

HISTORY OF SCIENCE 343: THE DARWINIAN REVOLUTION
Spring 2003

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The publication of Charles Darwin's famous book, On the Origin of Species, has often been viewed as a pivotal event in both the history of biology and the broader history of civilization. This course explores the validity of the claim of a Darwinian "revolution," examining the state of evolutionary thought before and after Darwin's famous publication. We will follow two chief aspects of evolutionary theory: its scientific twists and turns, and its significance as a broader cultural way of thought, with both religious and sociopolitical implications. At the border between these two realms lies the subject of human evolution, which will form a third distinct theme in the course. Coverage will include range across Britain, Europe and America, and across audiences from elite scientists to the broader reading public. While concentrating mainly on the nineteenth century, the course will also take the story forward through the "Modern Synthesis" of evolution and genetics in the 1940s and up into the late twentieth century.

There are three required texts:

1. Darwin, On Evolution (edited by Thomas F. Glick and David Kohn). For sale at Canterbury Books, 315 West Gorham.
2. Peter J. Bowler, Evolution: The History of an Idea, 3ed (photocopied page proofs) (\$22)
3. Course reader of photocopied materials (\$22)

Both photocopied works are for sale at the Dept. of the History of Science. Pay by check or cash (exact change appreciated.)

Graduate Student Course Requirements:

Grades will be based on a combination of discussion of readings (40%) and writing (60%).

Readings: There will be occasional additions to the undergraduate readings, including James Secord's Victorian Sensation and Janet Browne's book Charles Darwin: A Biography, Volume II. Shorter additional graduate readings will be made available a week in advance in the seminar room for photocopying. Graduate students are NOT expected to do reading responses, though you may want to think about the questions posed in them.

Writing: Graduate students will produce a minimum of 20-25 pages of scholarly prose, in a form appropriate to your stage in grad school and your interest in the material. This could be a research paper, a series of book reviews, an historiographic essay, or some other form that we agree upon. Book reviews are due the week the book in question is relevant to the discussion.

Undergraduate Course Requirements:

Each of the three units will be tested separately with a take-home essay of 4-5 pages (1000-1500 words, word-processed, to be handed in in hard copy); each essay is worth 25% of your total grade. (See grading policies and scale below.)

Class participation (25%): attendance, participation in discussion, ten short written reading responses (see below under "Note: Readings").

Honors Credit: In addition to the normal requirements, you will write a paper of approximately 9-12 pages engaging closely with at least one primary source text and placing it in historical context. Each component of your final grade, including this one, will then be 20% of the total.

NOTE: Readings are an essential part of this course. They are designed to complement the lectures, not duplicate them. They are also the basis for in-depth discussions each week (on which your class participation grade depends). To be fully prepared for your discussion section, you need to do more than just pass your eyes over all the assigned readings beforehand. You should think about them and consider how they relate to each other and to the lectures. Each week, I will provide a focus question or set of questions for you to think about as you read. For 10 of the discussions you are required to hand in a one-page reading response (word-processed is strongly preferred) that either responds to one of the questions or presents your own reactions to the readings. Responses are due in class on Friday each week; late responses are not accepted. You can pick any ten weeks you want. Any additional reading responses can be counted as extra credit for your class participation grade.

Important Dates:

Essay 1 due Monday, March 3, IN CLASS

Essay 2 due Monday, April 14, IN CLASS

Essay 3 due Monday, May 12, by 3 pm (the officially scheduled exam time is Sunday 5/11 at 7:25 pm, but I think an extra day is in order.) Late final essays will not be accepted.

Academic Performance and Accommodation:

Take-home essays: The essay questions ask you to think synthetically, drawing material from different weeks together into a unified picture. Every essay you write should take the form of an argument supporting a thesis. Since all essays are open-book, grading will NOT depend solely or even primarily on the correctness of the facts marshaled for your argument; this correctness is assumed as a base-point. Rather, much of your grade will be based on the persuasive power, sophistication, originality, and succinctness of your argument. (More on this during the course.)

Extensions are only granted if requested before the due date, and only in case of illness or other serious emergency. All extensions will have a definite new due date established. Papers received

after the new due date will be subject to late paper penalties.

Late paper policy: any piece of writing that you hand in late without an extension will have the following penalties assessed: a quarter of a grade for every working day late. For example, if the paper on its merits deserves a B, after one day it would receive a B/BC, after two days a BC, after three a BC/C, after four a C. NOTE: LATE FINAL ESSAYS (due May 13) WILL NOT BE ACCEPTED.

