# Names in Evolution
# Compiled by BIOL4510/5450 Spring 2010

**Erasmus Darwin** -- Kevin Odneal
**Thomas Hunt Morgan** -- Darcy Cook
**P.V. Tobias** -- Juston Carpenter
**Don Johanson** -- Nicole Kresak
**R.L Trivers** -- Kayla Reeves
**J. Tooby** -- Stephanie Sadowski

**Georges Cuvier** -- Kathryn Campbell
Georges Cuvier lived from 1769-1832, and was famed for his theories in evolution and introducing revolutionary ideas. Cuvier approached evolution with a holistic approach, believing that organisms existed as functioning wholes, and the theory of evolution by changing small features over time was not possible because any change in any small part of the organism would cause the whole to be dysfunctional, since the whole was necessary to be functional. He did not believe in organic evolution. He believed that any similarities between species were simply due to need for similar function, not proof of a common ancestor. He believed that the four branches of organisms, Vertebrata, Articulata, Mollusca, and Radiata could not be traced to any common ancestor.

**Carl Linnaeus** -- Meagan Aliff
Carl Linnaeus was a Swedish botanist who is often called “the Father of Taxonomy.” He was a religious man who believed that he could come to know God through nature. He classified plants by their sexual organs, a method that put him under attack by both churchmen and scientists. The scientists criticized his methods for creating inconsistent classifications, which in many cases they did. He also came under fire by the religious for placing humans in the same category as animals. Linnaeus is credited with coming up with our modern “binomial nomenclature” naming method, wherein species are known by two names, their genus and species name. Linnaeus believed that new species arose only from the original species from the Garden of Eden and had no concept on an open ended evolution.
Source: http://www.ucmp.berkeley.edu/history/linnaeus.html

**Charles Lyell** -- Elizabeth Ryan
Charles Lyell was born on November 11, 1797 in Kinnordy, Forfarshire, Scotland. His father also named Charles moved young Charles to London, England when he was two

years old. He entered Exeter College in Oxford in 1816. Charles Lyell is a Scottish geologist who is credited with the idea that all the features on the Earth's surface are produced by physical, chemical, and biological processes through long periods of geological time. (Encyclopedia Britannica) This concept is called Uniformitarianism. This term was first coined by James Hutton; however this began laying the major foundation for evolutionary biology. According to Lyell it was evolution not Biblical records that created the Earth's crust. His first paper *"On a recent formation of freshwater limestone in Forfarshire"* was presented in 1822. He was knighted in 1848 and made Baronet in 1864. He passed away roughly a decade later in London, England.

**Jean Baptiste Lamarck** -- Mackenzie Shafer

Lamarck was a firm believer that evolution occurred and proceeded in occurrence with natural laws. Lamarck was in the army and fought in the Pomeranian War. He retired in 1766 after being injured. His interest was specialized in botany, and he published a three volume piece entitled, Flora Francaise. He became a member of the French Academy of Sciences in 1779. He was a professor of zoology at the *Muséum national d'Histoire naturelle*. He invented the term invertebrate and published a major work on their classifications in 1801. He was the first one to use the term biology and continued his work primarily in invertebrate zoology (wikepedia.com)

Most people know Lamarck for his theory of inheritance of acquired characteristics. This theory generally states that organisms will acquire different traits and characteristics based on the use and disuse of the particular trait. An example of this theory would be the long neck of a giraffe. Originally giraffe's started out with short necks, but because they had to continually stretch their necks to reach the leaves in the trees, their offspring were born with long necks, acquiring the trait by the continuous use by the parent. We all know that this is not true, but this is how Lamarck saw the concept of evolution. He also maintained that the environment that the animal was housed in participated in how characteristics were acquired by the animal.

References:

http://en.wikipedia.org/wiki/Jean-Baptiste_Lamarck

**Thomas Malthus** -- Ryan Majcher

Thomas Malthus is a name that I was familiar with from a previous economics course, but I was unaware of his major contributions to the field of Evolution until now. He wrote a paper on the *Principle of Population as it Affects the Future Improvement of Society*. His major involvement in evolutionary thinking dealt with the sustainability of the Earth's

population based on the availability of resources. Populations have always grown much more rapidly than resources such as food and will continue to do so until the Earth can no longer support such a trend. At this point we will have met the Earth's carrying capacity and life will no longer exist. He proposed that a system of checks and balances such as disease, famine, crime, and natural disasters would keep the population in check and allow us to continue on as a population. The individuals that made it to the next generation would be stronger and better suited towards the environment. These were the origins of the idea of natural selection/survival of the fittest that Darwin would work with later on. I enjoyed researching this individual very much because food sustainability is something that I encounter frequently in my nutrition courses, and it is a problem that should be addressed more seriously than is currently being done. Malthus proposed that if population growths continued to grow at a staggering rate, we would eventually hit our carrying capacity ending life on Earth as we know it today. As China's population continues to grow, and their love for meat reaches that of the United States, we will begin to see the beginning of the end, as far as food production is concerned. Raising cattle takes away massive amounts of finite resources and causes many secondary effects that hurt populations such as water and air pollution from waste products.

