial mutations that are passed on to successive generations drive the evolution of new species. This may seem plausible; however, opponents of evolution, including creationist Henry Morris, contend that the probability of such “good” mutations happening successively is mathematically improbable.

According to Morris, an organism composed of 200 parts, for example, would mandate its evolutionary beginning as one cell, or one part, and added its additional 199 parts through progressive mutations. While these mutations were occurring, the organism had to successfully live in its environment so it could survive competition among other species. Each successive “add-on” becomes less likely to happen because it is harder to build a complex system than to break it down. If the system mutates “downward,” then it is either destroyed altogether or else moves backward in the evolutionary sense. Thus, this species would only have been possible with at least 200 consecutive and successful mutations, each of which is extremely rare. Even biologists recognize that mutations are rare, let alone beneficial. Even Darwin said, “Natural selection can do nothing unless favorable variations chance it to occur” (qtd. in Morris). If scientists give evolutionary theory the benefit of the doubt and assume that each mutation has a 50% chance of it being good or bad, statistics show that the probability of 200 successive mutations is one out of 10^{60} . This means that the chance of a 200-part species being formed by successful and successive mutations is one out of a trillion, trillion, trillion, trillion, trillion! When considering that a one-celled plant can have a million parts, far more than 200 parts, the improbability is even more significant and harder to explain (Morris).

Biologist B.G. Ranganathan, who earned a bachelor’s degrees in theology and

biology and wrote the text *Origins?*, stated, “First, genuine mutations are very rare in nature. Secondly, most mutations are harmful since they are random, rather than orderly changes in the structure of genes; any random change in a highly ordered system will be for the worse, not for the better. For example, if an earthquake were to shake a highly ordered structure such as a building, there could be a random change in the framework of the building which, in all probability, would not be an improvement” (qtd. in B. G. Ranganathan).

Similarly, American scientist Warren Weaver, former director of the division of natural sciences at the Rockefeller Institute, said, “Many will be puzzled about the statement that practically all known mutant genes are harmful, for mutations are a necessary part of the process of evolution. How can a good effect - evolution to higher forms of life - result from mutations practically all of which are harmful?” (qtd. in Warren Weaver et al.).

Apparently, many educated scientists raise doubt to beneficial mutations as the driving force of macroevolution, thus creating a hole in the evolutionary theory. Included in these scientists is Adnan Oktar, a former student at Mimar Sinan University in Turkey and author of *Evolution Deceit*. A creationist, he has been ridiculed for this theory and even arrested and committed to a mental hospital for his association with the Islamic religion and Creationism beliefs. According to Oktar, biologists have utilized fruit flies to further test the chance of beneficial mutations. For over 60 years, geneticists have been breeding fruit flies, which produce a new generation every eleven days. Every effort put into generating a useful mutation has resulted in failure, which should not be the case since fruit flies reproduce so quickly (Oktar).

Gordon Taylor, who studied natural sciences at Trinity College, wrote in his text *The Great Evolution Mystery*, “It is a striking, but not much mentioned fact that, though geneticists have been breeding fruit-flies for sixty years or more in labs all around the world -- flies which produce a new generation every eleven days-- they have never yet seen the emergence of a new species or even a new enzyme” (qtd. in Taylor 48).

Michael Pitman, author of *Adam and Evolution* and former Chief Scientist of Australia, further commented on the fruit fly experiments: “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” (qtd. in Pitman 70).

In fact, three biologists – Drs. Edward Lewis, Christiane Nuesslein, and Eric Wieschaus – received a Nobel Prize in Medicine for their study of the genetic control of embryo development through fruit flies. They also indirectly supported the idea that fruit flies have failed in producing beneficial mutations. The researchers worked for 50 years with the *Drosophila melanogaster* fruit fly and produced a fly with four wings instead of the normal two wings – indeed, a mutation. However, the extra pair of wings proved to be detrimental to the fly, not beneficial. In fact, the natural selection of the extra wings was due to a duplication of a body segment, which deleted the gene that controls the fly's balance. Again, harmful mutations are much more common than beneficial mutations; yet beneficial mutations are supposedly the driving force of macroevolution (Corby).