Plagiarism: plagiarism is grounds for failure on the assignment plagiarized (take-home exam or paper). If you use 3 or more words in a row from another source, it must be placed in quotation marks and footnoted. Otherwise, it is plagiarism. For more details on what plagiarism is and how to avoid it, consult a style manual or the Writing Lab.

Appealing a Grade: If you have questions about a grade, come speak to me. If the problem is not resolved, speak with the Undergraduate Chair, Prof. Michael Shank. He will attempt to resolve the issue informally and inform you of the Appeals Procedures if no resolution is reached informally.

Access and Accommodation: I will make every effort to honor requests for reasonable accommodations made by individuals with disabilities. (If you think you qualify for accommodation, please contact the McBurney Disability Resource Center [263-2741; <http://jumpgate.acadsvcs.wisc.edu/~mcburney/>] to establish your eligibility for services.) Requests for accommodation can be responded to more effectively if I receive them as far in advance as possible, preferably at the beginning of the semester. Such requests are confidential.

Religious Observance: If religious holidays or observances conflict with your participation in this course, please come talk to me **well in advance** for us to work out alternative arrangements. If any other problems arise, either academic or personal, which might jeopardize your performance in the course, you must try to inform me after class or by the soonest available office hour, by email (lknyhart@facstaff.wisc.edu), or by leaving a message with the History of Science department administrator (262-1406).

See also Grading Scale, appended to the last page of this syllabus.

Lectures and Readings, Week by Week

abbreviations: CR=Course Reader; GS=Graduate Students

Unit I. Ordering Nature, 1750-1845

Week 1: Setting the scene

1/22: Introduction: Evolution and the Western Tradition

1/24: *Discussion: How do we think about evolution? How might we think about it? What do our reflections on evolution tell us about our ideas about the place of humans in nature?*

Reading: Bowler, pp. 1-17, 24-26

Holy Bible, Genesis 1-7 (CR 1-6)

GS: all of Bowler Ch. 1

Week 2: Classification and the Progressive Order of Nature

1/27: The Problem of Classification

Reading: Bowler 48-50, 66-71

1/29: Classification and Progress

Reading: Bowler 62-66, 75-80, 84-95

J.B. Lamarck, Zoological Philosophy (1809), trans. Hugh Elliot (Chicago: Univ. of Chicago Press, 1984) pp. 19-34, 56-67, 106-133, 169-180 (CR 7-42)

1/31: *Discussion: How does Lamarck's evolutionism relate to the problem of classification?*

Week 3: The Historical Order of Nature

2/3: The Ordered World of Georges Cuvier

Reading: Bowler, 108-111

Toby Appel, The Cuvier-Geoffroy Debate (New York: Oxford University Press, 1987), 11-19, 34-39, 246-248, 251-252 (CR 43-54)

Georges Cuvier, The Animal Kingdom Arranged in Conformity With Its Organization (orig. French publ. 1817; English translation New York: Carvill, 1833), "Introduction," pp. 9-19, 32-36 (CR 55-64)

2/5: Fossils and Progress

Reading: Bowler, 111-120

Georges Cuvier, selections from the "Preliminary Discourse" to The Revolutions of the Globe (1812), in Georges Cuvier, Fossil Bones, and Geological Catastrophes. New Translations & Interpretations of the Primary Texts, ed. and transl. Martin J. S. Rudwick (Chicago: U. of Chicago Press, 1997), pp. 186-207, 216-234, 239, 248-252 (CR 65-90)

2/7: *Discussion: How does Cuvier's paleontology connect with his view of the order of nature?*

Week 4: Morphology in France and Germany

2/10: "Philosophical Anatomy" in France

Reading: Appel, Cuvier-Geoffroy Debate, 68-104, 258-265 (CR 91-116)

2/12: Idealistic Biology in Germany

Reading: Bowler, 100-102

Stephen Jay Gould, Ontogeny and Phylogeny (Cambridge: Harvard University Press, 1977), pp. 35-45 (CR 117-124)

Karl Ernst von Baer, "Fragments relating to philosophical zoology," (orig. 1828) trans. T. H. Huxley, in Henfrey and Huxley, Scientific Memoirs (London: Taylor and Francis, 1853; reprint edition NY; London: Johnson Reprint Corp., 1966), pp. 186-197, 209-215 (CR 125-134)

