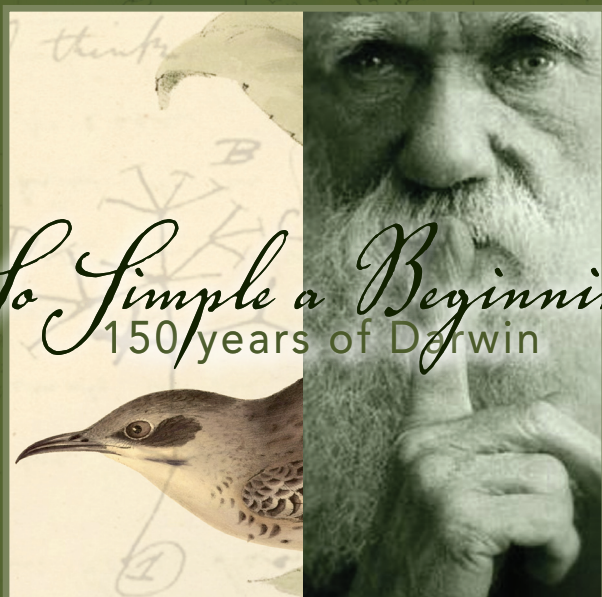


FALL EXHIBIT | LANGSON LIBRARY

So Simple a Beginning
150 years of Darwin



OCTOBER 2009 - MAY 2010

MURIEL ANSLEY REYNOLDS EXHIBIT GALLERY

So Simple a Beginning 150 years of Darwin

An exhibit in the
UC Irvine Langson Library
Muriel Ansley Reynolds
Exhibit Gallery

October 2009 - May 2010

Curated by

John Sisson,

Research Librarian for Biological Sciences

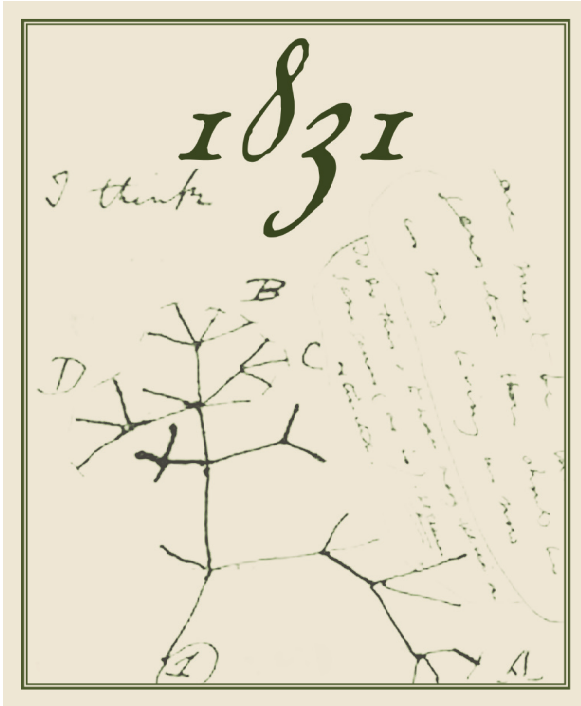
FOREWORD



Welcome to the UCI Libraries' fall 2009 exhibition, "So Simple a Beginning: 150 Years of Darwin," which recognizes the 150th anniversary of Charles Darwin's seminal work, *On the Origin of Species*, as well as the bicentenary of his birth. The exhibit traces the development and impact of Darwin's theory of evolution, and addresses the scientific and religious debate over his findings. John Sisson, Research Librarian for Biological Sciences, is the curator.

On behalf of the entire library staff, I hope you enjoy the exhibit and return to view others in the future.

Gerald J. Munoff
University Librarian



Background image: "Early taxonomic tree drawn by Darwin in his notes." *Notebook B: Transmutation of species (1837-1838)*. Charles R. Darwin.

ORIGINS

origins

FROM SO SIMPLE A BEGINNING ENDLESS FORMS MOST
BEAUTIFUL AND WONDERFUL HAVE BEEN, AND ARE
BEING, EVOLVED.

"From So Simple a Beginning" shows how Charles Darwin's theory of the mechanisms that drive evolution, challenged and influenced scholars, writers, artists, and scientists to rethink the relationship between man and all other life.

On the Origin of Species by Means of Natural Selection; or, The Preservation of Favoured Races in the Struggle for Life was published 150 years ago on November 22, 1859. This seminal book made Charles Darwin and his ideas the talk of the next 150 years.

Charles Darwin was born Feb 12, 1809, the 5th of the 6 children of Robert Darwin and Susannah Wedgwood. The death of his mother at age 8 caused him to learn self-sufficiency; consequently he became fond of activities that did not require the company of others. Interested in natural history at an early age, Darwin was an inveterate collector of everything from plants to pebbles. At age 18 his father sent him to Cambridge University to become a clergyman. At Cambridge Darwin's interests in natural history was fostered through his friendships with science professors.

In his last year at the university, Darwin became firm in his desire to become a scientist rather than fulfilling his father's intent that he become a clergyman. Darwin wrote his father that his studies "stirred up in me a burning zeal to add even the most humble contribution to the noble structure of Natural Science." (Darwin, Francis. Ed. *Life and Letters of Charles Darwin, Including a Biographical Chapter*. London: John Murray, 1887.)

To this end, Darwin seized the opportunity to travel on the H.M.S. Beagle on a natural history expedition under the command of Captain Fitzroy.

On Dec 27 1831, he left England for a survey of South America and a circumnavigation of the globe. Darwin took several books along that strongly influenced him. Chief among these was *Principles of Geology* by Sir Charles Lyell. This book along with the journals he kept and specimens he collected provided him with the raw material for his great idea.

Darwin continued in his habit of collecting on the expedition. He found that the more he observed and collected, the more questions he had about the diversity of life and how that variation arose. Darwin was convinced by his voyage that variation arose from within a species to adapt and fill the natural world, but what was the mechanism that drove this variation?

FROM SO SIMPLE A BEGINNING ENDLESS FORMS MOST
BEAUTIFUL AND WONDERFUL HAVE BEEN, AND ARE BEING,
EVOLVED.

Charles R. Darwin. *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life.* London: John Murray. 1859 p. 490

MY IDLE SON! TWO UNIVERSITIES, WASTED IN SHOOTING,
DRINKING, DEBTS — AND COLLECTING INSECTS!

Ruth Padel “A Desperate Way to Avoid Paying Your tailor” IN
Darwin : A life in poems. New York: Alfred A. Knopf, 2009. p. 22.

1. **"Portrait of Charles Darwin."** George Richmond, 1840.

One of the most widely known pictures of Charles Darwin at age 31.

2. **"Giant Land Iguana,"** Plate VI. Isobel Cooper, artist.

Galapagos, World's End. William Beebe.

New York; London: G.P. Putnam's Sons. 1924.