Despite evidence claiming mathematical improbability, committed evolutionists continue to support their theory using two main observations: homology and the fossil record, among others (Campbell 448).

Homology is the similarity in characteristics resulting from shared ancestry. There are two types of homologies: anatomical and molecular. Included in anatomical homologies are homologous structures, which represent variations on a structural theme that was present in the descendants' common ancestor. For example, the forelimbs of all mammals show the same arrangement of bones from the shoulder to the tips of the digits, even though such arms, forelegs, flippers, and wings may have different functions – lifting, walking, swimming, and flying (Campbell et al. 448). This concept is demonstrated in the picture below. Evidently, this seems logical.

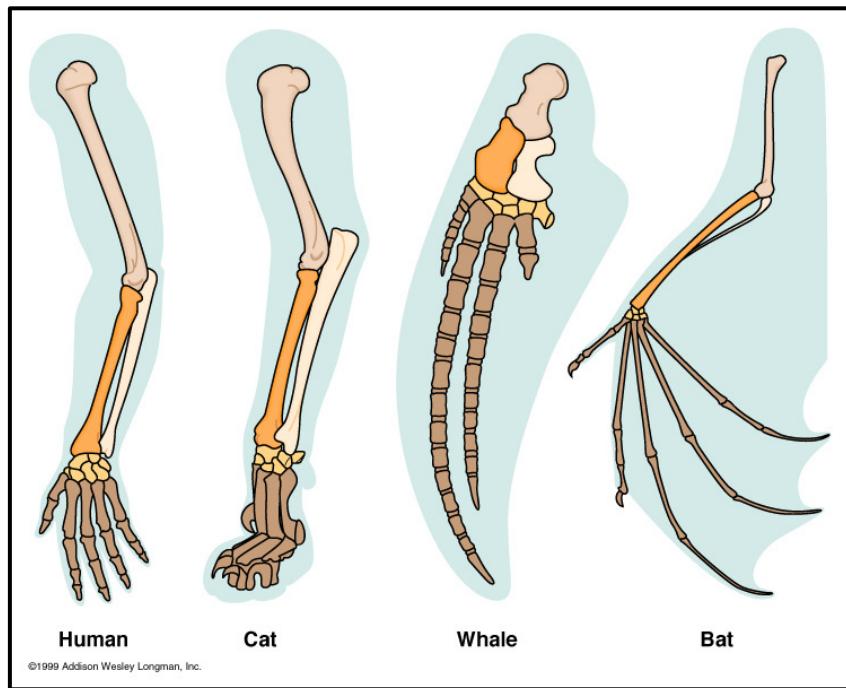


Figure 5:
Homology of Forelimbs. Digital image. Memorial University. Web. 13 Jan. 2011.
<http://www.mun.ca/biology/scarr/Homology_of_forelimbs.htm>.

A division of homology is comparative embryology, or the comparison of early stages of animal development. Scientists argue that at some point in their development, all vertebrate embryos have throat pouches that develop into different structures – gills in fish and throats in humans, for example (Campbell et al. 448). To illustrate the similarities in animals at the embryonic stage, evolutionary biologist Ernst Haeckel developed an illustration, which can be seen below. Over 50 years ago, however, the drawing was debunked. Scientists now know that the supposed "gills" are really the initial phases of the middle-ear canal, parathyroid, and thymus; the claimed "egg yolk pouch" is a pouch that produces blood for the infant; and the likened "tail" is the backbone, which resembles a tail because it takes shape before the legs do (Oktar). Even with all of this information, the drawing is still presented in science textbooks. Evolutionary critics have not failed to draw attention to this situation.

