

## David Starr Jordan (1851-1931)

David Starr Jordan studied fish and promoted eugenics in the US during the late nineteenth and early twentieth centuries. In his work, he embraced Charles Darwin's theory of evolution and described the importance of embryology in tracing phylogenetic relationships. In 1891, he became the president of Stanford University in Stanford, California. Jordan condemned war and promoted conservationist causes for the California wilderness, and he advocated for the eugenic sterilization of thousands of Americans. Like many American eugenicists of the early twentieth century, Jordan combined ideas of Mendelian genetics and of Darwinian natural selection to form a basis for limiting or encouraging reproduction in certain individuals and groups based on their perceived hereditary fitness. Like other eugenicists, Jordan's attempt to control the reproductive fate of entire populations marked an episode in the history of reproduction and biology in which its concepts increasingly influenced the social and cultural contexts.

Jordan was born 19 January 1851 in Gainesville, New York, to Huldah Lake Hawley and Hiram Jordan. His parents were farmers and teachers from an English Puritan background. They had five children, of which Jordan was the fourth. His father, an abolitionist, and his mother, a religious person, influenced Jordan's later ideas about pacifism and what he considered to be his obligations as a public figure. In his early years Jordan tended the sheep on the farm and helped make maple syrup. During this period, he explored his interests in plants and in astronomy. Jordan later took the middle name Starr to indicate his interests in astronomy and to honor his mother's reverence for Unitarian minister, Thomas Starr King.

By special exemption, Jordan attended an all-female school at the nearby Gainesville Female Seminary, in Gainesville, New York, at fourteen years of age. After three years, at the age of seventeen, Jordan began teaching elementary school in South Warsaw, New York. In March 1869 he received a scholarship to attend the newly inaugurated Cornell University in Ithaca, New York to study botany or animal husbandry. In 1872, Jordan obtained a Master's in Science in botany, instead of a Bachelor's degree, because of his extra undergraduate work as an instructor in botany.

At Cornell, Jordan became class president, class essayist and class poet. He studied with Charles Frederick Hartt, a geologist and student of Louis Agassiz who specialized in the geology of Brazil; with Burt Green Wilder, a comparative anatomist and neurologist; and with Albert Prentiss, the chair of botany who encouraged his students to conduct studies of local flora. His work with these men, some of whom opposed Darwin's theory of natural selection, led him in 1873 to the Anderson School of Natural History on Penikese Island, off the coast of Massachusetts. He studied there for several summers with the anti-Darwinian Louis Agassiz, but Jordan came to accept the theory of natural selection through his own studies of zoology. Despite their difference of opinion, Agassiz inspired Jordan to study fish.

Afterwards, Jordan focused on science education. He had teaching stints at Lombard College in Galesburg, Illinois, and at Appleton Collegiate Institute in Appleton, Wisconsin. In 1874, he taught high school science at Indianapolis High School in Indianapolis, Indiana, and, in 1875, he became a professor of biology at Butler University in Indianapolis, Indiana, where he remained until 1879. He later became a professor of natural history in 1879 and then president in 1885 of Indiana University in Bloomington, Indiana, at the age of thirty-five. He remained president until 1891.

Jordan, influenced by Agassiz, rejected the traditional style of science education that emphasized rote learning and memorization. He instead encouraged hands-on instruction and student choice in electives. This new style of education attracted the attention of Leland Stanford Jr., the founder of Stanford University, who asked Jordan to become president of the institution in 1891. Jordan worked

at Stanford as president and then chancellor until he retired in 1913, promoting science education and Darwinian natural selection, as well as the importance of field naturalism to biology. At Stanford, Jordan promoted his vision of a civil society, which included the conservation of wilderness, the education of young people, the promotion of science, and the principles of eugenic breeding.

In his scientific work, Jordan primarily studied fish and fish embryology. He wrote greater than 600 articles on the study of fish, and he served as an expert on national and international commissions on the conservation of North American fish. In this work, Jordan frequently detailed the embryonic forms of fishes and described the potential of embryology to indicate the links between species and genera. For example, in *Fishes*, published in 1907, Jordan defended the link between the classes of chimaera (Holocephali) and sharks (Elasmobranchii) by detailing the commonalities found in their embryonic stages.

In his earlier writings on evolution, including his 1898 co-authored *Footnotes to Evolution*: a series of popular addresses on the evolution of life, Jordan said that he was influenced by Ernst Haeckel's concept of the Biogenetic Law. This concept, Jordan believed, showed that the study of embryology revealed the stages of evolutionary progression from simple organisms to those of greater complexity. Jordan also relied on Darwin's theory of evolution to argue that natural selection can generate the development of complexity in some organs, while other organs remain simple. Furthermore, in *Evolution and Animal Life: an elementary discussion of facts, processes, laws and theories relating to the life and evolution of animals* (1907), in a chapter titled "Factors in Ontogeny," Jordan argued that the study of the causes that initiate and control development, including the fertilization and maturation of the germ cells, are likely to contribute to our understanding of evolution.

Jordan also played a crucial role in the formation and funding of the first eugenics organization in the US, the Eugenics Committee of the American Breeders Association. The Committee was established in 1906 under the direction of Charles Davenport, and based at Cold Spring Harbor Laboratory in Cold Springs, New York. Historian Alexandra Minna Stern has argued that the Committee gained the funding from a wealthy widow, Mrs. E.S. Harriman, who supported eugenics research through the Eugenics Record Office (ERO) at the Cold Spring Harbor Laboratory in Cold Spring Harbor, New York, largely due to Jordan's reputation. The Eugenics Record Office collected the hereditary information, or pedigrees, of families in the US. State officials used these studies to justify strict immigration quotas and sterilization legislation in the 1920s.

Jordan continued to work to reform education and later co-founded and directed the Sierra Club, an environmental organization founded in 1882 in San Francisco, California. During the 1910s, Jordan was part of a group that later historians called the Progressive Reformers. These reformers, often holding different political views, shared a faith in scientific solutions to perceived economic and social problems. Jordan argued that war destroyed the best genetic stock of a generation, and that a loss of wilderness contributed to the degeneration of the Anglo-Saxon cultural and biological superiority that had made them the leaders in the US. Jordan was also concerned with the poor condition of California's mental health institutions. Jordan and fellow eugenicists argued that the hereditary fitness of the upper classes would soon be swamped by the uncontrolled breeding of the lower classes and the mentally ill. After his retirement from Stanford University in 1913, Jordan focused his efforts on publicizing the perceived dangers of Mexican immigration in the national *Eugenical News*. These ideas led him to advocate for breeding regulations based on eugenic principles and the implementation of immigration quotas in California.

In 1928, Jordan joined others, including philanthropist Charles Goethe, to found the Human Betterment Foundation, based in Pasadena, California. This organization was committed to the sterilization of people they called the genetically unfit—especially inmates of state mental health facilities—and to the dissemination of model legislation and reports on the positive outcomes of sterilization. These studies culminated in a publication produced by agriculturalist Paul Popenoe and financier Ezra Seymour Gosney entitled *Sterilization for Human Betterment: a summary of results of 6000 operations in California, 1909-1929*, published in 1929. Eugenicists used the results published in that book to advocate for the expansion of sterilization legislation in places like Germany and the Scandinavian countries. Jordan remained a member of the Human Betterment Foundation and a proponent of eugenics until his death in Palo Alto, California on 19 September 1931.

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