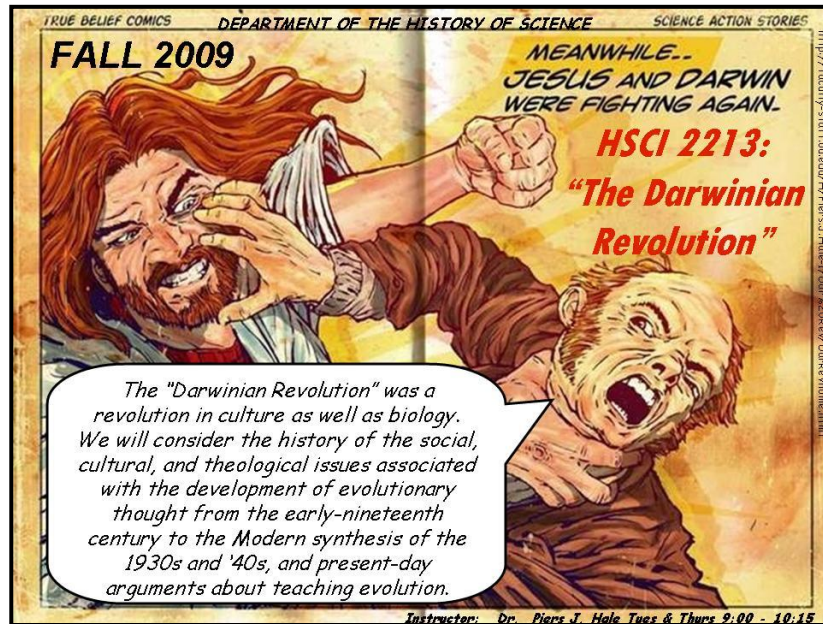


HSCI 2213: “THE DARWINIAN REVOLUTION”



The publication of Charles Darwin's *Origin of Species* in 1859 radically altered prevailing perceptions of the natural history of life and has profoundly shaped western culture ever since. Darwin's theory of evolution by natural selection placed humanity in the natural order and thus it is unsurprising that it was controversial from the start. The “Darwinian Revolution” was a revolution in culture as well as biology, and we will consider the history of the social, political and theological issues associated with the development of evolutionary thought.

COURSE TEXTS

Required:

Charles Darwin. *On the Origin of Species by means of natural selection or the preservation of the favoured races in the struggle for life.* (Cambridge Mass, & London: Harvard University Press, 2003).

Additional readings listed below will be placed on D2L.

Time and location:

Mon/Wed/Fri: 12:30-13:20
PHSC 117

Office hours:
Mon & Wed 4:15-5:00
& by appointment

Assessment

Take home essays: 2x25% = 50% of total

Essays should be sophisticated and informed, reflecting in-depth analysis of lecture and reading material. They should have a clear thesis and be appropriately referenced using a recognised citation style.

Document questions: 2x10% = 20% of total

This will be a short written assessment in which students will be asked to assess several documents. We'll discuss this more in class.

Final short answer examination: 1x30% = 30% of total

Due dates:

Documents 1: Monday 21st February.

Essay one: Friday 11th March.

Documents 2: Monday 11th April.

Essay two: Wednesday 27th April.

Final exam: Friday 13th May.

Course Formalities and Expectations

Attendance and Participation:

Attendance in class is mandatory. If you have good cause to miss class, it is imperative that you discuss this with your instructor BEFOREHAND. **Note: A student with more than nine undocumented absences will lose one grade per absence thereafter:** ie: an "A" becomes a "B+", a "B+" becomes a "B" and so on. *Any student who misses fifteen or more classes without documented and justifiable cause may receive a failing grade irrespective of any written work submitted.*

If you repeatedly miss class without good cause you will receive a written warning. Persistent absences may result in your receiving a failing grade for the course. ***For this reason if you have good cause to miss class, it is imperative that you discuss this with your instructor BEFOREHAND.***

Academic Integrity and Plagiarism:

Plagiarism is the unacknowledged appropriation of someone else's words, ideas, or work which is then represented as your own. It will not be tolerated and carries significant and serious penalties. At a minimum you will receive 0% for the assignment, and your name put on record. It is possible that you might receive 0% for the course, and in extreme cases may be expelled from the college. You are therefore strongly recommended to educate yourself regarding what plagiarism is and how to avoid it. Your instructor and/or the staff at the writing centre will be happy to advise you on this matter if you are in any doubt.

NB: Be aware that ignorance of what constitutes plagiarism will not be accepted as an excuse for it. If at any time you are unsure of how to cite material, your instructor or writing centre staff will be happy to advise you.

YOU SHOULD CHECK THIS LINK

<http://libraries.ou.edu/help/tutorials/academicintegrity/player.html>

OU operates an equal opportunities policy. For information on Disability Resources and Policy see: The Disability Resource Centre web site: <http://drc.ou.edu/>

Work that is late will not be graded unless there are exceptional documented circumstances

CLASS SCHEDULE

Week One:

Monday 17th January: No class today.