One of the most striking animals found in the Galapagos, these yellowish-orange belly and brownish-red backed iguanas grow to 4 ft in length.

3. **"Darwin and the Beetle."** Albert Way (c.1827-1831).

This charming drawing was made by a school friend to celebrate Charles Darwin's fondness for insects when he was studying at Cambridge (1827-1831).

4. ***The Voyage of the Beagle: Darwin's Extraordinary Adventure Aboard Fitzroy's Famous Survey Ship.***

James Taylor. Annapolis, MD: Naval Institute Press, 2008.

A recent biography that retells how Darwin's voyage on the H.M.S. Beagle was one of the great natural history adventures of the 1800s.

5. **"Mimus Melanotis,"** Birds Part 3 no. 2 Plate: 17.

The Zoology of the Voyage of the H.M.S. Beagle. John Gould.

Edited and superintended by Charles Darwin, London. Smith Elder and Co. 1839.

Arguably, the presence of four endemic, allopatric mockingbird species within the Galapagos archipelago had greater influence than any other organism on the initial development of Darwin's concept of Natural Selection.

6. "A typical page from CD's Zoology Notes."
Charles Darwin's Zoology Notes & Specimen Lists from the H.M.S. Beagle. Charles Darwin.
Ed. Richard Keynes. Cambridge: Cambridge UP, 2000.

7. "Map of the Beagle Voyage."
Journal of Researches into the Natural History and Geology of the Various Countries Visited by H.M.S. Beagle Etc.
C.R. Darwin. London: John Murray, 1890.

The 5 year voyage of the Beagle took Darwin around the world.

8. ***Journal of Researches into the Natural History and Geology of the Countries Visited During the Voyage of H.M.S. Beagle Round the World, Under the Command of Capt. Fitz Roy, R.N.***
Charles R. Darwin. NY: Harper & Brothers, 1846.

The journal of Darwin's voyage and the observations he made would have made Darwin's scientific reputation even had he not gone on to write *The Origin of Species*.

9. *Principles of Geology; Being an Attempt to Explain the Former Changes of the Earth's Surface, By Reference to Causes Now in Operation.* Sir Charles Lyell.

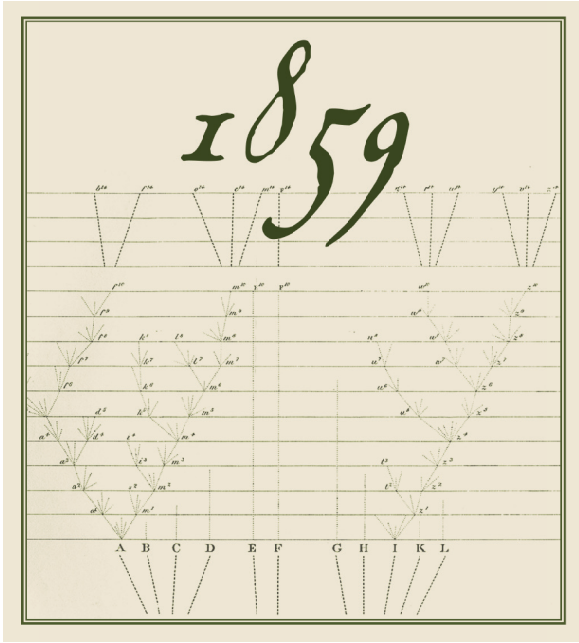
London: J. Murray, v.1. 1830-1833 (1875 edition).

Lyell's book with its arguments about the how the present day landforms were shaped by millions of years of geological processes strongly influenced Darwin to think about how the diversity of life he found on his voyage was also shaped.

10. *An Essay on the Principle of Population or, A View of its Past and Present Effects on Human Happiness: with an Inquiry into our Prospects Respecting the Future Removal or Mitigation of the Evils which it Occasions.* T. R. Malthus.

London: J. Murray, 1826.

This book led Darwin's thinking to the revelation that as each generation of life strove to populate and consume only those best fitted to the environment were likely to have offspring.



Background image: "Illustration of taxonomic tree."
William West, artist. *On the Origin of Species by Means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life*. Charles R. Darwin. London: John Murray. Lithograph, 1859.

The Origin only had a single illustration, this diagram demonstrating how species sharing similarities is explained by descent from common ancestors.

THE ORIGIN AND RESPONSE

The origin and response
INDIVIDUALS HAVING ANY ADVANTAGE HOWEVER
SLIGHT OVER OTHERS, WOULD HAVE THE BEST CHANCE
OF SURVIVING AND PROCREATING THEIR KIND.

When Charles Darwin arrived home in 1836, he chose not to publish the ideas he had gleaned from his voyage. Instead he contemplated what he had seen, starting his first evolution note-book in 1837. His reading of *An Essay on the Principle of Population* by Rev. T.R. Malthus suggested circumstances under which favorable variations in a species would tend to be preserved. As each generation of life strove to populate and consume, only those best fitted to the environment were likely to have offspring.

In June of 1842, Darwin wrote a 35 page brief abstract of his theories, and with encouragement of his friends, wrote a 230 page expansion of his ideas in the summer of 1844. Darwin's eventual plan was for a multi-volume essay laying out his ideas and examples.

The arrival of a letter from Alfred Russell Wallace in the summer of 1858 changed his sedate pace. Wallace, a naturalist working overseas in the Malay Peninsula, asked for Darwin's opinion on Wallace's own ideas about natural selection. This letter prompted Darwin to present Wallace's letter and a selection from Darwin's own unpublished notebooks simultaneously at the July 1, 1858 meeting of the Linnean Society of London. The positive scientific reception of these ideas compelled Darwin to publish *On the Origin of Species* on November 22, 1859 in a first edition of 1,250 copies.

Prior to 1859, the concept of evolution was known by people, but generally not accepted by serious thinkers. The publication of *The Origin* changed all that. It was the subject of constant comment in magazines and newspapers as well as scientific societies, and also became the crux of many arguments between scientific and religious figures. Most of the popular arguments centered on the discussion of how man evolved and man's link to apes. Darwin himself responded to these arguments by writing in 1871 *The Descent of Man, and Selection in relation to Sex*.

INDIVIDUALS HAVING ANY ADVANTAGE HOWEVER SLIGHT OVER OTHERS, WOULD HAVE THE BEST CHANCE OF SURVIVING AND PROCREATING THEIR KIND.

Charles R. Darwin. *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. London: John Murray. 1859 p. 80-81.

NO BOOK, DEALING WITH A SCIENTIFIC SUBJECT HAD EVER, I SUPPOSE, BEEN SO LARGELY READ BY PEOPLE WHO WERE NOT SCIENTIFIC. WE ALL TALKED ABOUT IT. *THE ORIGIN* WAS NOT ONLY THE SUBJECT OF CONSTANT COMMENT IN MAGAZINES AND NEWSPAPERS AS WELL AS THE MEETINGS OF SCIENTIFIC SOCIETIES, BUT IT FURNISHED A THEME FOR CONSTANT JESTS IN THE COMIC PAPERS, AND IT WAS AN UNFAILING TOPIC FOR CONVERSATION IN ALL CULTIVATED PRIVATE HOUSES.