2/14: Discussion: *What features do early nineteenth-century French and German idealistic biology have in common? How are they different? What is the nature of change over time in each perspective?*

Week 5: The British Context

2/17: Natural History and Natural Theology

Reading: Bowler, 102-106, review 115-120

2/19: Continental Ideas in Britain

Reading: Bowler, 120-129, 134-140

John H. Brooke, "Scientific Thought and its Meaning for Religion: The Impact of French Science on British Natural Theology, 1827-1859," Revue de Synthèse IV. S. No. 1, janvier-mars 1989, pp. 33-59 (CR 135-148)

Robert Chambers, Vestiges of the Natural History of Creation [1844] (reprint ed. New York: Humanities Press, 1969), pp. 191-205, 212-235 (CR 149-168)

2/21: Discussion: *How did the British scientific, social, and religious context shape the reception of continental ideas about evolution and the order of nature?*

GS: James Secord, Victorian Sensation (all).

Receive Unit I essay question Friday, 2/21

Unit II. "Darwinian" Evolution, 1844-1925

Week 6: Darwin's World, 1826-1856

2/24: Generation and Geology: The Roots of Darwin's Approach

Reading: Bowler 129-134, 141-164

Darwin 1-45

2/26: Pigeons and Barnacles: The Development of Darwin's Theory

Reading: Bowler, 164-173

Darwin pp. 46-87 (browse)

2/28: Discussion: *What intellectual and resources did Darwin draw on in developing his theory of evolution?*

GS: Rebecca Stott, "Darwin's Barnacles: Mid-century Victorian Natural History and the Marine Grotesque." In Transactions and Encounters: Science and Culture in the Nineteenth Century, ed. Roger Luckhurst and Josephine McDonagh. Manchester: Manchester Univ. Press, 2002.

Week 7: "Darwinian" Evolution

Unit I Essay due Monday, March 3

3/3: Darwin's and Wallace's Evolutionary Theories

Reading: Bowler, 173-176

Darwin 152-155 (letter to Gray); 335-346 (Wallace's essay)

3/5: The Argument of the *Origin* and the Great Gestalt Shift

Reading: Bowler 177-183

Darwin 156-216 (*Origin* selections)

3/7: Discussion: *How is Darwin's theory similar to and different from Wallace's? Of what did Darwin seek to persuade his readers in the Origin, and how did he go about this?*

GS: Janet Browne, Charles Darwin: A Biography. Vol. 2: The Power of Place, Part I: 3-162

Week 8: The Reception of Darwin's Theory

3/10: The Comparative Reception of Darwin's Theory in Europe

Reading: Bowler, 183-223

3/12: Evolution and Belief I: The Late 19th Century

Reading: Ernst Haeckel, The History of Creation (trans. 1874) (New York: Appleton, 1887), pp. 1-23. (CR 169-182)

Asa Gray, "Darwin and his Reviewers: Natural Selection and Natural Theology" Atlantic Monthly, October 1860, pp. 412-419. Reprinted in Asa Gray, Darwiniana, ed. A. Hunter Dupree (Cambridge: Harvard/Belknap, 1963), pp. 118-123 (CR 183-186)

A. J. Lustig, "Erich Wasmann, Ernst Haeckel, and the Limits of Science," *Theory in Biosciences* 121 (3), Nov. 2002, 252-259 (CR 187-190)

3/14: Discussion: *What did Haeckel, Gray, and Wasmann see as the implications of evolution for Christian belief? What larger issues in the reception of Darwin's theory do these stances reflect?*

GS: Janet Browne, Charles Darwin, vol. 2, Part II: 165-321

SPRING BREAK 3/15-3/23

Week 9: Evolution and Society, 1859-1918

3/24: Type Casting: Evolution, Race, and Class

Reading: Bowler, 211-214, 292-297

Darwin, 240-277

3/26: Evolution and "the Woman Question"

Reading: Bowler, 313-315

Nancy Leys Stepan, "Race and Gender: The Role of Analogy in Science," Isis, 1986, 77: 261-277. (CR 191-200)

3/28: Discussion: *How did Darwin explain differences between the races and sexes? How did his understanding of these differences—and the understanding of other late nineteenth-century scientists—reflect the social situations of the people doing the theorizing? Was this bad science?*