Wednesday 19th January:

“Charles Darwin”, “Darwinism” and “The Darwinian Revolution”:

Some significant questions...

In this class I will introduce the course, and introduce the history of the idea of evolution and of the man who formulated the theory of natural selection to explain it.

Friday 21st January:

Charles Darwin: a biographical introduction. The “Struggle for Existence”: Scarcity, industry, competition and progress.

Charles Darwin was born in 1809 into a wealthy middle class family in England. His father was a wealthy Doctor and financier, his wife’s family were the Wedgwood’s—of Wedgwood pottery fame.

Week Two:

Monday 24th January:

Dark satanic mills and the workshop of the world:

The struggle for existence was a term in wide use before Darwin appropriated it in his thoughts about evolution—it was reality for the majority of the poor and working class in the country. During the nineteenth century England was in the midst of the industrial revolution. It was a time of unprecedented change politically as well as economically. Immense wealth existed in the face of slum housing and grinding poverty. Mining and industry also drove advances in many of the natural sciences, including mineralogy and geology—it was also a time of political uncertainty.

Reading:

Thomas Robert Malthus, *An Essay on the Principle of Population*, [1798]. 6th edition, (London: John Murray, 1826).

Adam Smith. *The Wealth of Nations*, 1776, pp.109-10, 117-121.

Wednesday 26th January:

William Paley's Natural Theology

Although England's economy was undergoing dramatic changes, in many senses the politics that mattered—those of the Anglican ruling elite—were based on stability. There is no separation of church and state in England, and long-established Anglican theology underlined the incumbent conservative politics of the nation. William Paley (1743-1805) was the English mathematician, theologian and Anglican priest who was most closely associated with “natural theology”. In this section of his book *Natural Theology*, which was mastered by every nineteenth-century university student—Darwin included—Paley described how the order, complexity and apparent purposefulness in nature, compels the careful observer to conclude that the universe and everything in it was the creation of an omnipotent and loving designer. This was known as the “argument from design” or “argument from analogy.” This is still the mainstay of present day “creationist” arguments for “intelligent design”—more of which *anon.*

Reading:

William Paley, *Natural Theology: or, Evidences of the Existence and Attributes of the Deity Collected from the Appearances of Nature*. Philadelphia: John Morgan, 1802.

Friday 28th January:

Evolution and Extinction in France: Jean Baptiste Lamarck and Georges Cuvier.

Contrary to popular belief, the majority of the thinking public did not believe the Genesis story to be literally true prior to the publication of Darwin's *Origin of Species* in 1859. However, and in large part because of the predominant Anglican theology in England, we have to turn to France to see the most open speculations about “transmutation”, as evolution was then termed. The novel and extraordinary fossil finds that were being exposed as a result of mining needed explanation. The most exciting ideas came out of the National Museum in Paris from Jean Baptiste Lamarck (1744-1829) and Georges Cuvier.

Reading:

Jean Baptiste Lamarck, *Zoological Philosophy* [1809], (University of Chicago Press, 1984.

George Cuvier, *Essay on the Theory of the Earth*, [1813]. (Edited by Robert Jameson, Edinburgh, William Blackwood, 1827.

Week Three:

Monday 31st January:

Earth History: “Uniformitarianism” and “Catastrophism”

William Whewell (1794-1866) a prominent geologist, mineralogist, and Master of Trinity College Cambridge, named the two theoretical explanations of the history of the Earth's surface, “Catastrophism” and “Uniformitarianism”. The former allowed for significant occasional leaps in explaining the Earth's natural history, a view associated with Cuvier's “revolutions”. Uniformitarianism, however, entailed slow and gradual change. Cuvier's *Theory of the Earth* (1813) (along with William Buckland's *Geology and Minerology* (1836)) marked the field until the publication of Charles Lyell's controversial *Principles of Geology* (1830-1833). Lyell (1797-1875), a former student of Buckland, proposed a uniformitarian theory of earth's development suggesting that the earth was much older than previously assumed. Lyell argues that the fossil record is a “poor census taker”.

Reading:

Charles Lyell, *Principles of Geology* [1830-1833]. London: John Murray, Vol. I, pp.1-2, 78-9, 165-6, Vol. II, pp.1-19, 20-21, 124, Vol. III, pp.30-31.

Wednesday 2nd February:

Form and function in nineteenth-century comparative anatomy in England.

Richard Owen (1804-1892) was from Lancaster in England and had attended Lancaster Grammar School with Whewell with whom he remained close friends. Trained as a surgeon he was a brilliant dissectionist. Appointed curator of the Hunterian Collection of specimens at the Royal College of Surgeons in London he soon became the most distinguished British comparative anatomist of his day. In 1830 he became acquainted with Cuvier and in 1856 he became superintendent of the natural history department of the British Museum. Significantly Owen saw evidence of design in the organisms he dissected, and he wrote a number of important works demonstrating exactly this, in this one, *On the Nature of Limbs*, Owen outlines homology as evidence for design. Owen was an avowed anti-evolutionist from the start and was later to come into conflict with those who advocated Darwinian evolution in the 1860s, Thomas Huxley in particular.