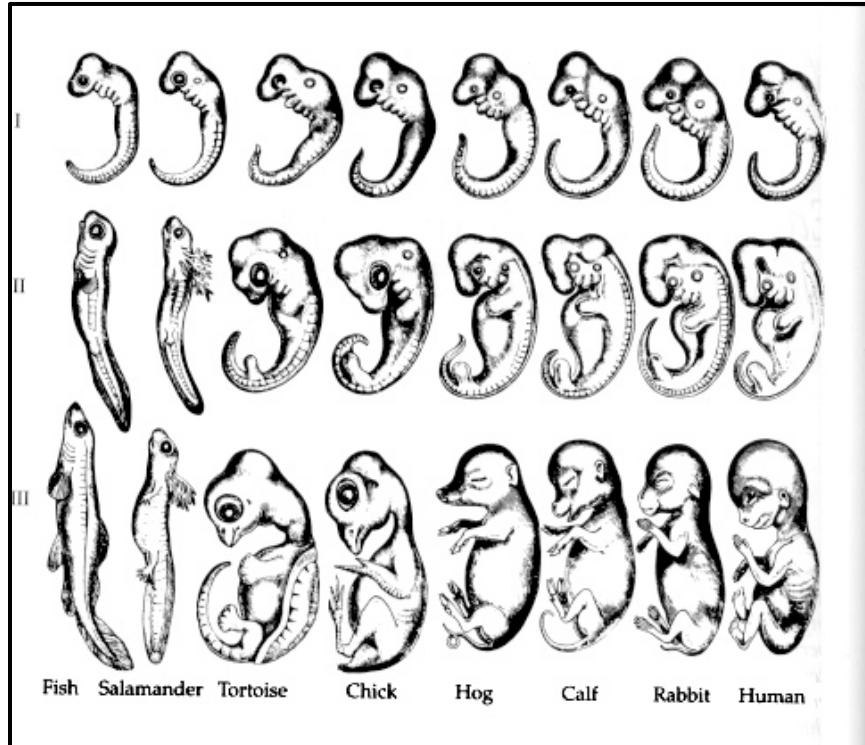


Figure 6:
Haeckel and the Vertebrate Archetype. Digital image. *Developmental Biology 8e Online*. Web. 13 Jan. 2011. <<http://8e.devbio.com/article.php?id=242>>.

Two leading neo-Darwinists, George Gaylord Simpson and W. Beck, admitted, “Haeckel misstated the evolutionary principle involved. It is now firmly established that ontogeny does not repeat phylogeny” (qtd. in Simpson, Beck 241).

Similarly, an article in the October 1999 edition of *New Scientist* stated, “The early human embryo never has functioning gills like a fish, and never passes through stages that look like an adult reptile or monkey” (qtd in McNamara).

Vestigial organs, “species parts that have little or no importance to certain organisms” (qtd. in Bergman), are also a subject matter when discussing homologous structures. They are considered “left-overs” of evolution because they served an important function in the organism’s evolutionary ancestor. However, evolutionary critics point out that just because an organ seems useless does not mean that this is necessarily the case. Such a critic is Dr. Jerry Bergman, who has a PhD in human biology from Columbia Pacific University. According to Bergman, in the past, evolutionists have claimed that there were about 180 vestigial structures in humans, including the tonsils, the appendix, the pineal gland and the thymus. However, biologists have found purposes for several of these organs. The tonsils serve a vital role in preventing disease. After having completed their role in the early stages of life, the tonsils can be removed later in life (Bergman). However, according to the New York Department of Cancer Control, “People who have had tonsillectomies (surgical removal of the tonsils) are nearly three times as likely to develop Hodgkin’s lymphoma, a cancer of the lymphatic system (Galton 26-27). This correlation may indeed illustrate the importance of tonsils in the body.

The appendix was also thought to be a vestigial organ. Now scientists know that it contains a high bacteria population that aid in immunity by fighting foreign bacteria. It is located at the termination of the ileum, the final section of the small intestine, which is practically sterile. Additionally, the pineal gland secretes melatonin, a hormone that regulates the circadian rhythm (24-hour cycle biochemical, physiological, and behavioral processes in organisms). And like the tonsils, the thymus “educates” T-cells in their role, which is crucial to the immune system. While a use has not been found for every vestigial organ, given time, this may one day be the case as the number of vestigial structures is declining as anatomy and physiology fields advance (Bergman).

University of Guelph zoologist S.R. Scadding, an evolutionist himself, concurred with the invalidity of vestigial organs by saying, “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” (qtd. in Oktar).