GS: Janet Browne, Charles Darwin, vol. 2, Part III: 325-497

Week 10: The Public Faces of Evolution, 1890-1930

3/31: Museum Tour: Evolutionary Research on Display

Reading: Bowler, 227-234, 274-292

Henry Fairfield Osborn, "The First Steps to Parnassus in Central Asia," Lecture VI

in Man Rises to Parnassus (Princeton, 1928), 187-221 (CR 201-220)

4/2: Evolution and Belief II: Creationism in America

Reading: Bowler, 322-324

Ronald L. Numbers, "The Creationists," in God and Nature: Historical Essays on the Encounter between Christianity and Science, ed. David C. Lindberg and Ronald L. Numbers (University of California Press, 1986), pp. 391-403 (CR 221-227) [note that this is not the entire article; we'll be reading the rest of it at the end of the course.]

William Jennings Bryan, "God and Evolution," New York Times, Feb. 26, 1922 (CR 239-242)

Henry Fairfield Osborn, "Evolution and Religion," New York Times, Mar. 5, 1922 (CR 243-246)

Edward Grant Conklin, "Bryan and Evolution," New York Times, Mar. 5, 1922 (CR 246-248)

Jeffrey Moran, "Reading Race into the Scopes Trial: African Americans, Science, and Fundamentalism," unpublished article manuscript (42 pages) (CR 249-290)

4/4: Discussion: How were issues of race, evolution, and religion intertwined in early twentieth-century America? How did actors' understanding of these relationships reflect their position in society?

****Receive Unit II essay question, Friday, 4/4****

Unit III: "Modern" Evolution

Week 11: The Mechanisms of Evolution

4/7: The Problem of Heredity

Reading: Bowler, 199-202, 251-256

Darwin, 216-239

4/9: The All-Sufficiency of Natural Selection?

Reading: August Weismann, The Germ-Plasm. A Theory of Heredity. Trans. W. Newton Parker and Harriet Rönnefeldt. (New York: Charles Scribner's Sons, 1893), pp. 1-35, 75-77, 392-409. (CR 291-320)

Herbert Spencer, "The Inadequacy of Natural Selection" Contemporary Review, 1893, 63: 159-166, 439-448 (CR321-330)

4/11: Discussion: Why was heredity such an important issue in the debates over natural selection in the late nineteenth century? What underlying differences in approach to science do we see in the debate between Weismann and Spencer?

Week 12: The Modern Synthesis

****Second essay due Monday, April 14****

4/14: Darwinism vs. Mendelism

Reading: Bowler, 224-227, 256-273

4/16: The Modern Synthesis

Reading: Bowler, 325-339

J. Huxley, Evolution: The Modern Synthesis, 13-46 Julian Huxley, Evolution: The

Modern Synthesis (New York: Harper, 1942), pp. 13-46 (CR 331-348)
 Mayr, Ch. 5, "The Systematic Categories and the New Species Concept," pp. 102-122 in idem, Systematics and the Origin of Species (Columbia Univ. Pr., 1942) (CR349-360)

Stephen Jay Gould, The Structure of Evolutionary Theory (Belknap/Harvard, 2002), 503-518 (CR 361-370)

4/18: Discussion: What did the "modern synthesis" synthesize? What did it accept, and what did it reject? Which problems and organisms (and their researchers) were privileged in this process, and which were marginalized?

Week 13: Post-Synthesis Evolution

4/21: Evolutionary Theory in the Wake of the Synthesis (**lecture/discussion: be sure to do the reading for today!**)

Reading: Gould, Structure of Evolutionary Theory, pp. 518-543 (CR370-382)

Discussion question: what do you think of Gould's argument concerning the "hardening" of the synthesis?

4/23: Evolution and Belief III: Evolution as a Belief System

Reading: Bowler, 340-346

Connie Barlow, Evolution Extended: Biological Debates on the Meaning of Life (MIT Press, 1994), pp. 145-179 (CR 383-400)

George Gaylord Simpson, The Meaning of Evolution, revised edition (Yale University Press, 1967) [original 1949], pp. 281-294 (CR 401-408)

4/25: Discussion: Teilhard de Chardin, Julian Huxley, and G. G. Simpson, in different ways, sought to extend evolution from the realm of biology to that of philosophy. How are their approaches similar, how different? Do you think this move (in any of its versions) is legitimate?