Reading:

Richard Owen, *On the Nature of Limbs*, 1849, reprinted Chicago University Press 1990, pp.3, 4-9, 13-14, 39-40, 85-6.

Friday 4th February:

Charles Darwin and the Voyage of the Beagle.

Between the end of 1831 and the October of 1836 Darwin sailed aboard the H.M.S. *Beagle*, a Royal Naval survey vessel, as the captain's companion. His voyage took him from Plymouth, England, around South America, through New Zealand and Australia, across the Indian Ocean and around the Southern tip of Africa. When he left he was twenty-two with a general university education, five years later he returned to England as a minor celebrity as a result of the many plant animal and geological specimens he had collected during his voyage. Several elements of his voyage—and not just his visit to the Galapagos Islands—later became very important for his views on speciation and his theory of Natural Selection.

Reading:

Charles Darwin "Chiloe and Concepcion: Great Earthquake." *Journal of Researches into the Natural History and Geology of the Countries visited During the Voyage of HMS Beagle Round the World, Under the Command of Capt. Fitz Roy, RN.* (2nd ed. Corrected with additions) London, John Murray, 1845.

Week Four:

Monday 7th February:

Darwin's Voyage on the Beagle: Tierra del Fuego.

It was not only Darwin's celebrated visit to the Galapagos Islands that led him to his evolutionary conclusions, but he was also led to think long and hard about the divergence and variety of individuals within a species by his encounter with the natives of Tierra del Fuego. Darwin was led to consider both the role of the environment and the role of personal effort as explanatory of the differences between races.

Reading:

Charles Darwin, *Journal of Researches in to the Natural History and Geology of the Countries Visited by H.M.S. Beagle* (1839), Chapter 10, pp.180-203.

Wednesday 9th February:

Darwin's Voyage on the Beagle: The Galapagos Islands.

September 15th 1835 *Beagle* dropped anchor off what is now San Cristobal Island in the Galapagos archipelago. In this class we will consider what Darwin saw there and what impressed him most—and, ironically—what did not!

Reading:

Charles Darwin, *Journal of Researches in to the Natural History and Geology of the Countries Visited by H.M.S. Beagle* (1839), Chapter 17, [edited selections].

Friday 11th February:***The famous Malthusian moment and ‘Darwin’s delay’—A historiographic interlude.***

We know that Darwin became a convinced transmutationist certainly by 1837—read Malthus in the September of 1838. This was, according to some, his ‘eureka!’ moment—but what exactly did Darwin get from Malthus? Further, if Darwin had it all worked out by 1838, why wait until 1859 to publish? We will consider two very different answers to that question.

Week Five:**Monday 14th February:*****Evolution in England: The Vestiges of the Natural History of Creation.***

Evolutionary ideas had long been associated with politically radical ideas and thus when an anonymous book was published by a respectable book publisher in 1844 it scandalised the nation. *The Vestiges of the Natural History of Creation* was written by the Scottish publisher Robert Chambers (1802-1871).

Reading:

Robert Chambers, *The Vestiges of the Natural History of Creation* [1844], London, George Routledge and Sons, 1887, (edited selections).

Wednesday 16th February:***The Philosophy of Science and Scientific Proof: William Whewell.***

In this class we consider the philosophy of science, and, in particular, the nature of scientific proof and what made for good science. Debate on this question in England at this time came to centre around what it meant to be a good Newtonian. Arguably the most important writer in this debate was the Cambridge mathematician William Whewell (1794-1866). It is no exaggeration to call Whewell one of the most influential figures in the history of modern science. The son of a Carpenter, Whewell was recognised as a superb mathematician by a local parish priest, and arrangements were made for his education. Through hard work and scholarships he attended Cambridge University and eventually became Professor of Mineralogy and Professor of Moral Philosophy. He was close to many of the prominent men of science of his day – including Lyell, John Stevens Henslow, Adam Sedgwick and with Darwin during his own student days at Cambridge. In this section from *The Philosophy of the Inductive Sciences* (1840), Whewell explained how scientists could best use the inductive method to extrapolate knowledge from collections of observations. Whewell’s thinking on this matter was vital to Darwin’s argument for evolution in *Origin*.

Reading:

William Whewell, *The Philosophy of the Inductive Sciences* [1840]. London: John W. Parker, Vol. I, pp.iii-iv, 41-48, Vol. II, pp.212-239.

Friday 18th February:***Introducing Origin***

Given Darwin’s concern over publishing, and the standards of science of the day, Darwin was eager to show that he was doing good science. This much is evident from even the first few pages of Darwin’s introduction.

Reading:

Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* [1859]. Introduction.

Week Six:

Monday 21st February:

On the Origin of Species: “The Struggle for Existence”

“This is the doctrine of Malthus” Darwin had stressed, we will pay close attention to his explanation of the struggle for existence that he saw going on in nature all around him.