**Robert Chambers** -- Gabrielle Knafler
Robert Chambers is credited with writing Vestiges of the Natural History of Creation, published in 1845. The popular book attracted both negative criticism and keen interest. The controversy over the book stems from its content. Vestiges of the Natural History of Creation poses hypothesis about the formation of the solar system, evolution, and human origin. Robert Chambers was first a writer and publisher and second a self-taught student of botany and geology. Though Chambers' theories are not scientifically sound, publishing them was yet another step in generating new ideas about evolution and the origin of man. Charles Darwin published On the Origin of Species in 1859.
http://www.ucmp.berkeley.edu/history/chambers.html

**Thomas Henry Huxley** -- Abby Naquit
Thomas Henry Huxley was born on May 4, 1825 in Ealing, England. He went through two years of childhood education, and lacked real, formal education, but engaged himself in many readings regarding science, history, and philosophy. At the age of 21, he became the assistant surgeon on the Royal Navy frigate, the H.M.S. Rattlesnake. While onboard, Huxley collected and studied marine invertebrates. These included cnidarians, tunicates, and cephalopod mollusks. In returning to England in 1850, he

found out that his research results had earned him into the ranks of the English scientific establishment. He associated himself with other scientists including geologist Charles Lyell, philosopher Herbert Spencer, and naturalist Charles Darwin.
Huxley earned the nickname “Darwin’s bulldog” for being outspoken on defending and advocating Darwin’s theory of evolution by natural selection. At first he was opposed to this view, but accepted it when he read Origin of Species. He did not agree with Darwin’s theory 100% and still critiqued it. In regards to other evolutionary theories, including those of Lamarck and Robert Chambers, Huxley did not support it stating that they were more metaphysical than scientific. In addition, he also rejected the idea of recapitulation.

Huxley’s most famous writing was *'Evidence on Man’s Place in Nature'* (1863). Published only five years after Origin of Species, it reviewed primate and human paleontology and ethology. In addition, it was the first time someone tried to apply evolution to humans. Along with his colleagues, Huxley showed how anatomically similar the brains of apes and humans were. He also became one of the most noted comparative anatomists of the 19$^{th}$ century in clarifying the relationships between invertebrates that were not understood very well. He also concluded that birds evolved from small dinosaurs after comparing *Archeopteryx* and *Compsognathus*.

**Alfred Russel Wallace** -- Nicole Rosenthal
Alfred Russel Wallace is significant to the field of evolutionary biology because of his work on natural selection and other ideas of evolution. He was an explorer as well as a biologist, botanist, and the “father of biogeography”. Through his travels he collected specimens and planned to test the hypothesis of evolution. He studied in the Amazon where species that were related could be in close proximity. Using ideas of biogeography he came up with general observations that would become his theory of natural selection. Charles Darwin found out about his work and ended up publishing his own paper.

**Gregor Mendel** -- Elizabeth Shuler
Gregor Mendel played a very important role in evolutionary biology. He was able to demonstrate how traits are passed on from generation to generation using pea plants. He was able to prove how there are traits that can be recessive, which are generally not expressed, and dominant traits, which generally are expressed. Dominant traits are generally those that help an individual survive as well as helping the population as a whole survive. Dominant traits get passed on to other generations more often than recessive traits because they allow the species to survive more successfully than

recessive traits. However, mutations can take place among a species that allows for more successful survival rates. These mutations will get passed on and thus cause more individuals of the species to develop the new trait. This passing on of new, successful mutations can cause a species to evolve into a greater, more successful species.

Gregor Mendel also played an important role in genetics. However, genetics plays a very large role in evolution. By using genetics, it is possible to research where mutations took place along a line of inheritance. It is also possible to determine which mutations will most likely be passed on and which mutations will not be passed on. This helps in the determination of how a population will change over time.

**William Jennings Bryan** -- Chris Novak

William Jennings Bryan was the Secretary of State under Woodrow Wilson. Bryan hated the idea of Darwinism, and was against the idea of teaching it in schools. He said it took away from the idea that God is the ultimate being and it belittles the Christian faith. He was afraid that it was making its way into both upper and lower levels of education. Universities around this time still had a very close connection to the church which Bryan feared was also adapting, and semi-accepting the idea of Evolution over Creation. He has been stated to argue that if Christians wanted to teach Christianity they had to build their own schools and facilities to do so. He argued that in public schools if you want to learn about Darwinism, then the people who want to learn about should have to build their own facilities to do so. He uses the fact that in the constitution it is illegal to teach Christianity at the public's expense, but questions why it isn't illegal to teach Darwinism in public schools. It is a very touchy subject in which both parties can be considered right. Both parties are however at an impasse because neither side of the argument has the proof that one is wrong or right.

**Alfred Wegener** -- Kacey Mayer

Alfred Wegener was a German scientist who hypothesized continental drift, but was unable to provide a mechanism and so his theory was not accepted until after his death. Wegener argued that all the continents had once been joined in a complete landmass he termed Pangaea. He noticed that the continents fit together like a jigsaw puzzle. Analyzing the Atlantic coasts of South America and Africa, he found similarities in rock type and fossils, including the fern Glossopteris.

The theory of Pangaea has important implications for evolutionary thought. Because the land mass was all connected, organisms could spread anywhere on it where the habitat was suitable. Therefore, life forms or their ancestors present at that

time are represented on all present continents, whereas types of organisms that appeared after the splitting up of Pangaea are only found certain places.
Sources:
http://pangaea.org/wegener.htm
http://biology.clc.uc.edu/Courses/bio303/contdrift.htm

**Julian Huxley** -- Mario Amicarelli
Sir Julian Huxley was born June 22, 1887. Huxley suggested evolution was primarily driven by natural selection; he was one of the few biologists who believed this. Huxley was a professor at the University of Oxford for a brief period of time and a few of his students became very successful in their respective fields. He traveled the world frequently, especially Europe, Africa, and the U.S. Huxley was also one of the pioneer developers of the new evolutionary synthesis. He was also a secular humanist and was an active member of the Rationalist Press Association for nearly 60 years. He coined many terms such as clade, cline, and ethnic group. Julian Huxley died February 14, 1975.

**George Gaylord Simpson** -- Nicole Kessler
George Gaylord Simpson, a paleontologist, was born on June 16, 1902 in Chicago, IL. His contributions to evolutionary theory include a classification of mammals, based on his studies of mammalian evolution. His books include Tempo and Modern Evolution, The Meaning of Evolution, The Major Features of Evolution, and The Principles of Animal Taxonomy.