Week 14: Sociobiology

4/28: The Origins of Sociobiology

Reading: Bowler, 356-361

E. O. Wilson, Sociobiology: The New Synthesis (Cambridge, Mass.: Belknap Press of the Harvard University Press, 1975), pp. 3-6, 298-313, 554-55 (CR409-430)

4/30: Sociobiology: The Debate

Reading: Richard Lewontin, Steven Rose, and Leon J. Kamin, Chapter 9, "Sociobiology: The Total Synthesis" pp. 233-264 in idem, *Not in Our Genes: Biology, Ideology, and Human Nature* (NY: Pantheon, 1984) (CR431-450)

E.O. Wilson, *Naturalist*, pp. 330-353 (CR451-463)

5/2: Discussion: What was at stake in the sociobiology debate? Why was it so heated?

****Receive final essay question 5/2****

Week 15: Wrap-Up

5/5: Evolution and Modern Values (**lecture/discussion**)

Reading: Bowler, 369-381; Numbers, "The Creationists," 404-415 (CR228-237)

5/7: Taking the Long View

5/9 Discussion: overview/review, questions about final essays

****FINAL ESSAY DUE MONDAY, MAY 12****

GRADING SCALE FOR TAKE-HOME ESSAYS:

- A For outstanding essays only. Thesis and argument are clear, thought-provoking, and based on correctly understood facts; material used to support the argument synthesizes ideas from different parts of the course (readings, lectures, discussions from different weeks); relationships drawn between facts and ideas are sophisticated, subtle, and/or original. Writing is grammatically correct and succinct. The argument flows well from point to point, without any puffery or wasted words.
- AB: For very good essays that for some reason fall short of the criteria listed above. For example, the argument may be murky in one place; information may be presented that doesn't directly or clearly contribute to the argument; writing style may be awkward here and there, or flawed by one or two consistent (if minor) grammatical errors.
- B: Your basic okay grade. The essay may pursue a straightforward but not especially deep or sophisticated argument; it is okay as far as it goes, but doesn't penetrate the material very far. It may have a flash of brilliance that is unfulfilled, counterbalanced by minor grammatical problems, a weakness in argumentation, and/or a significant misunderstanding of events or chronology.
- BC: The essay shows some of the basics of the ideal essay, but is weakened by a lack of serious think-work or writing problems. It may make superficial connections without offering sufficient evidence to make the connections plausible or persuasive, or it may have what is in principle a good argument supported by incorrect facts or chronology. Alternatively, it may provide a fairly solid argument with minor flaws, from which the reader is repeatedly distracted by awkward or ungrammatical prose.
- C: A grade signifying some serious problem in essay-writing. It may deliver facts without a recognizable thesis or argument; it may wander away from the point; or it may be a thoughtful attempt so weakened by writing problems (grammar, punctuation, word choice) that it is difficult for the reader to understand a crucial point you are trying to make.
- D: A marginal grade. There may be enough in here to show you have attended a few lectures and/or done some of the reading, but the essay indicates no effort at synthesis or thinking on your own, or else shows a serious misunderstanding of the nature of the material and/or the assignment. Also used for essays that are just barely coherent.
- F: For unacceptable essays. An essay may be judged unacceptable if it contains plagiarism (see below); if it consists primarily in content inappropriate to the question or the material for this course; if it shows a complete misunderstanding of the course content; or if the writing fails to meet standard college-level requirements of basic communication in English.

The A-F system translates on your transcripts into a 4-point scale, where A = 4, AB = 3.5, B = 3, BC = 2.5, C = 2, D = 1, and F = 0. On any given assignment, you may receive a grade that is different from one of these, reflecting a penumbra around each grade (e.g., the "B" grade might range between 2.76 and 3.25). Thus you can tell if your paper is at the high, middle, or low end of the grade range for any given assignment.

Plagiarism: plagiarism is a serious breach of academic integrity and may be grounds for failure on the assignment plagiarized (take-home exam or paper). If you use 3 or more words in a row from another source, it must be placed in quotation marks and footnoted. Otherwise, it is plagiarism. For more on what constitutes plagiarism and how to avoid it, see the UW Writing Center's handout "Quoting, Paraphrasing, and Acknowledging Sources" (online at: <http://www.wisc.edu/students/plagiarism.pdf>). It would also be wise to review the UW's student guide on academic misconduct (at: <http://www.wisc.edu/students/amsum.htm>).