Reading:

Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* [1859]. Chapter 3.

Wednesday 23rd February:

Natural Selection and Speciation

In light of the fact that far more organisms of any species are born than can possibly survive, Darwin argued, only the best fitted to their environment would survive to reproduce. These survivors would tend to pass on their beneficial traits to the next generation. The unfit would, he concluded, be dispassionately exterminated by this same mechanism. Over time these favourable variations would, if they continued to prove advantageous, result in significant morphological changes in the species. In this chapter too Darwin also puts forward his theory of divergence, by which he sought to explain how one species might, through circumstance and selection, be split into two or more distinct species.

Reading:

Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* [1859]. Chapter 4.

Friday 25th February:

Selection and divergence continued.

In this class we continue our discussion of selection and the speciation that Darwin believed would result from it.

Week Seven:

Monday 28th February:

Difficulties on Theory:

Having laid out the mechanism of his theory of the Struggle for Existence and of the Natural Selection that must therefore ensue, Darwin turned to the objections that he anticipated might be raised against his theory. In chapter six and seven Darwin dealt explicitly with a number of reservations that he anticipated his readers might have about the efficacy of selection to accomplish all that he claimed for it.

Reading:

Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* [1859]. Selections from Chapter 6.

Wednesday 2nd March:

Instincts of social insects...

In this class on *Origin* we will discuss one of the most difficult of all the objections that Darwin anticipated being raised of his theory. How might one account for the existence of sterile castes of insects that each had a distinct morphology?

Reading:

Selections from *Origin*, Chapter 7.

Friday 4th March: No class today.

Week Eight:

Monday 7th March:

Morphology, embryology, recapitulation and conclusion:

In this class on *Origin* we will discuss one of the most difficult of all the objections that Darwin anticipated being raised of his theory. How might one account for the existence of sterile castes of insects that each had a distinct morphology...

Reading:

Selections from *Origin*, Chapters 13 & 14.

Wednesday 9th March:

Ideologies clashing: T.H. Huxley and Sam Wilberforce at the 1860 meeting of the British Association.

A significant aspect of the history of evolutionary thought revolves around the religious controversy it raised. Perhaps the most famous event in this history was the debate between “Darwin’s Bulldog” Thomas Huxley and the Bishop of Oxford, Sam Wilberforce. We will revisit this debate. It was certainly a significant event, but perhaps not for the reasons we might think!

Friday 11th March:

“The details left to chance” : Asa Gray, contingency and design in nature.

Asa Gray (1810-1888) was a botanist at Harvard who, following the publication of the *Origin*, commenced an enthusiastic and a lifelong correspondence with Darwin. Whereas many people thought that Darwin’s theory refuted Paley’s argument from design, in many ways like Kingsley, Asa Gray believed that natural selection was the mechanism through which God brought new species into the world. He was influential in ensuring that the *Origin* had a ready reception in the United States, and defended the work against the charge of atheism. However, Darwin took him to task in correspondence, and later in public, over his persistent theism.

Reading:

Correspondence between Charles Darwin and Asa Gray: Charles Darwin to Asa Gray, 22 May 1860, *The Correspondence of Charles Darwin*, Vol. 8, 1860, Cambridge: Cambridge University Press, 1993, pp.223-226.

Week Nine:

Monday 14th March: SPRING BREAK

Wednesday 16th March: SPRING BREAK

Friday 18th March: SPRING BREAK

Week Ten:

Monday 21st March:

Darwinian Natural Theology in England: Charles Kingsley and Water Babies

In contrast to Wilberforce, the Broad-Church Anglican Priest, Charles Kingsley read Darwin’s work as being consistent with Natural Theology. As well as a popular author, with a controversial background in political Radicalism, Kingsley had become tutor to the Prince of Wales and Chaplain to the Queen. – he was thus not without influence! He wrote, spoke, and sermonised (!) extensively on evolution and its religious orthodoxy, but nowhere did he do this more deeply (or more charmingly) than in the fairy tale he wrote in 1862-3, *Water Babies*.

Reading:

John Beatty & Piers J. Hale, “*Water Babies: an evolutionary parable*”, *Endeavour*, Vol.32, No.4, 2008: 141-6.

Wednesday 23rd March:***Questioning selection:***

The period that followed the publication of *Origin* has been described by more than one historian as the “Non-Darwinian Revolution.” By the end of the 1860s most naturalists were convinced evolutionists, but few people accepted that natural selection could do all that Darwin said it could. Perhaps most notable were the objections made by the Scottish Engineer Henry Charles Fleeming Jenkin (1833-1885) and the Irish physicist William Thompson (1824-1907), who later became Lord Kelvin. Fleeming Jenkin pointed out that if those organisms with unusually fit traits bred with the less fit of their population, the result would tend to be an averaging out of that trait, rather than its exaggeration to the point of forming new species. William Thompson also questioned Darwin’s theory. His calculations of the earth’s age, based upon deductions about the temperature of the Earth’s core, suggested that the Earth was nowhere near old enough for sophisticated organisms to have evolved through the slow uniformitarian processes favoured by Darwin.