James Bryce. "Personal Reminiscences of Charles Darwin." *American Philosophical Society Proceedings* Vol XLVIII (1909) pg x.

11. "On the Tendency of Species to Form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection. Charles R. Darwin and A. R. Wallace [Read 1 July]. *Journal of the Proceedings of the Linnean Society of London Zoology*. August 3 (1858): 46-50.

Darwin's first official communication of his thoughts about species and natural selection was at the July 1, 1858 Meeting of the Linnean Society of London. This presentation consisted of an extract of Darwin's unpublished work and a letter from Alfred Russell Wallace. Wallace had written to Darwin asking him to present Wallace's own ideas about how species were created. The scientific reception of these papers made Darwin feel forced to publish a fuller explanation of his arguments.

12. *On the Origin of Species by Means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life.*

Charles R. Darwin. London: John Murray, 1859.

On the Origin of Species was published November 22, 1859 in a first edition of 1,250 copies. The book became one of the more widely read scientific books of the time. At the time Darwin warned reviewers that the work was to be regarded but as the abstract of the larger treatise which he had in preparation.

13. *ScienceNews*. January 31, 2009.

14. *Darwin: Art and the Search for Origins.*

Pamela Kort, Max Hollein and Schirn Kunsthalle Frankfurt.
Cologne: Wienand, 2009.

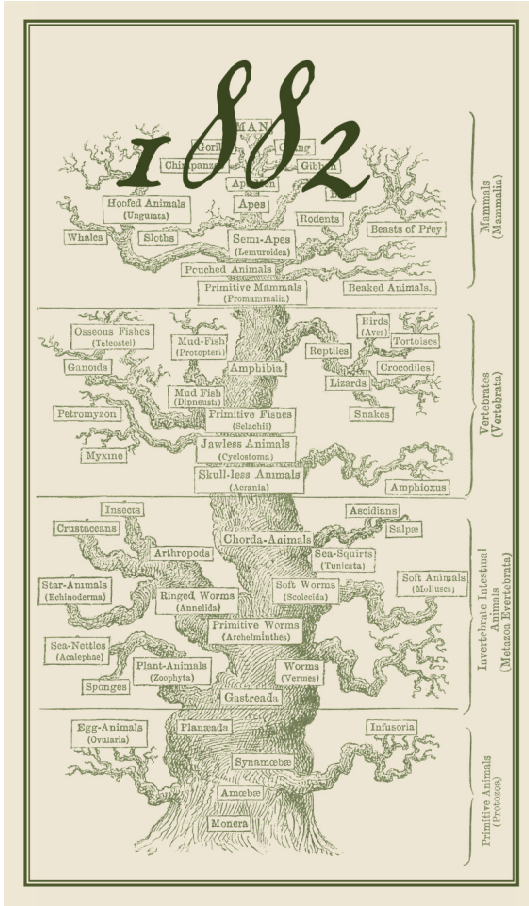
A recent book discussing how artists of the time reacted to *The Origin* and the revelations about man's relationship to other species.

15. "The Lion of the Season." *Punch*. May 25 (1861).

The popular reaction to *The Origin* was unexpected. It became fashionable to discuss it and popular magazines like *Punch* satirized how popular it had become. Even 12 years after its initial publication it still was topical humor in American journals like *Harper's Weekly*.

16. "Mr. Bergh to the Rescue."

Thomas Nast, *Harper's Weekly*. August 19, 1871.



Background image: "Genealogical Tree of Humanity." Ernst Haeckel, artist. plate XV. Evolution of Man. Ernst Haeckel. 1866.

Ernst Haeckel examined different forms of life trying to detect a pattern as to how man developed and evolved.

17. "Skeleton of a Man and the Four Anthropoid Apes."

Waterhouse Hawkins, artist.

Evidence as to Man's Place in Nature. Thomas Henry Huxley.
London: Williams and Norgate, 1863.

Darwin did not defend his views directly instead other scientists took on the role of "Darwin's Defender." Chief among these was Thomas H. Huxley who chose to debate and discuss in his own *Man's Place in Nature* man's relationship to the apes. Huxley collected his own anatomical evidence how structures linking apes and man were the evidence of relatedness.

18. "Krao, The Missing Link." (c.1884).

One of the popular ideas was that a missing link between ape and man might still exist in the world. This poster shows how one exhibitor took advantage of people's curiosity.

19. ***The Descent of Man, and Selection in Relation to Sex.***

Charles Darwin. London, J. Murray, 1871.

Darwin wrote this in response to the many debates about how and why man evolved. Sometimes referred to as Darwin's second great book, it outlines how biological principles may have guided how people evolved.

20. ***The Evolution of Man; a Popular Exposition of the Principal Points of Human Ontogeny and Phylogeny.*** Ernst Haeckel.

Translated from the German by Ernst Heinrich Philipp August.
NY: Appleton, 1899.

Ernst Haeckel was a German biologist who was also very interested in evolution. He examined and drew many different forms of life trying to detect a pattern to how life developed and evolved.



THE BIG QUESTIONS

WHAT IS DARWINISM? IT IS ATHEISM. THIS DOES NOT MEAN, AS BEFORE SAID, THAT MR. DARWIN HIMSELF AND ALL WHO ADOPT HIS VIEWS ARE ATHEISTS; BUT IT MEANS THAT HIS THEORY IS ATHEISTIC; THAT THE EXCLUSION OF DESIGN FROM NATURE IS, AS DR. GRAY SAYS, TANTAMOUNT TO ATHEISM.

The controversial nature of Darwin's views were immediately noted upon publication of *The Origin*. Darwin was aware that his theory of selection would trouble those who believed that all species were created in a single origin. He argued:

"He who believes that each being has been created as we now see it, must occasionally have felt surprise when he has met with an animal having habits and structure not at all in agreement. What can be plainer than that the webbed feet of ducks and geese are formed for swimming? Yet there are upland geese with webbed feet which rarely or never go near the water..." (p. 185 *The Origin of Species*, 1859)

Some religious figures of the time supported the conservative perspective: the world was very young, all life had been created by a creator in the biblical 7 days, and Humans were unique from other animals. As discovery and collecting took place it became evident to many that there was a greater variety of life than previously understood. Comparative studies and embryology were discovering similarities among all animals including humans.

Many religious figures believed that the fact that God created the world and everything in it was not up for debate, but Darwin's book pushed this discussion out into the churches and parlors of England. Many saw the

foundations of Christian faith being questioned inappropriately. As *The Origin* was perceived as being against divine design, it seemed imperative to show why it must be wrong. These arguments ranged from completely denying evolution based on the strict authority of the written bible to accepting evolution as part of a new understanding of the Creator's greater plan.