**Theodosius Dobzhansky** -- Erin Tucker
Theodosius Dobzhansky (1900-1975) was a geneticist and evolutionary biologist who emigrated from Ukraine to the United States in 1927. He was a leading figure in modern evolutionary synthesis due to publishing work on the synthesis of evolution and genetics. In his book *"Genetics and the Origin of the Species"*, he defined evolution in genetics terms as “a change of the frequency of an allele within a gene pool.” In 1971, he published his essay *“Nothing in Biology Makes Sense Except for in the Light of Evolution”* which states that the theory of evolution explains the interrelatedness between various biological facts and makes sense of them. He also claims in his essay that religion and science should be considered separately and that Christianity and evolutionary biology are compatible.

**Wilhelm Weinberg** -- Emily Menzies

Wilhelm Weinberg was a physician and obstetrician-gynecologist. He is most known in biology for the Hardy-Weinberg principle which he gathered independently of G. H. Hardy. This principle deals with genetic equilibrium. The main assumptions of this principle are that populations are very large with an infinite number of individuals, individuals mate at random, there are no mutations, there is no gene flow between populations, and there is no difference in the ability to survive to a reproductive age and passing on genes. This principle serves as a model of a stable population to use to compare real (unstable) populations when looking at allele genotype and phenotype frequencies for single gene traits. This is a widely excepted model used to predict or measure the rate of evolution in populations; however, it is based on a stable population, which means that all the assumptions will not apply to any real population.

**Ernst Mayr** -- Sarah Brown

Ernst Mayr is a very popular evolutionary biologist of the 20th Century. Most commonly known of adapting the Biological Species Concept, Mayr has often been accredited with a lot of things, including his trademark as a taxonomist. One of his most famous books, Systematics and the Origin of Species, helped him transition to evolutionary biology. He helped advance the theory of Mendelian genetics of heredity and Darwin's theory of natural selection to form a sort of modern synthesis. The modern synthesis that he helped invent supports that Mendelian genetics is consistent with natural selection which helps produce gradual evolution. The biological species concept was another one of his developments to the movement of evolutionary biology because it helped scientists better define how species come about and defining species as a group of interbreeding populations that are reproductively isolated from other groups. With this, he also developed different forms of speciation, specifically allopatric speciation, which help to explain how species progress from one species to another, or evolve from other species. He is also noted with determining that the species is the keystone to evolution, meaning that the species, as a unit, has been responsible for making gradual changes and adaptations over the course of time to achieve successful evolutionary changes.

**R.A. Fisher** -- Donna Ruth

Sir Ronald Aylmer Fisher was a very interesting gentleman from England who was a master of mathematics, particularly statistics, and had interests in evolutionary biology and eugenics. His Parents were Katie Heath and George Fisher and he had three brothers and three sisters. He married Ruth Eileen Gratton Guinness and together they had two sons and seven daughters. In the academic world, Fisher was well known for

his accomplishments that include: The method of maximum likelihood, Analysis of Variance, a contribution to the equation for standard deviation, many equations pertaining to population genetics, and the recognition of degrees of freedom. Because of his work on the theory of population genetics and his interest in natural selection and the evolution of dominance, Fisher is considered to be one of the founders of neo-Darwinism and modern evolutionary synthesis.

**J.B.S. Haldane** -- Travis Westfall
J.B.S. Haldane (1892-1964) was born John Bourdon Sanderson Haldane. He is most noted for his mathematical contributions to population genetics. Himself, along with R.A. Fisher and Sewall Wright, are considered the three major contributors to the mathematical concepts used in population genetics today. Haldane is also noted for some of his writings. A series of ten essays called *"A Mathematical Theory of Natural and Artificial Selection"* as well as his book *The Causes of Evolution* discuss the mathematical concepts of natural selection like the distribution and change in gene frequencies, and the effects of migration and mutation on these frequencies. From his essay *On Being the Right Size*, Haldane is also noted for observing increasing animal complexity with increasing size. Dubbed the *Haldane principle*, certain bodily characteristics such as oxygen delivery become increasingly more complex for larger species because of the need for more oxygen over a larger body mass. Some of the awards that Haldane has won include the Darwin Medal, the Huxley Memorial Medal, the Feltrinelli Prize, the Kimber Award, and the Darwin-Wallace Medal.
Source: Wikipedia: http://en.wikipedia.org/wiki/J_B_S_Haldane

**Sewall Green Wright** -- LeLett Houston
(American Geneticist) Dec. 21, 1889-March 3, 1988
Sewall Wright was a mathematical genius of evolution and population genetics in his time. Sewall along with two other men R. A. Fisher, J. and B. S. Haldane were the founding fathers of theoretical population genetics. Wright's unique contribution was his "shifting balance theory," a theory of evolutionary progress due to large populations made up of partially isolated groups. Within these groups trial and error would take place but whatever the rate of succession; the combinations formed would be the factor to spread the variation in larger populations. Although his theory remained controversial, Sewall consistently worked hard to gather new methods and create new discoveries in science to prove himself and his work. Wright developed much of the theory of inbreeding (coefficient of inbreeding- a genetic term that refers to a result when two animals which are genetically related to each other mate) and the genetics of

quantitative traits (the study of continuous traits (such as height or weight) and their underlying mechanisms). Wright's method of path analysis (a statistical method of finding cause/effect relationships), in which animal breeders were the primary users of this technique but eventually became a standard statistical technique in the social sciences was accepted by nearly all biologists. Wright, Fisher, and Haldane were all key players in developing one of the major contributions in biological science through mammalian and biochemical genetics. The modern evolutionary synthesis, which is a union of ideas from several biological specialties which forms logical accounts of evolution would not be this far in our research studies and topics of discussion/ controversies if it wasn't for these great scientists.

- Pioneer in physiological genetics
- Uniquely responsible for the developmental and coat color genetics of guinea pigs.