Reading:

Henry Charles Fleeming Jenkin, “The Origin of Species” [Review Article] Originally published in *North British Review*, 1867, 46: 277-318.

Friday 25th March:***Further objections:***

There were other objectors with other objections. Even Alfred Russel Wallace had misgivings about the capacity for selection to account for the evolution of conscience. In this class we will discuss the objections raised by Wallace, the Duke of Argyll George Douglas Campbell, and the English Catholic anatomist St. George Jackson Mivart. As well as Darwin’s response to them.

Reading:

Alfred Russel Wallace, “Limits of Natural Selection as applied to Man” 1870.

Week Eleven:**Monday 28th March:*****The Descent of Man and Selection in Relation to Sex.***

In the *Origin* Darwin had carefully skirted the issue of human evolution, however, it was the obvious question that his readers asked, and which many other authors ventured into in light of Darwin’s theory. By 1871 Darwin finally decided to put pen to paper himself in *The Descent of Man*. In this book Darwin not only speculated about the origins of modern humanity, but also took the opportunity to more fully expound his theory of “sexual selection” a natural force that he saw working sometimes in tandem, and sometimes in opposition to natural selection. In doing so he sought to answer questions raised regarding the evolution of those supposedly unique human characters: morals and aesthetics.

Readings:

Charles Darwin, *The Descent of Man; and Selection in Relation to Sex*, (London: John Murray, 1871).

Wednesday 30th March:***The Descent of Man and Selection in Relation to Sex***

Darwin attempted not only to account for the issues of morphology that Wallace had raised, but also recognised that any theory of evolution would have to account too for the evolution of mind and morals.

Readings:

Charles Darwin, *The Descent of Man; and Selection in Relation to Sex*, (London: John Murray, 1871).

Friday 1st April:***The Descent of Man and Selection in Relation to Sex***

In this class we will talk a little more about Darwin’s theory of sexual selection.

Week Twelve:

Monday 4th April:

Herbert Spencer, the very social Darwinist before Darwin?

In this class we will look back at the work of Herbert Spencer. Spencer has become associated with the ideology called “social Darwinism.” An evolutionist before Darwin published *Origin* he had ideas that were similar in some senses, but vastly different in others. The views of the two men have often been uncritically conflated.

Wednesday 6th April:

The Politics of Evolution: Huxley and Kropotkin

Evolution was taken to have political as well as theological implications. Huxley, as we know, welcomed Darwin’s work as “a Whitworth Gun in the armoury of liberalism”, and he continued to argue that evolution endorsed liberal views throughout his life. Significantly, in 1888 he wrote an article in the periodical *Nineteenth Century* entitled “The Struggle for Existence in Human Society” in which he described nature – and human nature – as being governed by the same rules and passions as governed the gladiators arena.

Reading:

Thomas Henry Huxley, “The Struggle for Existence in Human Society”, Originally Published in *Nineteenth Century*, p.195-200, 202-206.

Friday 8th April:

In drawing this conclusion he drew the ire of Peter Kropotkin (1842-1921), a Russian Geographer who was then living in exile in London. Kropotkin was moved to respond, arguing that Huxley had grossly misrepresented Darwin’s work. At least as important for evolution as competition, he argued, was mutual aid. Kropotkin went on to write a number of articles expanding on his point over the next twenty years which were collected in *Mutual Aid* (1902) and *Ethics* (1921). In stressing cooperation over competition, Kropotkin recognised his own anarchist-communist political views in nature. His work which not only naturalised cooperation, but also rejected Malthusianism, was particularly influential in the British socialist movement.

Reading:

Peter Kropotkin, “Mutual Aid Among Animals”, *Nineteenth Century*, 1890, reprinted as Chapter One of *Mutual Aid, A Factor in Evolution*. London: Freedom Press, 1986, pp.21-7, 41-2, 48, 56, 58-9, 62-6, 70-3.

Week Thirteen:

Monday 11th April:

August Weismann, E. Ray Lankester and Evolutionary Degeneration and neo-Darwinism

In this class we will discuss two important developments in thinking about evolution: the idea of evolutionary degeneration, and neo-Darwinism. The former was publicised by Edwin Ray Lankester in his *Degeneration: A Chapter in Darwinism* (1880), the latter by the German cell biologist August Weismann. In the early 1880s Weismann (1834-1914), largely through experiments in which he cut the tails off of successive generations of mice, came to the conclusion that “acquired characters” simply were not inherited, thus significantly undermining the theory of Neo-Lamarckism. Weismann suggested that there were two types of cells in the human body – the somatic cells of the body, that could be altered in the course of our lives, and the germ cells, that contained the essence of life that would be passed on to form the next generation. This latter, he argued, were not influenced by “acquired characters”.