WHAT IS DARWINISM? IT IS ATHEISM. THIS DOES NOT MEAN, AS BEFORE SAID, THAT MR. DARWIN HIMSELF AND ALL WHO ADOPT HIS VIEWS ARE ATHEISTS; BUT IT MEANS THAT HIS THEORY IS ATHEISTIC; THAT THE EXCLUSION OF DESIGN FROM NATURE IS, AS DR. GRAY SAYS, TANTAMOUNT TO ATHEISM.

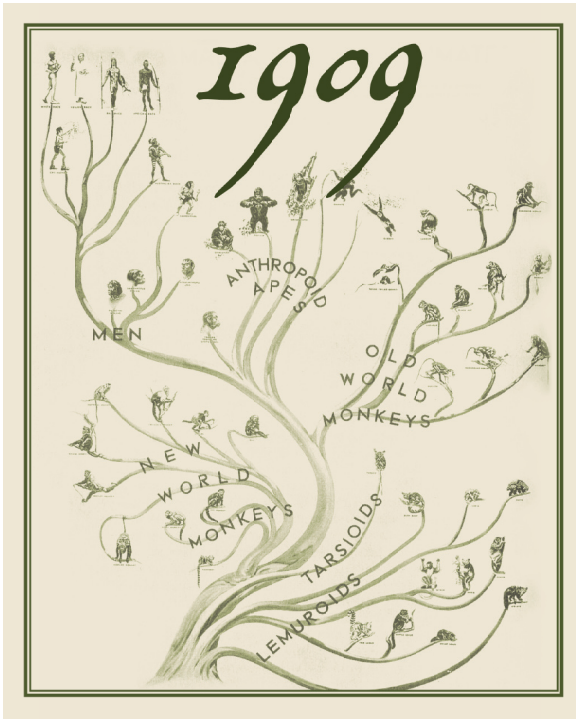
Charles Hodge. *What is Darwinism?* New York: Scribner, Armstrong, and Co., 1874. p. 177.

21. *Genesis and Geology; a Study in the Relations of Scientific Thought, Natural Theology, and Social Opinion in Great Britain, 1790-1850.*
Charles Coulston Gillispie. NY: Harper, 1951.

Mining and quarrying in the 1700s and 1800s produced a large number of fossil bones. One of the great conflicts of the time between science and religion was over what these fossil bones meant. Amateur and professional biologists tried to explain how they fit into the history of life while many religious scholars felt they were evidence of the biblical flood.

22. *Darwin's Forgotten Defenders: the Encounter Between Evangelical Theology and Evolutionary Thought.*
David N Livingstone. Grand Rapids, MI: W.B. Eerdmans, 1987.

Not every religious denomination felt that Darwin's work was atheistic. This discusses how there were many different theological reactions to evolution.



Background image: "Wall painting of man among the primates." American Museum of Natural History.

The American Museum of Natural History was at the forefront of innovative museum displays. Copies of their charts and diagrams were distributed as educational tools to other museums and organizations.

EVOLVING IN PUBLIC

evolving in public

THERE IS GRANDEUR, IF YOU LOOK AT EVERY ORGANIC BEING AS THE LINEAL SUCCESSOR OF SOME OTHER FORM...

Charles Darwin died April 19, 1882. However the impact and implications of his work continue to grow in the public's eye. Initially, Darwin had very little evidence to back up his theory, mostly observations about existing variations and a little fossil data about earlier forms that seemed related to present forms of life.

Many scientists felt that selection was a good model for how evolution might work, but, still it did not explain many other questions about how life came to be. There was continued criticism that while these ideas were interesting they had not been tested and may not be testable because mechanisms of evolution were subtle and hard to show.

In the mid-1800s quarrying and industrial mining were discovering large numbers of fossils throughout Europe. In America, the railroads and the opening of the West led to explorers and collectors finding the great fossil fields of the Dakotas and Arizona. Literal tons of fossils were being shipped to museums to be puzzled over and displayed.

Museums at the turn of the 20th century were regarded as the poor man's university. As bones of ancient mammals began to be displayed, curators would arrange them from most primitive to most modern. These displays of horses and other fossils became advertisements of and validation for modern forms of life arising from more primitive ancestors. Of particular interest and controversy were displays of primate fossils and early human fossils together leading to the implied conclusion that humans are related to these primates.

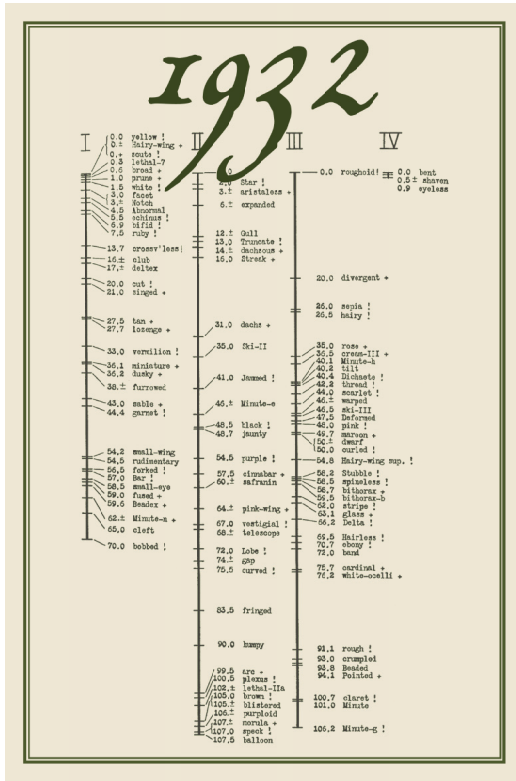
Evolutionary ideas from Scientific Darwinism and Social Darwinism also began to be applied more broadly to speculations about the ultimate fate of man. Popular books and journals discussed fears about the future of the species in general.

THERE IS GRANDEUR, IF YOU LOOK AT EVERY ORGANIC BEING
AS THE LINEAL SUCCESSOR OF SOME OTHER FORM...

Ruth Padel "More funny ideas about grandeur" IN *Darwin: A
life in poems*. New York: Alfred A. Knopf, 2009. p. 92.

23. "Hominid Display Case, Hall of the Age of Man."
American Museum of Natural History.
24. "Horse Evolution Chart."
American Museum of Natural History.
25. *Darwin and Modern Science: Essays in Commemoration of the Centenary of the Birth of Charles Darwin and of the Fiftieth Anniversary of the Publication of the Origin of Species.*
A. C. Seward. Cambridge, Eng.: Cambridge UP, 1909.

In this anniversary volume, scientists celebrated and listed the fossil and developmental evidence that was beginning to support Darwin's theory of selection.