For further proof of evolution, many scientists look to the fossil record, specifically transitional fossils. According to National Geographic writer Christopher Sloan, in 2006, archaeologists in Ethiopia found the Dikika Baby, a 3.3 million-year-old fossil that, some scientists claim, is the missing link to evolution. With an upper body that resembles an ape and a lower body that resembles a human, scientists are left to research whether this three-year-old female (age, according to teeth) is truly half man-half ape, or whether physical features as a result of physical environment caused her only to appear a transitional fossil. The baby has a small brain, flat nose, a long and projecting face, curved finger bones, and strong shoulder blades appropriate for climbing trees; all of

these characteristics resemble qualities of an ape. From the torso down, however, her body resembles a human, especially her kneecaps. The Dikika Baby is not the only one of her species, *Australopithecus afarensis*; however, she is the most complete compared to Lucy, an alleged 3.2-million-year-old adult female found in 1974 (Sloan).



Figure 7:
2000, December. "East Africa Forum » Paleoanthropology in Ethiopia (2): Dikika Baby." *East Africa Forum* » *News from the Horn of Africa*. Web. 13 Jan. 2011.
<http://www.eastafricaforum.net>



Figure 8:
Dikika Baby – 3 Going on 3.3
Million | KChristieHBlog. "KChristieH:
Website Design, Blog Customization, Email
Templates." Web. 13 Jan. 2011.
<http://www.kchristieh.com/blog/?p=261>.

How do evolutionary critics explain transitional fossils? They believe that these intermediate stages are confused as mutations or variations in species. In other words, such mutations are genealogical derivations rather than proof of a new species. These mutations may come from lack of proper development. For example, the Dikika Baby was found in an area where the soil was poor in iron. Many scientists think that the Dikika Baby was really a human who did not receive proper nutrients from the plants she ate, and thus did not develop completely, taking on ape-like qualities. West African groups (the area in which the Dikika Baby was discovered) have been scientifically proven to be the oldest human populations on Earth. They are biologically and physically

similar, yet display the highest degree of genetic variation in the human race. This genetic variation does not mean they are changing into a different species, however.

Furthermore, many of the alleged transitional fossils have turned out to be hoaxes. In 1912, paleoanthropologist Charles Dawson found a jawbone and cranial fossil fragment that he claimed had ape-like teeth and a human skull. For over 50 years, the 300,000-year-old “Piltdown man,” named after the village in which it was founded in England, was used as evidence of evolution. Approximately 500 theses were written about him (Oktar). In 1949, however, Kenneth Oakley from the British Museum's Paleontology Department used newly developed fluorine testing to verify its age. The results proved that the jawbone did not contain any fluorine, while the skull contained only a small amount of fluorine. This showed that the jawbone belonged to an orangutan that had only been buried a few years before, while the skull belonged to a 500-year-old man. It was indeed a man-made hoax – scientists deliberately added the teeth to the jaw and filled the gaps with molar surfaces. To make it look older, all of the pieces were stained with potassium dichromate, which disappeared when dipped in acid (Oktar).

Sir Wilfred Le Gros Clark, who was on the team that uncovered the forgery, was astonished: “The evidence of artificial abrasion immediately sprang to the eye. Indeed so obvious it may be asked ‘how was it that they had escaped notice before?’” (qtd. in Gould 44).

In 1922, Director of the American Museum of Natural History, Henry Fairfield Osborn, believed he found a fossil molar tooth in western Nebraska that had characteristics of both an ape and a man and belonged to the Pliocene period. Scientists quickly assigned the “Nebraska Man” a scientific name, *Hesperopithecus haroldcooki*,

and it was featured in many reconstructions and pictures, including one that depicted his family. Again, this was all based on a single tooth (Oktar).



Figure 11:
Nebraska Man. Digital image. *Truth and Science Mysteries*. Web. 13 Jan. 2011. <<http://www.truthandscience.net/theoriginofman.htm>>.