**Stanley Miller** -- Randy Williams

Stanley Miller was an American chemist and biologist born in California in 1930. Dr Miller's contribution to evolutionary biology was quite profound, providing insight into the question of abiogenesis, by showing how organic compounds may have arisen from inorganic materials. Working with Harold Urey, Dr Miller conducted what has become known as the Miller-Urey experiment. This experiment attempted to recreate chemical conditions similar to those thought to be present on the early Earth. The process included water, methane, ammonia, and hydrogen, sealed in a sterile glass apparatus. These components were heated to induce evaporation, while electrodes produced sparks simulating lightning in the early atmosphere. When the solution was allowed to cool and condense, analysis showed much of the carbon present in the system now resided in organic compounds such as amino acids, sugars, and lipids. Later analyses in 2008 using advanced analytic techniques showed that in one of Miller's experiments up to four times as many amino acids were produced then were originally identified. The Miller-Urey experiment proved that organic compounds could indeed arise from inorganic matter rather readily in conditions similar to those found on the pre-biotic Earth.

**James D. Watson** -- Joseph Ramirez

James Watson was fascinated with animals since he was a child. In particular, he was quite fond of birds He received his Bachelor's degree in Zoology in 1947. In 1950 he got his Ph.D. Watson was interested in Molecular Biology, especially the interactions between viruses and Bacteriophages. Watson became interested in the structure of

DNA when he was doing post doctoral research at Copenhagen University. James Watson and Francis Crick unraveled the structure of DNA using X-ray crystallography. There work was published in 1953. Watson was co-awarded the Nobel Prize in Physiology in 1962. James Watson was appointed as the director of the Human Genome Project in 1989. There he became dismayed by the idea of patenting genetic sequences. He left the organization, as a result, in 1992. Watson was awarded numerous awards over the course of his life. Later in his career, he turned his attention to cancer.

**Francis Crick** -- Amanda Lyons
Francis Crick, born on June 8, 1916, is well known for his partnership with James Watson and the pair's discovery of the structure of DNA. Crick began his studies as a physicist but later, in 1947, he changed his focus to biology. It was during this time that vast amounts of research was being devoted to genetics. Along with other colleagues, Francis Crick and James Watson discovered the helical structure of DNA through the use of X-ray diffraction. The pair was awarded the Nobel Prize in Physiology or Medicine of 1962 for their work. After this major discovery, Crick went on to research DNA replication and protein synthesis, which lead him to also discover codons and their complimentary amino acids. Francis Crick was also an outspoken advocate of teaching evolution in public schools.

**Mooto Kimura** -- Jonathan Sedely
Mooto Kimura's is most popular for writing the *Neutral Theory of Molecular Evolution* as a critique of Darwinism as well as mathematically coming up with the theory of the null hypothesis for which he has achieved recognition in the field of evolution and population genetics, despite being clearly against natural selection. Basically, the controversy starts because most Darwinist did not like Kimura's theory because he was telling the scientific community that Natural Selection was not as powerful as once thought and that natural selection had its limitations. Specifically, Kimura was looking at the molecular level that Natural Selection was greatly minimized, if not banished at all but randomness still took its place. Principally, molecular variation in proteins and DNA was uncovered that had no influence on the fitness of the individual organism which was coined to be selectively neutral. His argument presented that mutations and genetic drift accounted for evolution and stated the doubted if Natural Selection was of any importance in the traditional areas of morphology and anatomy.

**Allan Wilson** -- Adam Kohman

(Oct. 18, 1934 - July 21, 1991)
Awards: MacArthur Fellowship, (short-listed for Nobel Prize when he died)
Dr. Wilson earned his PhD at the University of California, Berkeley where he also taught until the time of his death in 1991. Dr. Wilson's two greatest contributions to the field of Evolutionary Biology lay in the realm of genetics and molecules. Dr. Wilson was the first to coin the "Molecular Clock" and how we could use genetic mutations to gage the distance from the 'original female' from which we all are to have descended. Not long after the waters had calmed from the first big stone that he threw into the waters of the scientific community did Dr. Wilson suggest another revolutionary breakthrough. In the early 1980's, Dr. Wilson claimed that he had discovered that all current humans were not just descended from a single female, which went against the standing theory which humans had evolved from separate humans over a large spread around the globe, but that this 'common mother' lived around 1500,000 years ago in Africa. These two revolutionary discoveries lead Dr. Wilson to be considered the leading molecular evolutionary biologist. He died on July 21, 1991 due to complications with his leukemia.

**Edward Osborne Wilson** -- Steve Norris
Edward Osborne Wilson has made significant contributions to the field of evolutionary biology through his study and explanation of the interactions amongst communal organisms and the development of social interactions as the result of perpetuated, evolved traits (www.achievement.org/autodoc/page/wil2bio-1). His studies are heavily focused on ants and other insects; but he has also applied many of his theories of social behavior toward humans and human social interactions. E. O. Wilson believes that sociobiology, including the development and characteristics of human societies, have developed because of the natural tendency of all organisms to maintain successful traits via reproduction and biological evolution; and that those traits are maintained because of some biological advantage (www.brainyquote.com/quotes/authors/e/e_o_wilson.html). Wilson has also contributed greatly to evolutionary biology through his study of chemical messengers as tools of communication between like organisms. Though this study parallels his sociobiology work, it also adds significant attributions to natural forces by nullifying the idea that communal insects act as a single-minded drones because that is the way they were designed, and replaces that notion with the theory that chemical communication has evolved over time and that the activity of drones is essential to perpetuating the genetic community of colonies. He also contributes this same idea, that natural forces are responsible for natural activities, to the qualities that define human beings as human (en.wikipedia.org/wiki/E._O._Wilson) . This extends to the appreciation of aesthetics and humanities creation of a supernatural

world. E. O. Wilson uses sociobiology to explain that these traits, and their maintenance within populations, is the result of evolution and is a natural phenomenon. This also contributes to evolutionary biology by offering another natural solution to a common, profound aspect to the human population as a whole; religion. E. O. Wilson continues to contribute to evolutionary biology via ecological conservation efforts that focus on maintaining biodiversity (www.eowilson.org/); which helps to maintain the complex interactions that provide ecological niches which promote specialization and speciation (Lavers, 2001. Why Elephants Have Big Ears: understanding patterns of life on earth).