Background image: "Map of the 4 Series of Linked Genes of *Drosophila Melanogaster*." Thomas H. Morgan. *The Theory of the Gene*. 1926.

This chart illustrates Morgan's discovery that certain genes do not disperse to the next generation independently but rather were "linked."

THE NEW SYNTHESIS

The new synthesis
THE RISING GENERATION OF BIOLOGISTS, TO WHICH
I BELONG, MAY NOW PERHAPS CLAIM TO MAKE ITS
VOICE HEARD.

In 1900 it was possible scientists might discount or reject Darwin's theories. By 1932 the linking of genetics, statistical analysis of the growth of populations, and understanding of the mechanisms of cellular reproduction led to a new understanding of the mechanisms of evolution. The modern understanding of the mechanisms of selection and evolution, was called Neo-Darwinism or The New Synthesis.

The renaissance came about, as articulated by John Haldane in 1932 in his book *The Cause of Evolution*, because:

"The rising generation of biologists, to which I belong, may now claim to make its voice heard. We have this advantage at least over our predecessors that we get no thrill from attacking either theological or biological orthodoxy; for eminent theologians have accepted evolution and eminent biologists denied natural selection."

These key discoveries helped evolution become a separate discipline of biology, rather than a sub-area. With this new field of study came new terms like: genetic drift, founder populations, mutation pressure, and selection pressure.

Evolutionary biology took another turn in 1953 with the understanding of the purpose of the structure of DNA. This discovery was the advent of molecular biology where the changes in the "information" that is transmitted between generations could now be described exactly. Finally the exact similarity or dissimilarity of two different individuals of a species could be described. Additionally, new measures of relatedness between species could be calculated allowing theoretical calculation of the rate of changes of individual gene sequences.

Darwin's insights of almost 100 years earlier reinforced the significance of the discovery of the function of DNA. Man shares not just common ancestry with all life on earth but also a common genetic material.

THE RISING GENERATION OF BIOLOGISTS, TO WHICH I BELONG,
MAY NOW PERHAPS CLAIM TO MAKE ITS VOICE HEARD.

H.G. Wells. Joan and Peter. New York: Scribner, 1927. p. 34.

26. "Cellular Development Diagram" Ernst Haeckel, artist.
Visions of Nature: the Art and Science of Ernst Haeckel.
Olaf Breidbach. London: Prestel, 2006.

Microscopic studies of how cells developed and divided led to new insights into how genetic material might be tied to evolution.

27. ***The Genetical Theory of Natural Selection.***
Ronald Aylmer Fisher. Oxford: Clarendon Press, 1930.
28. ***The Causes of Evolution.***
J.B.S. Haldane. NY: Longmans, Green and Co., 1932.

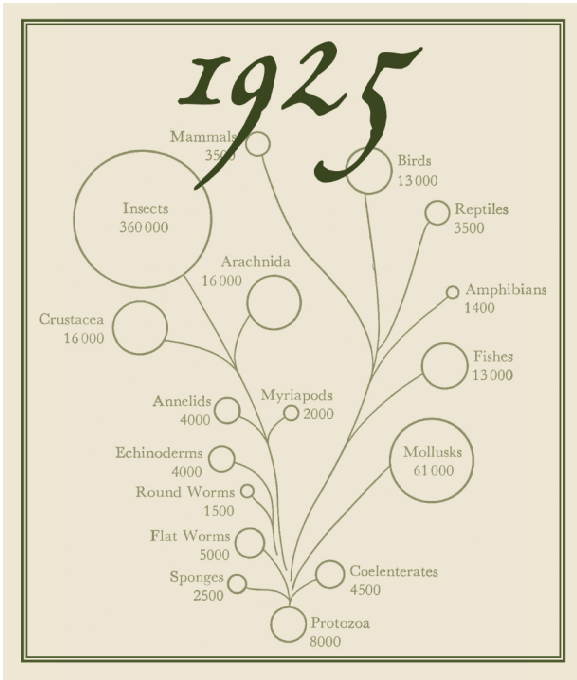
Fisher and Haldane were 2 of the mathematically inclined evolutionists who helped put together the study of genetics and Darwinism into one theory called population genetics.

29. "Development of Lizard, Snake, and Alligator Embryos"
Ernst Haeckel, artist. ***Visions of Nature: the Art and Science of Ernst Haeckel.*** Olaf Breidbach. London: Prestel, 2006.
30. ***Evolution***, May-June 1947.

The first journal of evolution was published in 1947. Established by scientists of this new breed, it gave them a forum to discuss new ways of observing evolution in action and proposing and testing mechanisms of selection.

31. ***Tempo and Mode in Evolution.***
George Gaylord Simpson. NY: Hafner, 1944.
32. ***Evolution, Genetics, and Man.***
Theodosius Grigorievich Dobzhansky. NY: Wiley, 1955.

As techniques and theory improved biologists like Simpson and Dobzhansky were able to write for the general reader about the evidence for the mechanisms of evolution.



Background image: "Taxonomy Tree." *A Civic Biology Presented in Problems*. George William Hunter. New York. American Book Company, 1914.

This diagram is from a textbook that John Scopes taught from. It was argued the diagram implied that humans were lost among the mammals in a small insignificant circle, rather than assigned a circle of their own.

THE SCOPES TRIAL

The scopes trial
...THE EVOLUTION THAT DESTROYS MAN'S FAMILY
TREE AS TAUGHT BY THE BIBLE AND MAKES HIM A
DESCENDANT OF THE LOWER FORMS OF LIFE.

There was continued popularization of evolution in the United States through the 1920s. Christian Fundamentalists and others felt threatened by how quickly scientific ideas were challenging and changing rural American society. They opposed widespread acceptance of the new discoveries about the age of the earth and the relationship of man to the primates.

William Jennings Bryan, a popular politician, became concerned about the future of Christian civilization. He felt any theory that emphasized struggle promoted war. He was also convinced that Darwin's theories inspired Germanic jingoism and destroyed the faith of America's youth by undermining their confidence in Scripture.

Bryan actively lobbied for state laws banning public schools from teaching evolution and by 1925, such legislation was being considered in 15 states. A prominent example was the Butler Act of 1925, making it unlawful in Tennessee to teach that mankind evolved from lower life forms. The American Civil Liberties Union (ACLU) and other organizations were upset by the anti-evolution laws being passed at the state level. The ACLU found a teacher, John Scopes who was willing to test the ban in Tennessee on teaching evolution in school.

The Scopes Trial seemed to give momentum to the fundamentalists' agenda, so the World Christian Fundamentals Association asked Bryan to represent them as counsel at the trial. The trial itself was a spectacle with tremendous press coverage and ran July 10-21, 1925. After 8 days of testimony the jurors returned a verdict in 9 minutes.