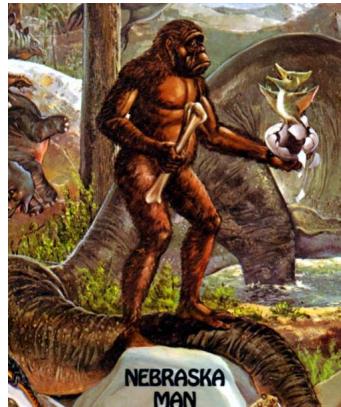


Figure 12:
Nebraska Man. Digital image. *Creation Proof*. Web. 13 Jan. 2011. <<http://creationproof.com/id4.html>>



Figure 13:
Nebraska Man. Digital image. *The Weapon of War*. 10 Sept. 2010. Web. 13 Jan. 2011. <<http://thy-weapon-of-war.blogspot.com/2010/09/theory-of-evolution-deception.html>>.

In 1927, scientists found other skeletons that belonged to “Nebraska Man.” Upon testing the skeletons, however, they discovered that the pieces belonged to neither ape nor human, but rather an extinct species of wild pig called *Prosthennops* (Oktar). William Gregory revealed this truth in his article published in *Science*, instigating the removal of *Hesperopithecus haroldcooki* drawings from evolutionary history (Gregory 579).

Because of these hoaxes and other evidence, some scientists claim that the fossil record is actually solid evidence against evolution. The apparently abrupt appearance of animals and plants reveals that many organisms do not have ancestors. In fact, scientists have failed to find an evolutionary history (from beginning of time to the end of time) for even one species of modern plants (Bebber). When terrestrial strata are examined, archaeologists find that all fossils of organisms living today (i.e., not extinct) appeared simultaneously, refuting the idea of gradual evolutionary development.

In his book *The Nature of the Fossil Record*, former president of the British Geological Association Derek V. Ager said, “The point emerges that if we examine the fossil record in detail, whether at the level of orders or of species, we repeatedly find not gradual evolution, but the sudden explosion of one group at the expense of another” (qtd. in Ager 133).

The oldest stratum of the earth in which fossils of living creatures have been found is the 500 million year old Cambrian, in which a sudden explosion of complex creatures without apparent ancestors merged. This period is thus dubbed the “Cambrian Explosion.” David Raup, a professor of geology at Harvard University, said, “The trilobites 450 million years ago used an optimal design which would require a well trained and imaginative optical engineer to develop today” (qtd. in Raup). The Cambrian Explosion has been called the “deathtrap for evolutionary theory” (Oktar).

Furthermore, in opposition to popular belief, the fossil record consists of animals that are still living today, and are thus not extinct. In fact, many fossils are either identical or extremely similar to today’s species. There are more types of animals in the present than there are types in the fossil record. This is in contrast to evolution, which claims that intermediate and transitional fossils should be significantly evident in the fossil record, thus lending more “species” to the mix. This lack of transitional fossils causes doubt in evolution since scientists have discovered millions of fossils and have explored thousands of places with all different sediments, but have been limited in their discovery of transitional fossils (Bebber).

Darwin said, “If my theory be true, numberless intermediate varieties, linking most closely all of the species of the same group together must assuredly have existed...

Consequently evidence of their former existence could be found only amongst fossil remains” (Darwin 172). Darwin was counting on the fossil record to prove his theory after he died. Scientists have been unable to find a meaningful number of transitional fossils. And the ones they have found have been refuted. Could the fossil record have let Darwin down?

In his book *The Revival of the Creationist Crusade*, evolutionist paleontologist Mark Czarnecki, said, “A major problem in proving the theory has been the fossil record; the imprints of vanished species preserved in the Earth's geological formations. This record has never revealed traces of Darwin's hypothetical intermediate variants - instead species appear and disappear abruptly, and this anomaly has fueled the creationist argument that each species was created by God” (Czarnecki 56).

Perhaps the most widely recognized proof against evolution is “irreducible complexity” – an idea coined by Michael Behe, a biological science professor at Lehigh University. A senior fellow of the Discovery Institute’s Center for Science and Culture, and a fellow of the International Society for Complexity Information and Design, Behe has committed his career to studying and proving Intelligent Design through irreducible complexity. Behe’s book, *Darwin’s Black Box*, refutes neo-Darwinism saying that it cannot explain complex, multi-celled species (Klinghoffer).