**Richard Lewontin** -- Lauren Zielke

Richard Lewontin is an American evolutionary geneticist. He obtained his degree from Harvard College in 1951 and his PhD from Columbia University in 1954. He has been teaching at Harvard University since 1973. Lewontin's role in evolution is in the development of molecular population genetics and the use of electrophoresis to study and understand the evolutionary implications of enzyme polymorphism. His papers on these topics are considered classics among many in the field. Lewontin is also active in supporting the Human Genome Project. Additionally, he has written many significant articles and books in the field in which he takes a social critic standpoint and challenges readers to consider how we practice biology and its place in society.

Sources:

Aronson, Jay. "Documents on Molecular Evolution." Welcome to CaltechAUTHORS - CaltechAUTHORS. 28 Aug. 2001. Web. 18 Jan. 2010. <http://authors.library.caltech.edu/5456/1/hrst.mit.edu/hrs/evolution/public/profiles/lewontin.html>.

"Conversation with Richard Lewontin, cover page." Institute of International Studies. Web. 18 Jan. 2010. <http://globetrotter.berkeley.edu/people3/Lewontin/lewontin-con0.html>.

**Stephen J. Gould** -- John Cook

Stephen Jay Gould (1941-2002) was an American paleontologist and evolutionary biologist. He spent the majority of his career at Harvard University. Over the course of his career, he actively campaigned against creationism and proposed that science and religion should be recognized as two separate and distinct fields. Probably his most important contribution to science was his part in the development of the theory of punctuated equilibrium. This theory proposes that evolutionary changes tend to occur quickly over short periods of time, though most of the time remains in an otherwise relatively steady state.

**Niles Eldredge** -- Lauren Stout

Niles Eldredge is an American paleontologist. He partnered with Stephen Gould and proposed the theory of punctuated equilibrium in 1972. This theory states that instead of a slow, continuous evolution the process is characterized by long periods of near standstill 'punctuated' by periods of very fast development of new life forms. In 1969 Eldredge became the Curator in the Development of Invertebrates at the American Museum of Natural History, a position that he holds today. His specialty is in the evolution of trilobites, a group of extinct arthropods.

Eldridge has also developed a hierarchical vision of evolutionary and ecological systems when he became focused on the rapid destruction of many of the world's habitats and species. Used repeated patterns in the history of life to form his ideas on how the evolutionary process works. Eldridge is a critic of the gene-centric view of evolution and recently developed an alternative account of the gene-based notions of evolutionary psychology to explain human behavior.

Niles Eldridge has published more than 160 scientific articles, books, and reviews, including *Reinventing Darwin*.

**Geerat J. Vermeij** -- Jessica Sciarra

After graduating from Princeton, and then Yale, he is now a professor at UC Davis in the Geology Department. His research encompasses the fields of evolutionary biology, marine ecology, and paleobiology, and focuses on extinct mollusks. He is well-published in scientific journals; he wrote four books and also made a PBS series. I should also note that he has accomplished all of this while being blind since the age of three.

His most famous contributions are to the idea of the evolutionary arms race. He has advanced his area of study by emphasizing the evolutionary influences that all organisms have on each other. The evolutionary arms race is the idea that species have struggled to evolve genes that give them beneficial adaptations over another species, and also co-adapt when it is necessary. This struggle of back and forth continues on, it is positive feedback. Also, the escalation hypothesis says that species with fewer adaptations through the evolutionary arms race are more likely to live through a massive extinction. This is because they are more flexible and can change their niche.

Credits: wikipedia for information on the evolutionary arms race and the escalation hypothesis, and courses.washington.edu for the information on Mr. Vermeij.

**Simon Conway-Morris** -- Chad Braley

He was born 11-6-1951 in a suburban area of London called Carshalton. He attended the University of Bristol from 1969 to 1972 and studied Geology; he received his PhD from the University of Cambridge in 1976 and researched Burgess Shale with Harry Blackmore Whittington. This research has established him as a major player in the scientific community. He is of religious faith and has created a bridge between the Christian community and the scientific community. The most interesting part Simon Conway-Morris's tale is that he questions material that he published. It shows that he is not absolute about anything and that the question of his findings is absolutely necessary to understand how the science works. He has many publications refer to these two links if you would like to see them all:

< (http://www.esc.cam.ac.uk/esc/files/Personal/sc113/ref-search_scm.htm) >,

< (http://publications.esc.cam.ac.uk:8080/view/people/sc113.html) >

He has a strong stance on convergent evolution. Stating that organism of different species with the same environmental pressures will develop similar traits to compensate for these pressures. His current focus of research is on the evolution of metazoan body plans especially dueterosome and lophotrochozoans.

**John Maynard Smith** -- Alexsandria Wilson

Professor Smith (January 6 1920 – April 19 2004) was a British evolutionary biologist and geneticist. He received qualifications as an engineer from Cambridge University in 1941. He spent a number of years designing aircraft before deciding to attend University College, located in London, in where he studied zoology and pioneered in fruit fly genetics under J.B.S. Haldane. Shortly after 1951, he became professor of zoology until 1965, where he was employed as a biology professor at the University of Sussex. He became emeritus professor in 1985. Smith, publicly known for his lucid *"Theory of Evolution"* (1958), has become known as one of the leading theorists of the postwar (WWII) years. Widely influenced by W. D. Hamilton and Robert MacArthur, and using concepts taken from the theory of games formulated by John von Neumann in the 1940s, he introduced in the 1970s the idea of an evolutionary stable strategy (ESS) and signaling theory. He also argued why sexual modes of reproduction predominate over other means in The Evolution of Sex (1978). Maynard Smith has continued to write on evolutionary theory in such works as *Evolutionary Genetics* (1989) and *The Major Transitions of Evolution* (1995). In 1991, he was awarded the Balzan Prize for Genetics and Evolution "for his powerful analysis of evolutionary theory and of the role of sexual reproduction as a critical factor in evolution and in the survival of species; for his mathematical models applying the theory of games to evolutionary

problems" (motivation of the Balzan General Prize Committee). In 1995, he was awarded the Linnean Medal by The Linnean Society and in 1999 he was awarded the Crafoord Prize jointly with Ernst Mayr and George C. Williams. In 2001 he was awarded the Kyoto Prize.