Reading:

H.G. Wells, *Time Machine* (London, 1895)

Wednesday 13th April:***Of Mice and Men: August Weismann, H.G. Wells, Science, and Socialism.***

In the mid-1880s Herbert George Wells (1866-1946) was a young science student with a passion for zoology. Significantly he studied under Huxley and Lankester. Huxley by this time was an established figure at what was shortly to become the Royal College of Science – a sure sign of how much society had changed in just twenty years. Wells was deeply impressed with Huxley's Malthusian biology, and although he went on to become a famous author and socialist, after graduating he worked briefly as a science teacher (writing his 1893 *Textbook of Biology*, the first biology textbook in the English Language), and later, as a science journalist. Although first introduced to Weismann's work as a student, it was through his science journalism that Wells really engaged with Weismann's theory of heredity. Wells, like many of his (and our own) contemporaries, saw profound social implications in biology, and Weismann – coupled with the Malthusianism he had learnt from Huxley – radically influenced his views about socialism. Although credited with founding the genre of "science fiction", Wells rejected this accolade, arguing that his books were "fantasies of possibility", and he explored many of these themes in his fictional works, notably *Time Machine* (1895)

Reading:

H.G. Wells, *Time Machine* (London, 1895)

Friday 15th April:***The Time Machine***

As you might imagine, the issues raised by Darwinian evolution made a big impact upon contemporary culture—and fiction was no exception. In this class we will look at H.G. Wells' Science fiction classic *Time Machine* (1895).

Reading:

H.G. Wells, *Time Machine* (London, 1895)

Week Fourteen:**Monday 18th April:*****Continuous or Discontinuous Evolution? The meaning of Mendel's peas.***

Hugo de Vries (1848-1935), a Dutch physiologist, was one of three biologists who independently rediscovered the 1865 work of Gregor Mendel on inheritance. At the time, Mendel's work was interpreted as an alternative to Darwinian selection, largely because mutations seemed to suggest that evolution occurred in "jumps", as opposed to Darwin's belief in a uniformitarian gradual and continuous change. William Bateson (1861-1926) was an English biologist and advocate of Mendelism and was the founder of the science of genetics, an advocate of Mendelism as an alternative to Darwinian selection, Bateson was, and remains, an important figure in the history of biology. Darwinian selection was defended by 'biometricians' and field naturalists: In particular, by Francis Galton, Walter Weldon and Karl Pearson.

Reading:

Hugo De Vries. "The Origin of Species by Mutation", *Science*, 1902.

Wednesday 20th April:***Eugenics in England and America:***

Francis Galton (1822-1911) was an anthropologist and pioneer in the study of the intelligence of mankind. He also coined the word "eugenics" to describe the science of racial improvement. Darwin's cousin, Galton was also a respected researcher and held a chair at University College London. In *Hereditary Genius* (1869), a book that impressed Darwin, Galton sought to quantify the hereditary relationship between members of high social position (which he took for a measure of their inherent quality), and their offspring. Charles Benedict Davenport (1866-1944) was an American evolutionary biologist who led the study of genetics and its application to eugenic ends in the United States. In 1902 he founded the Station for Experimental Evolution in Cold Spring Harbor, New York, and in 1910, the Eugenic Record Office to

promote and disseminate eugenic research and employed Harry Laughlin who became one of the most influential figures in the history of eugenics. He was responsible for bringing the infamous case BUCK v BELL that sought legal precedent for the forcible sterilisation of the feeble-minded.

Reading:

Harry H. Laughlin, *Eugenical Sterilization in America* (1926), in Largent, *Evolution*, pp.355-359.
Oliver Wendell Holmes Jr., BUCK v. BELL, Superintendent of State Colony Epileptics and Feeble Minded, Argued April 22, 1927, Decided May 2, 1927, in Largent, *Evolution*, pp.363-4.

Friday 22nd April:

Evolution in the Class Room: The Scopes Monkey Trial

In the early 1920s, several southern states passed legislation prohibiting the teaching of evolution in public schools, the Tennessee law declaring that it was a crime to teach that “man had descended from lower animals.” In a challenge to the constitutionality of these legislations the American Civil Liberties Union instigated the famous Scopes Trial in Dayton, Tennessee in 1925. The trial made national news, not least because of the celebrity advocates for each side, William Jennings Bryan for the State and Clarence Darrow who defended Scopes. Immortalised in the public mind through the televised play *Inherit the Wind*, the trial – and its consequences – have been somewhat misrepresented.

Reading:

The Butler Act, The State of Tennessee, [1925], in Largent, *Evolution*, p.375.

Week Fifteen:

Monday 25th April:

Theoretical population genetics and the Modern synthesis.

The 1930s saw important advances in theoretical biology the significance of which was a long time in being fully appreciated. J.B.S. Haldane, and Ronald Fisher in Britain, and Sewall Wright in the United States recognised that it was possible to make sense of the flow of changes in gene frequency in a population in terms of natural selection, reconciling the field. – At least in theory. The mathematics involved was beyond the majority of practicing biology, and what became known as the Modern Evolutionary Synthesis had to wait until the work of Theodosius Dobzhansky and others in the late 1930s and early 1940s. Evidence in the field, on the eve of the centenary of the publication of *Origin*, confirmed the theory.