An irreducibly complex system has four characteristics: “the parts are specifically structured to do a particular job; the parts are functionally integrated in a way that allows each of them to contribute their function to the whole system; the whole unit is precisely regulated to do the job at hand; the system does not work if any part is missing” (qtd. in Williams).

One such irreducible complex machine found in some prokaryotic and eukaryotic cells is the flagellum, a tail-like propeller, labeled by some scientists as “a masterpiece of nanotechnology” (qtd. in. Strobel). Howard Berg at Harvard University called it “the most efficient machine in the universe” (qtd. in Strobel). The flagellum runs at 100,000 RPM and consists of 40 different protein parts that allows its ‘motor’ to properly function. Without any one of these parts, the flagellum would not work. Thus, the question of how it arose is prominent because it could not have developed by gradual processes since one part needs the other 39 to work (Strobel).

Earth is also irreducibly complex system. In order for organisms to respire, a system of interworking parts must contribute. The components, among others, of this system include “photosynthesis in green plants (which has not been duplicated in the laboratory); sunlight of tolerable intensity; water in its liquid state; an average temperature range of 5-35 degrees Celsius; a water cycle; and an atmosphere containing 20% oxygen” (qtd. in Williams). No other planet has these conditions. Furthermore, the combination of the 23 degree tilt of earth’s axis, the rotation on the axis, and the rotation of earth around the sun spreads sunlight in such a way that temperature is balanced to maintain the water cycle. If any of these conditions were not so, life as we know it could not survive. Many contend that this fine tuned planet points to a designer, not something left to chance.

The eye is another irreducibly complex system. Scientists of the 19th century concluded that if a person lacked any of the eye’s integrated features, severe loss of vision or complete blindness would ensue. Charles Darwin knew about the eye and addressed it in his section of The Origin of Species called *Organs of Extreme Perfection*

and Complication. In Darwin's thinking, complex organs could not be produced in a single step or even a few steps because they require generations of organisms slowly accumulating beneficial mutations. He recognized that a complex organism suddenly appearing in one generation would be a miracle. However, it seems that such spontaneity had to have occurred in the eye because gradual development of this complex structure seems impossible since its features are interdependent. To advance his argument, Darwin pointed to different kinds of eyes, just as anti-evolutionists say that scientists are mistaking variation within a species as proof of evolution. Darwin proposed that the eye started as a simple light-sensitive spot and evolved into the complex camera-eye of humans. But the question of how initially vision arose still remains unanswered. Darwin chose to dismiss this question, saying, "How a nerve comes to be sensitive to light hardly concerns us more than how life itself originated" (qtd in. Behe).

When Darwin was developing his theory of evolution, he thought the cell was simple. Today, however, we know that the cell contains very complex biological machines within a very small volume. In fact, the cell is approximately a tenth of the size of the head of a pen, and contains about three million units of DNA. And, there are trillions of cells within one human body. It seems as if Darwinism was a lot more plausible when talking about globs of simple protoplasm rather than molecular machines found in cells we know today (Strobel).

Unaware of the idea of irreducible complexity, 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" (Oktar).

In both plant and animals, a two layer membrane made of lipids, or fats, surrounds the cell. Because lipids are only formed by living cells, the question of how they were initially formed again arises (Heinze).

“Though a few organic substances—for instance, certain simple amino acids—can form relatively easily under prebiotic conditions, other biochemical building blocks, such as nucleotides and lipids, require for their synthesis a ‘real factory.’ … The synthesis of these substances involves a series of reactions, each reaction following the previous one in utmost accuracy” (Iris Fry 126, 176-177).

This “real factory” that Iris Fry discusses is any living cell. The lipid membrane is mostly known for its role in serving as a barrier between the cell and its environment, preventing contents of the cell from escaping and mixing with its surroundings. However, the cell membrane has many other roles too. Nutrients go in through and wastes go out of the membrane through selective pumps made of proteins. If the lipid layer did not have these protein channels, too much water would enter the cell (hypotonic), keeping nutrients out, which would ultimately starve the cell. Based on this evidence, proteins and lipids had to work together from the beginning of time, an irreducibly complex system. This is impossible, however, because neither lipids nor proteins can be made spontaneously under natural conditions (Heinze).