**Walter Fitch** -- Daniel Taylor

Walter M. Fitch is currently Professor of Ecology and Evolutionary Biology in the School of Biological Sciences at the University of California at Irvine, where his research is currently focused upon molecular evolution.

Professor Fitch is the co-founder of the journal *Molecular Biology and Evolution*, and was the first president of the Society for Molecular Biology and Evolution. He is also a member of the National Academy of Sciences.

Professor Fitch is noted for his research on the reconstruction of phylogenies from DNA and protein sequences. He authored the first major paper on distance matrix methods, which introduced the Fitch-Margoliash method to best predict a set of pairwise distances among species:

Fitch, W. M. and E. Margoliash. (1967). Construction of phylogenetic trees. Science 155: 279-284.

He also developed the Fitch parsimony algorithm to evaluate the minimum number of changes of state of a sequence on a given phylogeny:

Fitch, W. M. (1971). Toward defining the course of evolution: minimum change for a specified tree topology. Systematic Zoology 20: 406-416.

More recently, Professor Fitch has investigated whether selection imposed by the human immune system is responsible for measurable evolution in populations of the influenza A virus. He and other colleagues have concluded that the immune system exerts strong selection pressure on influenza hemagglutinin genes, causing the virus

populations to evolve in response. This is discussed in detail in the chapter on "Evolution and Human Health" in our *Evolutionary Analysis* textbook.

Sources

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**William D. Hamilton** -- Darrin Meecha

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|---|---|
| Birth Date: | August 1, 1936 |
| Death Date: | March 7, 2000 |
| Place of Birth: | Cairo, Egypt |
| Nationality: | British |
| Gender: | Male |
| Occupations: | evolutionary biologist |

William D. Hamilton is considered by many to be the most influential evolutionary biologist of his generation, and is best known for his genetic explanation of altruism. Hamilton argued during the 1960's, that humans and other animals have a genetic tendency to act in ways that favor the survival of their relatives, and thus, perpetuate their own genetic profile. Considering the genetic basis of human behavior, Hamilton looked at what genes do, and how their choices are not really choices at all, but the effect of genetic programming suggesting that altruism is genetically determined, Hamilton explained a facet of behavior that Darwin's theory of survival of the fittest did not allow for. In fact, natural selection actually favors the altruistic or selfish gene because although it incurs risk to its actor, by promoting a greater number of relatives than the individual altruist (who chooses between himself and three brothers, for instance), it actually promotes the perpetuation of more familial genes than the individual altruist possesses.

Hamilton's theory of a genetic basis for altruism finds statistical evidence for behavior patterns, which makes human choices look genetically or instinctively determined. This is a translation of intuitive or emotional behaviors into mathematical probability. Feelings or personality have little to do with our behavior according to this genetic understanding of human actions.

**Luigi Luca Cavalli-Sforza** -- Emily Hernandez

Luigi Luca Cavalli-Sforza was a professor at Stanford University since 1970. He is one of the most important geneticists of the 20th century because he has summed up his work for laymen under five topics covered in *Genes, Peoples, and Languages* (2000). Cavalli-Sforza's *The History and Geography of Human Genes* (1994) is considered a standard for geneticists. Once the genetic structure of inheritance had been made plain, Cavalli-Sforza was one of the first scientists to ask whether the genes of modern populations might contain an inherited historical record of the human species. Cavalli-Sforza initiated a new field of research by combining the concrete findings of demography with a newly-available analysis of blood groups in an actual human population. Building on his years of research, he was one of the founders of the Human Genome Diversity Project, which is aimed at accumulating DNA samples from populations all over the world for a comprehensive study of human genetic difference. He has remained active in this study, which has so far collected 1,064 cell lines from all over the world for distribution of DNA to research laboratories.
http://drpeterjdadamo.com/wiki/wiki.pl/Luigi_Cavalli-Sforza (2006)

**Jennifer Clack** -- Jessica Jenkins
Jennifer Clack is an English paleontologist that has studied the developmental stages of tetrapods, including their origin and their evolutionary development. Tetrapods are similar to lobe-finned fish and it has been suggested that they have evolved from Devonian lobe-finned fish. She is researching the timing sequence of skeletal and other changes that suggest a transition from water to land. She wrote a well known book called *Gaining Ground: The Origin and Early Evolution of Tetrapods*. She is currently the curator at the Museum of Zoology at Cambridge University. She is also a professor of Vertebrate Paleontology at Cambridge University. She discovered a fossil of *Acanthostega* in 1987 in Greenland. This was a major discovery because it was a transitional stage of a water-bound primitive tetrapod (http://www.theclacks.org.uk/jac/index.html).

**Joseph Felsenstein** -- Heather Allamon
Joseph Felsenstein (b. 1942) is a Professor of Genome Sciences and of Biology, Adjunct Professor of Computer Science and of Statistics at the University of Washington. He did his doctoral work under Richard Lewontin, who pioneered gel electrophoresis techniques. Felsenstein's current research is focused on using population samples of molecular sequences to estimate effective population size, mutation rate, and other population parameters. Additionally, Felsenstein is working on modeling variance between and within species. Felsenstein has also created two

computer modeling programs that are made freely available to the public. The first program is called PHYLIP and it is used to estimate evolutionary trees. The other program is called LAMARC and it is used to estimate all the possible genealogies that could explain how the sample came about. The name LAMARC does not immediately refer to the work of Jean Baptiste Pierre Antoine de Monet, Chevalier de Lamarck, but LAMARC's homepage does credit Lamarck's important place in the history of evolutionary thought. Felsenstein's significance in the field of evolutionary biology has been his statistical methods for making sense out of phylogenetic information. His work allows us to figure out phylogenetic trees and thus how closely related different species are, which can lead to insights into many other areas.