Reading:

H.B.D. Kettlewell, "Darwin's Missing Evidence".

Peter Bowler. 2001. “The History of Evolutionary Ideas: The Modern Synthesis”, *Encyclopedia of the Life Sciences*, www.els.com, pp.1-5.

Wednesday 27th April:

The Narrow Road to Gene-land and the “Altruism Equation”:

Since the publication of *origin* there had been debate about two related things. First, what was the “unit of selection”, was it the individual, the group, or the species that was selected? The implications of this were significant for the second question: that of the apparent existence of altruism in nature. If selection worked purely on an individual, then how could it possibly have resulted in the altruism and mutual aid that people observed in nature? Critics of group selection, however, argued that it was a woolly concept that had fatal problems of its own. The work of William Hamilton showed that apparently “altruistic” behaviour could be explained as a result of what came to be called “kin selection.” Individuals that acted in a way that increased the survival chances of their own close relatives (who carried some of the same genes as themselves) would thus in effect be acting to preserve copies of their own genes. This idea was to be popularised by Richard Dawkins in his 1976 work *The Selfish Gene*.

Reading:

W.D. Hamilton, “The Evolution of Altruistic Behaviour,” *American Naturalist*, Vol. 97, no.896, (1963):354-6.

Friday 29th April:

Selfish Genes, Deceit and Self Deception

Darwin acknowledged that deception would evolve as a survival strategy in the natural world in the sense that organisms would evolve mimicry—either for defence or camouflage. Dawkins suggested that deceit in terms of lying might also be explained as an evolved adaptive characteristic. Robert Trivers took this one stage further to suggest that so too self-deception might be an adaptive trait—this has implications for thinking about the sort of creatures we have evolved to become.

Reading:

Richard Dawkins, *The Selfish Gene*, (London, 1976).

Robert Trivers, *Social Evolution*, (Menlo Park: Benjamin Cummings, 1985).

Week Sixteen:

Monday 2nd May:

Creationism and Intelligent Design: On Teaching the ‘Debate’?

The Scopes Trial was clearly not the end of Creationist attempts to prohibit the teaching of evolution in American classrooms, or indeed, to gain equal time for what they termed “Creation Science” – the argument that there is scientific evidence for the Divine Creation – as an alternative to the scientific evidence for evolution. Indeed both Arkansas and Louisiana passed legislation to this effect in the late 1970s. Following the ruling of Judge Overton in January 1982 that the teaching of Creation Science alongside evolutionary explanations of the development of life on earth is unconstitutional, an appeal to the U.S. Supreme Court was made on behalf of the State of Louisiana. This in turn resulted in the 1987 case *Edwards vs. Aguillard* – in which the unconstitutionality of teaching Creation Science in public schools was upheld. More recently Creationism re-emerged in the form of “Intelligent Design” – a similar set of claims, but in which there is no *explicit* reference to a Christian God as the designer. However, in Pennsylvania in 2005, in the case of *Kitzmiller vs Dover Area School District*, Judge Jones also ruled the teaching of “Intelligent Design” unconstitutional. – As more recent history has shown, however, this has not been the end of the matter

Reading:

Extract from *Kitzmiller vs. Dover School Area District*, filed December 20th 2005.

Wednesday 4th May:

A two-pronged attack: social Darwinism revisited.

In the face of difficulties in getting Christianity into the science classroom over the last few years there have been attempts to associate evolutionary ideas with racist politics. In this class we will consider the historical record in order to evaluate this sort of political manoeuvring.

Friday 6th May:

Exam review session.

Final Exam: Friday 13th May.

Tips on Effective Essay Writing

Since writing an effective essay is not a straightforward task, and improving your essay technique is one of the most important skills you will learn during any class, here are some initial suggestions. First write some general notes on what you already know about the subject of your essay, outlining the most striking points. Think why these points are so important, and what they entail for the particular methodological or ethical approach with which you are concerned. Then turn to the notes you have taken during class and to the set readings themselves—as well as any further background readings you may have identified through bibliographic surveys or other relevant classes. Continually re-examine your list of striking features and the organisational structure you have imposed upon them, and think how these materials might help you to articulate your analysis more clearly. When you are ready, sketch an outline of your argument, and then write your first draft. Make sure that to the best of your knowledge there are no logical gaps in your argument. If you can identify some, go back to the literature to see if you can close them. This second look at the literature (and your reading notes) is important. Once you have constructed a hypothesis, you will be able to test it against the arguments of the various authors, and to find those who support your case, and those who are your opponents. (note: having your own hypothesis is the point at which the essay truly becomes your own contribution to the debate). You are then ready to proceed to the second phase.