The outcome of the trial was anti-climactic; John Scopes was declared guilty and ordered to pay the \$100 fine for teaching evolution. The primary outcome was an awareness of the cultural line between religion and science. Following the trial there was a series of lobbying efforts for the suppression of references to evolution in textbooks, particularly in southern states.

...THE EVOLUTION THAT DESTROYS MAN'S FAMILY TREE AS
TAUGHT BY THE BIBLE AND MAKES HIM A DESCENDANT OF
THE LOWER FORMS OF LIFE.

William Jennings Bryan. "God and evolution."
New York Times Feb 26, 1922 p. 1

33. "God and evolution." William Jennings Bryan.
New York Times, Feb 26, 1922: 1.

W.J. Bryan was invited to present his objections to Darwinism. Bryan objected strongly to the idea that man was a descendant of the "lower forms of life."

34. *Monkey Trial; the State of Tennessee vs. John Thomas Scopes*.
Boston: Houghton Mifflin, 1960.

35. "The Tennessee Anti-Evolution law (Butler Act of 1925)."
House Bill 27:185 (Signed 03-21-25).

36. *Anti-Evolution Laws*.
American Civil Liberties Union. January 1927.

The trial of John Scopes, July 10-21, 1925, under the provisions of the Butler Act of 1925 brought to America's attention the cultural gap between science and religion. Following the trial other states enacted anti-evolution laws.

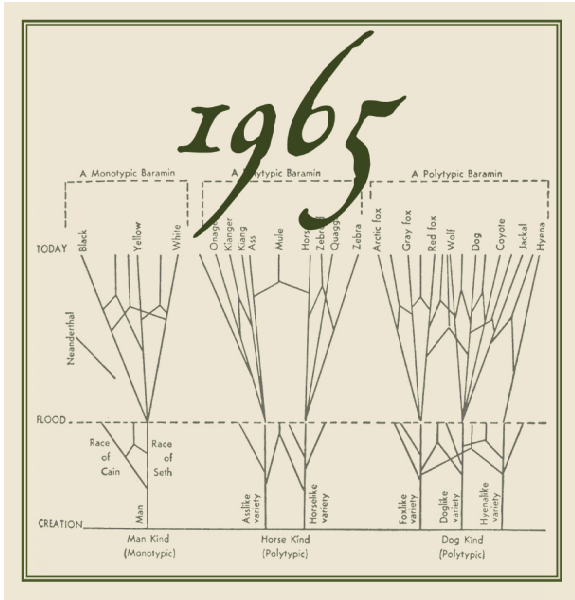


Background image: Evolutionary biology took another turn with the solving of the purpose of the structure of DNA in 1953. Darwin's insights of almost 100 years earlier reinforced the significant of the discovery of the function of DNA. Man shares not just common ancestry with all life on earth but also a common genetic material.

I LOOK WITH CONFIDENCE TO THE FUTURE, TO YOUNG AND RISING NATURALISTS, WHO WILL BE ABLE TO VIEW BOTH SIDES OF THE QUESTION WITH IMPARTIALITY.

Charles R. Darwin. *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life.* London: John Murray. 1859. P. 482.

37. *Discover Magazine.* March 2009.
38. *The Evolution of Darwinism: Selection, Adaptation, and Progress in Evolutionary Biology.* Timothy Shanahan.
Cambridge, UK: Cambridge UP, 2004.
39. *Systematics and the Origin of Species: on Ernst Mayr's 100th Anniversary.*
Eds. Jody Hey, Walter M. Fitch, and Francisco Ayala.
Washington, D.C. : National Academies Press, 2005
40. *Mathematics of Evolution and Phylogeny.*
Ed. Olivier Gascuel, NY: Oxford UP, 2005.
41. *Reconstructing Evolution: New Mathematical and Computational Advances.* Eds. Olivier Gascuel and Mike Steel.
Oxford : Oxford UP, 2007.
42. *Speciation.*
Jerry A. Coyne and H. Allen Orr.
Sunderland, MA: Sinauer Associates, 2004.



Background image: "Diagram of Three Genesis Kinds." *Evolution, Creation and Science*. Frank L. Marsh. Washington: Review and Herald Pub. Assn., 1947.

The authors made the argument from a geological point of view that fossils could easily be explained as a product of the biblical flood.

CREATIONISM

creationism

SCIENTISTS AND THEOLOGIANs HAVE WRITTEN ELOQUENTLY ABOUT THEIR AWE AND WONDER AT THE HISTORY OF THE UNIVERSE AND OF LIFE ON THIS PLANET, EXPLAINING THAT THEY SEE NO CONFLICT BETWEEN THEIR FAITH IN GOD AND THE EVIDENCE FOR EVOLUTION. RELIGIOUS DENOMINATIONS THAT DO NOT ACCEPT THE OCCURENCE OF EVOLUTION TEND TO BE THOSE THAT BELIEVE IN STRICTLY LITERAL INTERPRETATIONS OF RELIGIOUS TEXTS.

By the early 1960s opponents of evolution still had no coherent theoretical alternative to the theory of evolution. Many were concerned that without an argument against evolution as being taught in high schools and colleges they would lose their opportunity to present their point of view.

These fundamentalists moved on to relabeling themselves as supporters of Scientific Creationism and Creation Science. They drew upon the expertise of fundamentalist scientists and geologists to create detailed counter arguments to evolution that could be used in classrooms. The first such text was the 1961 book *The Genesis Flood; the Biblical Record and Its Scientific Implications*.

Creation Science was the new preferred term and there were lobbying efforts at the state level to be allowed to teach this as an alternate theory to the theory of evolution. Their basic argument being that in the interest of education all possible theories of creation should be taught in textbooks and classrooms. These efforts lead to another round of cultural discussions and lawsuits about the place of creation science in science education.

Another attempt to link scientific evidence with a critique of evolution has arisen in recent years with the Intelligent Design movement. This movement

advocates that the complexity of organic life implies it has to be the product of a designer. Furthermore, the theoretical and experimental problems with the theory of evolution mean that scientists should search for an alternative theory.

All sides continue to debate the place God and science should meet. The big questions that Darwin brought to the forefront of society 150 years ago continue to go on. Where do we come from, why are we here, and what is our destiny?

SCIENTISTS AND THEOLOGIANs HAVE WRITTEN ELOQUENTLY ABOUT THEIR AWE AND WONDER AT THE HISTORY OF THE UNIVERSE AND OF LIFE ON THIS PLANET, EXPLAINING THAT THEY SEE NO CONFLICT BETWEEN THEIR FAITH IN GOD AND THE EVIDENCE FOR EVOLUTION. RELIGIOUS DENOMINATIONS THAT DO NOT ACCEPT THE OCCURENCE OF EVOLUTION TEND TO BE THOSE THAT BELIEVE IN STRICTLY LITERAL INTERPRETATIONS OF RELIGIOUS TEXTS.

National Academy of Sciences (U.S.) and Institute of Medicine (U.S.) *Science, evolution, and creationism*. Washington, D.C. : National Academies Press, 2008 p. 12.