**Willi Hennig** -- Udita Datta

Willi Hennig, a German zoologist, was born on April 20, 1913. A taxonomist specializing in Dipterans, he is regarded as the leading proponent of the field of Phylogenetic systematics. His theory of taxonomic classification was based on genealogical relationships i.e. on the basis of events occurring over the organisms' evolutionary history. His book Phylogenetics Systematics, published in 1966 deals with systematic biology based on phylogenetic relationships or Cladistic Systematics.

Broadly speaking, Phylogenetic systematics is a tool, which allows biologists to reconstruct patterns of events that eventually gave rise to the vast diversity of living beings. The field of Phylogeneic Systematics not only deals with classification (assigning individuals to relevant groups and naming these groups), but also involves studying the pattern of relationships among Taxa. Thus, systematics can often be used to illustrate the mechanisms of evolution.

Cladistics is based on the idea that members are assigned to the same group if they share a common evolutionary history and are consequently "closely related" compared to those placed in other groups. Unique features called Synapomorphies, are used to predict the groups into which the members are to be assigned. These are shared derived characteristics that are absent in the distant ancestors.

The field of Cladistics involves the following three major assumptions:

•All organisms are related by descent to a common ancestor.

•There is a bifurcating pattern of cladogenesis.

•The characteristics of lineages change over time.

It is these changes in characteristics that allow identification of different groups. The original set of characteristics is termed as Plesiomorphic and the changed state as

Apomorphic. Thus, Cladistics makes predictions on relationships between organisms and is believed to be one of the best methods for phylogenetic analysis.
Important position held by Hennig included the post of director of phylogenetic research at the State Museum of Natural Science, Stuttgart. He was also awarded the gold medal of Linnaean Society and the gold medal for Distinguished Achievement in science of the American Museum of Natural History.
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**Kary Mullis** -- Domonique Anderson

Born December 28, 1944 Kary grew up in a small rural town in North Carolina. He lived near his grandparent's farm where he caused chaos and had fun with his cousins. In 1966 Kary received a Bachelor of Science degree in chemistry from the Georgia Institute of Technology. He then earned a Ph.D. in biochemistry from the University of California, Berkley in 1972. In 1979 Kary joined the Cetus Corporation in Emeryville, California, as a DNA chemist. He spent seven years there where he conducted research on oligonucleotide synthesis and invented the polymerase chain reaction (PCR). PCR multiplies a single, microscopic strand of the genetic material billions of times within hours. PCR will help exercise a new scientific discipline, paleobiology. Kary was awarded the Nobel Prize in chemistry and awarded the Japan Prize for the PCR invention in 1993. He is currently working as a Researcher at Children's Hospital and Research Institute at Oakland. His role in evolutionary biology is to influence his new theory of paleobiology. His significance is little but will grow in time because the PCR invention is based completely on DNA. With this method it will be easier to break through on certain diseases that are genetic.
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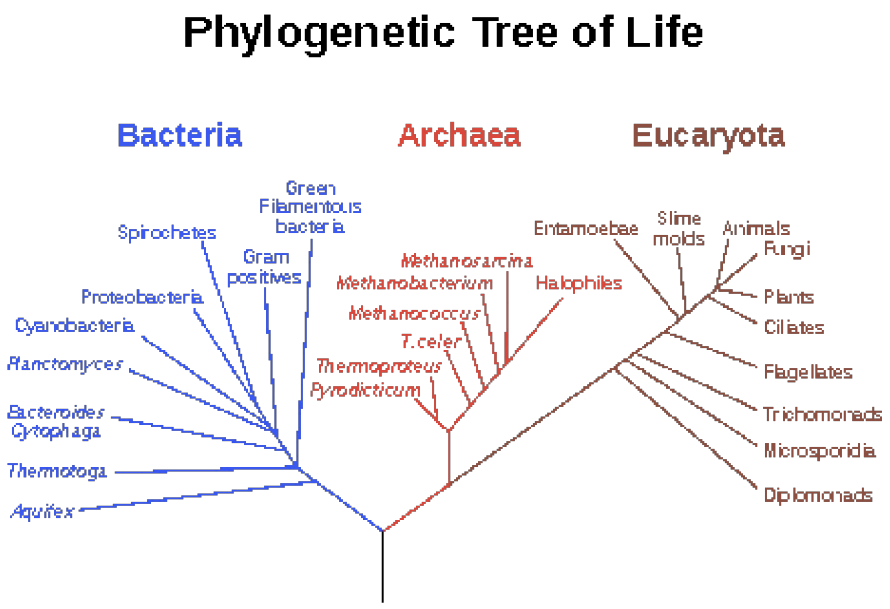
**Carl Woese** -- Laura Suchomel

Carl Woese is an American microbiologist and physicist, born in Syracuse, New York, on July 15th, 1928. Woese is well known for defining the Archaea, which is a domain of life. He defined Archaea ( a group of single-celled microorganisms separate from bacteria) in 1977 by phylogenetic taxonomy of 16S ribosomal RNA. Woese redrew the taxonomic tree upon defining the Archaea; the new taxonomic tree now includes the three domains of Bacteria, Eukarya, and Archaea. The taxonomic tree is based on genetic lineages instead of structure similarities. Defining Archaea, which have a different evolutionary history than bacteria, was a vital effort made by Woese. Woese clarified the diversity and evolution of microbes, which was extremely important to evolutionists and ecologists.




