Evolutionary Thought

Evolutionary thought, the idea that species change over time, has roots in antiquity, in ideas of the Greeks, Romans, Chinese and Muslims. However, until the 18th century, Western biological thinking was dominated by essentialism, the idea that living forms are unchanging. During the Enlightenment, evolutionary cosmology and the mechanical philosophy spread from the physical sciences to natural history. Naturalists began to focus on the variability of species and the emergence of paleontology with the concept of extinction undermined the static view of nature. In the early 19th century Jean-Baptiste Lamarck proposed his theory of the transmutation of species, which was the first fully formed scientific theory of evolution.

The evolutionary theory often referred to as Darwinism was first put forward by Charles Darwin and Alfred Russel Wallace and discussed in detail in Darwin's *On the Origin of Species* (1859). Unlike Lamarck's theory, Darwinism proposed common descent and a branching tree of life. It was based on the idea of natural selection, and it synthesized evidence from animal husbandry, biogeography, geology, morphology, and embryology.

Darwin's work led to the rapid acceptance of evolution, but the mechanism he proposed, natural selection, was not widely accepted until the 1940s. Most biologists argued that other factors drove evolution, such as inheritance of acquired characteristics (neo-Lamarckism), an innate drive for change (orthogenesis), or sudden large mutations (saltationism). The synthesis of natural selection with Mendelian genetics during the 1920s and 1930s, founded the new discipline of population genetics. Throughout the 1930s and 1940s, population genetics became integrated with other branches of biology, finally resulting in a unified theory of evolution - the modern evolutionary synthesis.

Following the establishment of evolutionary biology, studies of mutation and variation in natural populations, combined with biogeography and systematics, led to sophisticated mathematical and causal models of evolution. Paleontology and comparative anatomy allowed more detailed reconstructions of the history of life. After the rise of molecular genetics in the 1950s, the field of molecular evolution developed, based on DNA, RNA, and protein sequences. The gene-centered view of evolution then rose to prominence in the 1960s, followed by the neutral theory of molecular evolution, sparking debates over adaptationism, the units of selection, and the importance of genetic drift. In the late 20th century, genetic sequencing led to a reorganization of the tree of life into the three-domain system, and the newly-recognized factors of symbiogenesis and horizontal gene transfer have introduced yet more complexity into evolutionary history.

Environmental Science Institute
UNIVERSITY OF TEXAS AT AUSTIN

Evolution Related Court Case

Tammy Kitzmiller, et al. v. Dover Area School District, et al., Case No. 04cv2688, was the first direct challenge brought in the United States federal courts against a public school district that required the presentation of "Intelligent Design" as an alternative to evolution as an "explanation of the origin of life." The plaintiffs successfully argued that intelligent design is a form of creationism, and that the school board policy thus violated the Establishment Clause of the First Amendment to the United States Constitution. The judge's decision has sparked considerable response from both supporters and critics.

Eleven parents of students in Dover, Pennsylvania, near York, sued the Dover Area School District over a statement that the school board required be read aloud in ninth-grade science classes when evolution was taught. The plaintiffs were represented by the American Civil Liberties Union (ACLU), Americans United for Separation of Church and State (AU) and Pepper Hamilton LLP. The National Center for Science Education (NCSE) acted as consultants for the plaintiffs. The defendants were represented by the Thomas More Law Center (TMLC). The Foundation for Thought and Ethics, publisher of a textbook advocating intelligent design titled *Of Pandas and People*, tried to join the lawsuit as a defendant but was denied.

The suit was brought in the U.S. District Court for the Middle District of Pennsylvania seeking injunctive relief. Since it sought an equitable remedy there was no right to a jury trial; the Seventh Amendment to the Constitution did not apply. It was tried in a bench trial from September 26, 2005 to November 4, 2005 before Judge John E. Jones III. On December 20, 2005 Judge Jones issued his 139-page findings of fact and decision, ruling that the Dover mandate was unconstitutional, and barring intelligent design from being taught in Pennsylvania's Middle District public school science classrooms. The eight Dover school board members who voted for the intelligent design requirement were all defeated in a November 8, 2005 election by challengers who opposed the teaching of intelligent design in a science class, and the current school board president stated that the board does not intend to appeal the ruling.

Witnesses for the Plaintiffs

Witnesses for the plaintiffs Kenneth R. Miller, a biology professor from Brown University and noted author and commentator opposed to the intelligent design and creationist movements, was the first witness. He testified as an expert witness that "Intelligent design is not a testable theory and as such is not generally accepted by the scientific community." He said that the idea of intelligent design was not subject to falsification, but many claims made by intelligent-design advocates had been falsified. Asked what the harm was in reading the statement, Miller gave a two-fold response. 1) "[I]t falsely undermines the scientific status of evolutionary theory and gives students a false understanding of what theory actually means." And 2) "as a person of faith who was blessed with two daughters, who raised both of my daughters in the church, and had they been given an education in which they were explicitly or implicitly forced to choose between God and science, I would have been furious, because I want my children to keep their religious faith."

The **creation-evolution controversy** (also termed the **creation vs. evolution debate** or the **origins debate**) is a recurring political dispute about the origins of the Earth, humanity, life, and the universe, between those who espouse the validity and superiority of a particular religiously-based origin belief (i.e., creationism), and the scientific consensus, particularly in the field of evolutionary biology, but also in the fields of geology, palaeontology, thermodynamics, nuclear physics and cosmology.

This debate is most prevalent in generally conservative regions of the United States. It is often portrayed as part of the culture wars. While the controversy has a long history, today it is mainly over what constitutes good science, with the politics of creationism primarily focusing on the teaching of creation and evolution in public education.

The debate also focuses on issues such as the definition of science (and of what constitutes scientific research and evidence), science education (and whether the teaching of the scientific consensus view should be 'balanced' by also teaching fringe theories), free speech, Separation of Church and State, and theology (particularly how different Christian denominations interpret the Book of Genesis).

Within the scientific community and academia the level of support for evolution is overwhelming, while support for biblically-literal accounts or other creationist alternatives is very small among scientists, and virtually nonexistent among those in the relevant fields.