43. ***The Genesis Flood; the Biblical Record and its Scientific Implications.***
John Clement Whitcomb and Henry M. Morris.
Philadelphia : Presbyterian and Reformed Pub. Co., 1961.
44. ***Science and Creationism: a View from the National Academy of Sciences.***
Committee on Science and Creationism, National Academy of Sciences. Washington, D.C. : National Academy Press, 1984.
45. ***What is Creation Science?***
Henry M. Morris and Gary E. Parker.
El Cajon, CA: Master Books, 1987.
46. ***Thank God for Evolution: How the Marriage of Science and Religion will Transform your Life and Our World.***
Michael Dowd. New York: Viking, 2008.

The Art of Evolution

CREATIVITY AND DARWIN

Evolutionary ideas appear in art as reflections of questions such as who are our ancestors, how are we connected to our parents, what is our true nature, and what is next for man?

Artists from the earliest cave drawings have seen animals and tried to capture their essence in art. One of the earliest reflections of evolutionary ideas in art was depicting primates and humans together. Editorial cartoons reflected the philosophical quandary: Are we balding apes or are primates simply unclad humans? Comic artists put clothes on apes to parody the idea that we could be related. More serious artists painted primates doing human activities or simply contemplating a human skull.

Evolutionary theory has its own language and symbols. Visual shorthand symbols for evolution include clichés like the fish evolving into the lizard evolving into the ape evolving into the man. Another symbol is that of the evolutionary tree. It works as a way of expressing how things change through time and we use it as a visual metaphor to explain how the complex arises from the simple. Finally we have learned the shapes of our own chromosomes and the DNA within. These shapes imply the ultimate artistic dream, for the artist to sculpt life itself.

47. *Endless Forms: Charles Darwin, Natural Science and the Visual Arts.* Eds. Diana Donald and Jane Munro. New Haven: Yale UP, 2009.
48. "The Darwinian Eye." Harriet Ritvo. *Science*. 323.5922 (March 27 2009) 1673–1674.

49. "Black Tie Affair." Nicolas Rule.1992.

The Molecular Gaze: Art in the Genetic Age. Suzanne Anker.
Cold Spring Harbor, NY.: Cold Spring Harbor Laboratory Press, 2004.

"Black Tie Affair" uses men's ties to depict a phylogenetics tree. Visually we are also reminded of the ancestral trees showing parents and grandparents. By using the ties we may be reminded of the shapes of chromosomes and how our lives are ultimately just DNA reproducing itself.

50. "My Grandparents, My Parents, and I." Frida Kahlo, artist. 1936.

The Molecular Gaze: Art in the Genetic Age. Suzanne Anker.
Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press, 2004.

Artists were influenced by evolution to express ideas about how they were connected to their family as biological beings. Kahlo reflects on how she is a baby born of parents who were born from their parents. She makes the connection that we are born as an outgrowth of an unbroken biological chain of life extending back through time.

51. "Palaeanthropical Physiognomy." Gerhard Lang, artist. 1991/2000.

The Molecular Gaze: Art in the Genetic Age. Suzanne Anker.
Cold Spring Harbor, N.Y: Cold Spring Harbor Laboratory Press, 2004.

Evolution expressed the idea that we are not only related to the animals we are animals. Gerhard Lang in his altered photographs shows the person and the animal as one being. We are made up of bits and pieces of other life and our natures reflect it.

52. "Formula of Spring." Pavel Filonov, 1915.

Exploring the Invisible: Art, Science, and the Spiritual.
Lynn Gamwell. Princeton, NJ: Princeton UP, 2002.

In 1914 Pavel Filonov joined with Malevich and others to form a group of painters called World Flowering, dedicated to expressing their belief that not only the human species but the whole cosmos is an evolving organism. They created art that expressed the altered perceptions and expanded consciousness of these higher being (themselves).

What separates us from the animals?

THE MIND AND DARWIN

One of the outcomes of thinking about Darwin's theories was to question our relatedness to animals. As our knowledge of this relatedness and differences has increased, a basic question remains: How much of our biology provides an ultimate explanation of human nature?

We recognize that we seem to have minds different from those of animals. We list these differences as self-awareness, emotions, culture, and a sense of ethics. As early biologists and other scientists accepted evolution, they tried to understand how these differences could have evolved from animals. They began to think of higher and lower mental abilities as a way of classifying animals and relatedness.

"Nature versus Nurture" has long been shorthand for the argument about how much of "who we are" is our biology. Biologists, physiologists, and psychologists have used comparative studies to classify and understand animal brains so we might build a representation of the essential parts of our brains.

Other thinkers felt that we should be asking, "What are the best traits of the human mind?" Natural Selection and evolutionary theories were applied to try to understand thousands of years of thought about who we are. Philosophers applied Darwinian ideas to classifying the order in which abilities evolved and determining what was the most highly evolved form of mind.

As self-conscious beings, we experience complex emotions and live in an intricate society of other conscious beings. In an attempt to explain how such complexity could arise, researchers looked at behavioral traits at the genetic level. Sociobiology is the theory that we are driven by innate behavioral mechanisms, therefore certain complex behaviors may be programmed into all life, as a way for a specific set of genes to be passed on.

53. *Pleasures of the Brain*.
Eds. Morten L. Kringelbach and Kent C. Berridge,
NY: Oxford UP, 2010.
54. *Is Human Nature Obsolete? Genetics, Bioengineering, and the Future of the Human Condition*.
Eds. Harold W. Baillie and Timothy K. Casey.
Cambridge, MA: MIT Press, 2005.
55. *Evolutionary Cognitive Neuroscience*.
Eds. Steven M. Platek, Julian Paul Keenan, and Todd K. Shackelford.
Cambridge, MA: MIT Press, 2007.
56. "The Hairy Human." Sidney Harris, artist.
What's So Funny about Science? Cartoons by Sidney Harris from American Scientist. Sidney Harris.
Los Altos, CA: William Kaufman, Inc. 1977.
57. *Nature Versus Nurture: the Long-Standing Debate Over What Makes Us the Way We Are*. Desmond Collins.
Tiverton, Devon [England]: Clayhanger Books, 2002.
58. "The Process of Evolution and the Highest Human Personality."
Herbert F. Standing. *Spirit in Evolution; From Amoeba to Saint*.
Herbert F. Standing. London: G. Allen and Unwin Ltd. 1930.
This chart shows how higher and lower spiritual states can be represented as we have evolved.
59. *Does Evolution Explain Human Nature? Twelve Views on the Question*. Templeton Conversation, No. 5.
West Conshohocken, PA: John Templeton Foundation, Spring 2009.
60. "Mental Evolution in Animals." George J. Romanes, artist.
Mental Evolution in Animals. George J. Romanes.
NY: D. Appleton and Company, 1895.