**Lynn Margulis** -- Adam Boulton

Lynn Margulis was born on March 5, 1938 in Chicago, IN. She attended the University of Chicago at the age of 14 for her undergraduate degree. Then went to the University of Wisconsin-Madison for her masters, and UC Berkeley for her Ph.D. She is typically known for her Endosymbiotic theory, which theorizes the origins of Eukaryotic cells. This theoretical paper was written in 1966 and was heavily rejected by the scientific community, despite opposition Margulis pushed her theory forward and was able to get it published in The Journal of Theoretical Biology. Since then her theory has had

countless arguments made for it. She now teaches at the University of Massachusetts Amherst.

**Barbara McClintock** -- Corey Forrest

Barbara McClintock took an undergraduate course in genetics at Cornell in 1921. Genetics had not yet been generally accepted. This, along with a cytology class, developed her interest in genetics and she made genetics her focus in graduate school. After finishing her PhD, McClintock, along with George W. Beadle, Marcus M. Rhoades and Professor Rollins A. Emerson began working on cytogenetics. She theorized that genes are transposable and can move on and between chromosomes. This went against common thought of the day, but her discovery was confirmed in the early 1980's and she was awarded the Nobel Prize in Physiology or Medicine in 1983. Among many other discoveries, she was also responsible for the cytological proof of crossing-over, determination of the physical location of genes within chromosomes, and the discovery that the centromere is divisible. She became the first American woman to win a non-shared Nobel Prize.

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**Mary Leakey** -- Emily Anderson

Mary Leakey (1913-1996) and her husband (Louis) (1903-1972) were well known British anthropologist that discovered that humans may have evolved in Africa. In 1959 Mary discovered a skull and teeth fragments of a species they called *Zinjanthropus* (*Australopithecus boisei*) in Tanzania. In 1965 Mary and her husband discovered fissile remains of *Homo erectus*. Mary also discovered Homo fossils in Africa that were 3.75 million years old. The discovery of these fossils help to prove that our human ancestors were much older than we previously thought. She also discovered the Laetoli footprints, which are footprints that were preserved in volcano ash over 3.6 million years ago. This foot prints are thought to believe to human ancestors that were bipedal. Mary died in 1996 at the age of 83.

Dr. Louis Leakey and his wife Mary Leakey display the skull of a human ancestor, Zinjanthropus, in 1959.

**Svante Pââbo** -- Michele Kensik

Svante was born on April 20,1955 in Sweden. (Wikipedia). Svante now spends his time as the Director of the Genetics Department at the Max Planck Institute in Germany studying Evolutionary Genetics (Wikipedia.) Svante is well known as being the founder of paleogenetics, which is the study of the genetics of early humans (Wikipedia).

Some of his well known work is on human genomics in comparison to the chimpanzee genome. In his comparison of chimpanzee genes to segments of human DNA sequences, he found that there was only an average of 1.2% difference between their genomes (Time, May 2007). This was another step in proving the evolutionary history and theory, that humans had evolved from apes or Neanderthals. Currently, this is his current research. In 2006, he actually decoded small fragments of DNA from ancient Neanderthals (Time, May 2007). His goal is to decode the Neanderthal genome in efforts to continuous support human evolutionary theory.

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**Rosemary Grant** -- Joshua Smith
Rosemary Grant and her husband are both professors at Princeton university. She is an evolutionary biologist. She is known for her research in the Galapagos. She and her husband have spent years studying Darwin's finches in the Galapagos. They have spent six months each year since 1973 doing research on the island. During this remarkably long-termed study they documented natural selection in the various species of finches. They have received numerous awards for their research.

**Christian Nusslein-Volhard** -- Ashley Hannah
Nusslein-Volhard has contributed to evolutionary biology mainly through her work on the embryo development of *Drosophila melangaster* (fruit fly). This Nobel-prize winning work investigated the mechanism of development from single cells to complex forms of fruit fly larva during embryogenesis. She was able to identify the genes involved in different processes during development by chemically inducing genetic mutations and identifying the affected body segments of the fruit fly. This work has led to evolutionary knowledge that protostomes and deuterostomes most likely have a relatively well-developed common ancestor, which had a more complex body plan than originally predicted. Her work has also increased understanding of transcription regulation and can be linked to the discovery of toll-like receptors.
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**PZ Myers** -- David Gesicki
Paul Zachary Myers is an American developmental evolutionary biologist. He graduated first with a Bachelors of Science in zoology from the University of Washington in 1979. After that Myers quickly shifted interest towards developmental evolution and later graduated with a PhD in biology from the University of Oregon. Myers has done postdoctoral research at several universities and is currently an associate professor of biology at the University of Minnesota where he teaches genetics, human physiology, developmental biology and neurobiology. Myers works with zebrafish in his field of developmental evolution. Myers is most famous as being an outspoken atheist and advocate against the intelligent design and creationist movements. In 2009 Myers was named the Humanist of the Year by the American Humanist Association. Myers started sharing his views in 1992 through a glob he named *Pharyngula*. Pharyngula is an embryonic stage of development that shows striking similarities among all vertebrates including a notochord, dorsal hollow nerve cord, post-anal tail, and a series of paired

branchial grooves.  Through this website Myers is able to reach more people, where he talks evolution and criticizes many ID and creationist groups and websites such as the *Discovery Institute* and *Answers in Genesis*.  In 2005 Myers moved his website to Scienceblogs a project started by the Seed Media Group which publishes a popular international science magazine.  Myers' blog has received many great reviews including a commendation from the scientific journal Nature which named *Pharyngula* as the top-ranked blog written by a scientist.  In a 2008 film called Expelled No Intelligence Allowed, Myers states that he was mislead by producers as to the purpose of the film and parts of his interviews were later used to only further the new cause of the film. Myers was also not allowed entrance into a screening of the film after making this allegation towards the film.  Myers' guests including the very outspoken Richard Dawkins were allowed entrance.  Myers' role in evolution today is through his blog where he is able to post his views on evolution and provide some supporting views against the views of intelligent design and creationism.