As with all theories, the debate of the actual commencement of the universe remains prominent. In order to have evolution, the universe must have created itself somehow. Thus, included in the theory of macroevolution is the primordial soup theory, which states that “self-replicating entities, the precursors to life as we know it, arose spontaneously out of the chemical environment of the early Earth” (qtd. in A. Kate). The

chemicals are thought to have been carbon dioxide, ammonia, water, and methane, which perhaps formed amino acids, the building blocks of proteins, when exposed to lightning.

The proteins started the chain reaction of life (A. Kate).

In 1953, Stanley L. Miller and Harold C. Urey conducted an experiment to explain the origin of life, specifically the chemical soup theory. They put methane (CH_4), ammonia (NH_3), hydrogen (H_2), and water (H_2O) molecules in a closed system and added electric current to mimic lightning. After one week, 10-15% of the carbon formed organic compounds, and 2% had formed amino acids, the building blocks of proteins. Scientists were excited to find that the basic building blocks of life, amino acids (which were of the simplest kinds), could be formed under conditions thought to be present in early times (Szaflarski).

However, Miller's experiment has caused skepticism recently. Scientists now believe that predominantly reductant (reducing agent) molecules, such as the ones in the experiment, were not present in the Earth's early atmosphere, and that the tremendous amount of energy required in Miller's experiment could not have been replicated in early times. Although lightning storms were present, they were not continuous as the Miller/Urey experiment demonstrated. Thus, many scientists suggest that amino acids and organic compounds may have been formed, just not in the large amounts this experiment produced – that is, not enough to form life. And, even if amino acids were formed, no experiment has found a way to link them together to form proteins, which in turn, combined with DNA to form the first living cell. In fact, this has been proven to be impossible. Proteins are so complex that they only are able to form in a laboratory, and even this process is very difficult. They cannot naturally form on their own from just

amino acids, at least based on today's scientific findings. An analogy would be if bricks formed in nature, they would get together to build a house... again, impossible!

Furthermore, amino acids are of two kinds: right-handed and left-handed. Only proteins containing all left-handed amino acids will work in living cells because proteins containing right-handed amino acids have the wrong shape and do not connect properly to the surrounding proteins. The amino acids formed in Miller's and Urey's experiment were half right-handed and half left-handed, so they would not work in a living cell's proteins. Add this to the fact that in nature, proteins will not form outside of cells (unless in highly specialized conditions in a laboratory), and macroevolution is certainly questionable, arguably impossible (Heinze).

The Second Law of Thermodynamics has also changed the minds of many scientists who once believed in evolution. Newton's Second Law states that "all things in the universe are undergoing a continual process of decay" (qtd. in Thomson). This law has proven to be one of the most tested and fundamental principles in all of science. Any law or theory that violates it is considered impossible. Evolution, which hypothesizes that the world is increasing in complexity with time, directly contradicts the most definite law of science. To defend their beliefs, many evolutionists turn to circular reasoning, pointing to the fossil record. This is not viable because evolution is used to interpret the fossil record, so it cannot be used to justify evolution. However, the fossil record actually is more consistent with Newton's Second Law because there is strong evidence for the steady loss of species within it (Thomson).

It is interesting to note that the scientific method, which scientists use in all of their research, does not apply to the theory of evolution. The main steps of the scientific

method are ask a question, do background research, construct a hypothesis, test the hypothesis by doing a repeatable experiment, and draw a conclusion based on the results. Evolution violates this fundamental premise as it cannot be directly observed or repeated.

Evolutionists contend that genetic variation brought about by natural selection is observable proof for evolution. However, this is a post-hoc fallacy. Such variation only proves that there is variation among species. It does not show that new genes or information was formed. No species has been observed changing into another, currently or in the fossil record. Certainly, organisms adapt through microevolution, but this does not mean that they will eventually become a separate species. Although scientists claim to find proof of evolution in both homology and the fossil record, counter evidence has surfaced, leading scientists to research irreducible complexity and its significance in the evolution debate. For this reason, evolution remains only a theory.

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