Survival of the Fittest

BUSINESS AND DARWIN

"The social Darwinism description of nature, with its emphasis on the survival of the fittest and a claw-and-fang mode of natural selection, precisely reflects the relations that prevailed in the nineteenth-century marketplace. The fit is almost perfect, and it is hard to say whether natural Darwinism produced Social Darwinism or the very reverse." Murray Bookchin. *Biology as a social weapon*. (1977)

The term "survival of the fittest" did not come from Darwin but rather Herbert Spencer. Spencer, an economist and philosopher, first used the phrase - after reading Charles Darwin's *On the Origin of Species* (1859) - in his *Principles of Biology* (1864), in which he drew parallels between Spencer's own economic theories and Darwin's biological ones. Darwin then borrowed Spencer's new phrase as a synonym for "natural selection" in the fifth edition of *On the Origin of Species*, published in 1869.

The acceptance of natural selection by many people brought up the question whether social processes might also be subject to these laws. Spencer suggested interpreting social organization by strict analogy with the physical organism. The social equivalent of the biological struggle was the free play of market forces (*laissez-faire* economics).

Darwin's theories were interpreted by businesses as saying whoever adapted to changes in the environment was bound to prevail, while those who could not were doomed. John D. Rockefeller saw Darwin's law of nature no different from the law of the marketplace, saying "The growth of a large business was merely survival of the fittest. " In modern times Bill Gates has been characterized as; "He's Darwinian. He doesn't look for win-win situations with others, but for ways to make others lose."

This selection of business articles shows how this popular interpretation of evolutionary thought is still an active metaphor for competition.

61. *The Evolution of Institutional Economics: Agency, Structure, and Darwinism in American institutionalism*. Geoffrey M. Hodgson
NY: Routledge, 2004.
62. *The Principles of Biology*. Herbert Spencer. Vol.1.
London: Williams and Norgate, 1864.
63. "Survival of the Fittest - How Strong Brands Survive Hard Times."
Checkout Volume 35, Issue 2, 2009: 60-68.
64. *Choice, Chance & Organizational Change: Practical Insights from Evolution for Business Leaders & Thinkers*. Clay Carr.
NY: American Management Association, 1996.
65. "Survival of the Fittest." Megan Rowe.
Restaurant Hospitality. March (2009): 24-28.
66. "The Survival of the Fittest." Frank Tannenbaum.
Columbian Journal of World Business. March-April (1968): 13-20.

DON'T WASTE YOUR TIME WORRYING ABOUT THE "SURVIVAL OF THE FITTEST." IT WILL HAPPEN, SIMPLY BECAUSE WE DEFINE THE FITTEST AS THOSE WHO SURVIVE. CONCENTRATE INSTEAD ON RESPONDING TO YOUR COMPETITIVE ENVIRONMENT AND COEVOLVING SUCCESSFULLY WITH IT. THEN, BY DEFINITION, YOU WILL BE AMONG THE FITTEST.

Clay Carr. *Choice, chance & organizational change : practical insights from evolution for business leaders & thinkers*. New York : American Management Association, 1996. p. 95.

Evolution vs Inspiration

LITERATURE AND DARWIN

Darwin's thoughts and ideas permeated the writing of the late 1800s. Novelists and poets explored themes such as life evolving from the primordial ooze, what is that of the animal in man, and the evolutionary struggle as life "red in tooth and claw" tries to win its battle.

Evolutionary ideas could be portrayed subtly, e.g. as a drawing room conversation reflecting how a character was educated in the issues of the times. Portrayed overtly; evolution was confronted in fiction like *The Island of Dr Moreau* (1896). In it H.G. Wells writes about animals who are transformed by a scientist (skipping years of evolutionary time) to become men but by not having the concurrent "moral evolution" the beast-men eventually fall back into their savage ways. In *The Time Machine* (1895) Wells speculates on the ultimate fate of man after 800,000 years of evolution. Would we become savagely competitive and mechanically inclined Morlocks (the working class) or the artistic but unmotivated Eloi (the leisure class)?

Still other writers confronted the theme that as the traditions of natural theology were dismantled by Darwinian science, the world had to be reconstituted not from divine inheritance but from arbitrary acts of human will. The story of the struggle to rise up from lowly origins fit in with social Darwinist and capitalistic ideas of success.

Biology has learned more about what drives animals and perhaps humans to reproduce, creating yet another lens for Darwinian and evolutionary ideas to be used in literature. More recent analysis have explored the makeup of human nature including why certain characters select the spouse they do, looking at *Othello* and male sexual jealousy, *Madame Bovary* and the biology of adultery, and *Catcher in the Rye* and the biology of parent-offspring conflicts.

67. *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction.*
Gillian Beer. 2nd ed. Cambridge: Cambridge UP, 2000.
68. *Darwin and Faulkner's Novels: Evolution and Southern Fiction.*
Michael Wainwright. NY: Palgrave Macmillan, 2008.
69. *Cosmic Optimism; a Study of the Interpretation of Evolution American Poets from Emerson to Robinson.*
Frederick William Conner. Gainesville, FL: Florida UP, 1949.
70. "Trapped by the Morlocks." Joe Mugnaini, artist.
The Time Machine. H.G. Wells. NY: Limited Editions Club, 1964.
71. *Madame Bovary's Ovaries: A Darwinian Look at Literature.*
David P. Barash and Nanelle R. Barash. NY: Delacorte Press, 2005.
- The authors take some of the insights on evolutionary behavior and sexual selection in animals and applies them to interpreting human behavior in literature.
72. *The Descent of Love: Darwin and the Theory of Sexual Selection in American Fiction, 1871-1926.* Bert Bender.
Philadelphia: Pennsylvania UP, 1996.
73. "Darwin to the Rescue." Britt Peterson.
The Chronicle Review. August 1 (2008): B7-B9.

TO THE WORLD OF THE 1880'S THE STORY OF LIFE, OF THE ORIGIN AND BRANCHING OUT OF SPECIES, OF THE MAKING OF CONTINENTS, WAS STILL THE MOST INSPIRING OF THE NEW ROMANCES.

H.G. Wells. Joan and Peter. New York: Scribner, 1927. p. 34.

FURTHER READINGS

further readings

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Berkeley: California UP, 2009.
- Kramer, Herbert J.
The Intellectual Background and Immediate Reception of Darwin's Origin of Species.
Thesis (Ph. D.)--Harvard University, 1948, 1948.
- Miller, James B.
An Evolving Dialogue: Scientific, Historical, Philosophical and Theological Perspectives on Evolution.
Program of dialogue between science and religion.
Washington, D.C.: American Association for the Advancement of Science, 1998.
- Ruse, Michael, and Robert J. Richards.
The Cambridge Companion to the "Origin of Species."
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The Evolution Wars: A Guide to the Debates.
Millerton, NY: Grey House Pub, 2009.



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