Writing multiple drafts is really the only way to produce a good essay, especially if you can gain some distance from early drafts, for example, by reading them aloud to yourself, your friends, or having someone else read them to you. This is how professional academics work, and so you should try to do so too. You are encouraged to exchange your essays with one another and discuss your work with your colleagues as the course progresses. You should be aware that essays written the night before they are due invariably read like they were written the night before they were due, and as a result often appear ill-considered, disorganised, and incoherent. You should aim to manage your time to allow for *at least* two drafts and revisions. This will pay significant dividends in terms of the quality of your submitted work, and correspondingly, with the grade you can expect. Your tutor will be happy to discuss early drafts of your work, as will staff at the writing centre.

What makes a good essay

Introduction and argument: A good essay does not simply summarise the argument of the text(s) under examination. It also involves you constructing a coherent narrative about how those texts relate to a broader argument of your own. So, a good essay might start off with a short introduction to the particular element of the topic that you discuss. This might be followed with a similarly brief account of what you intend to say and how you intend to convince the reader of your argument, which brings us to the importance of clear organisation.

Argument and organisation: A good essay should not simply be a list of points about the subject under examination, all arranged in a haphazard manner. It should instead take the reader step by step through the argument so that they will end up seeing the logical progression of your narrative, even if they might not agree with your conclusions. This means that after a good introduction, each subsequent paragraph should introduce one particular idea about the episode and finish with a statement that prepares the reader for the next paragraph and its particular idea. These paragraphs should be arranged in a logical sequence that takes the reader from the introduction to the conclusion, which means, of course, that the paragraphs should not contradict each other. A good organisation of these steps then depends critically on a very clear

understanding of your essays' aims and objectives. A clear understanding of your readers' likely assumptions is equally important to avoid their misunderstanding any part of your argument. Think of it as a chess game, and so always try to put yourself in your readers' shoes! Do not annoy them unnecessarily by forcing them to ask 'where is this essay going?'

Evidence: A good essay should not only be a logical argument, but it should have the aim of convincing your reader of your point of view. To this end each point of the argument should be backed by evidence from the literature you have consulted, as is appropriate to the specific point being made. Importantly, direct quotes or paraphrases of the text or other literature should be carefully referenced, in footnotes and in a full bibliography of all works cited.

Reference:

Please use Chicago style of referencing. For more information see:

http://www.chicagomanualofstyle.org/tools_citationguide.html

Accurate referencing is not simply a matter of avoiding any accusation of plagiarism, but also of leaving open the possibility for your readers to explore the point you make in greater detail than is appropriate to the argument of your essay. It is perhaps needless to say, but you must always take care that your quotations or references support your point and this may sometimes mean that you will have to explain how this is the case.

Style: A good essay should be written well, attentive to syntax, grammar and spelling. This is not because your reader is pedantic, but because good syntax and grammar helps clarify your argument. You should avoid the passive void, such as "it was said that..." Instead use the active statement 'so-and-so said that...', —by doing so you are providing the reader with much more possibly important information and certainly raises new questions,—who is the author? What are their credentials? Where did they write it, and when? Was what they said accepted or controversial? — As you can see, the active voice is a lot more useful for an historian.

GRADING PRACTICES AND STANDARDS

Percent	Letter Grade
90-100	A exceptional
87-89	B+ competent
84-86	B competent
80-83	B- competent
77-79	C+ adequate
74-76	C adequate
70-73	C- borderline
67-69	D+ inadequate
64-66	D inadequate
60-63	D- inadequate
00-59	F unacceptable

The following guidelines offer a characterisation of the type of work that might be associated with various ranges of grades. The intent here is to encourage general consistency across faculty and Graduate Teaching Assistants, and to give a guide to what is required in academic writing rather than to provide precise specifications.

90% to 100% (A)

“A” grade work is *exceptional*, showing strong evidence of original thinking and good organisation. The student will have shown a capacity to analyse and synthesize information, as well as a superior grasp of the subject matter in hand and an ability to make sound critical evaluations based upon an extensive knowledge base. Work of this standard should be well argued, well documented, and well written.

80% to 89% (B- to B+)

Work of this grade is *competent*, showing evidence of a reasonable-to-solid grasp of the subject matter. It should also show evidence of critical and analytical thinking. The work should also indicate a familiarity with the literature. It should be clearly written, accurate and coherent, including major points from the course material and an appreciation of their importance.

70% to 79% (C- to C+)

Work of this grade is of *adequate* performance, showing a fair understanding of the subject matter and an ability to develop solutions to simple problems in the material. It may include some errors and slight misconceptions, but should be indicative of a reasonable engagement with the course material. An acceptable although uninspired piece of work, it should not contain serious errors, but may lack style and vigour in its articulation.

60% to 69% (D- to D+)

Work of this grade is *adequate, but poor*. Poorly articulated and lacking in a coherent argument it may also lack sufficient documentation. Although it may provide some relevant information, it omits many important points and contains a number of substantial errors or misconceptions.

00% to 59% (F) Inadequate.

Work of this standard is *inadequate*, showing little or no understanding of the subject matter. Exhibiting little evidence of critical and analytic skills, this work contains only a limited or irrelevant use of the literature. Poorly articulated it is likely to lack coherence and be difficult to comprehend. Work of this grade is not of degree standard.



NOTES

