

History of Science 343: The Darwinian Revolution, Spring 2020
University of Wisconsin – Madison
TR 9:30-10:45 Education L159 (face-to-face)

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Office Hours: Tues 11-12, 1:30-2:30
and by appointment
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Darwin's name is associated with one of the great developments in modern science: evolution. But he was not the first evolutionist, and a number of evolutionary theorists think we are currently in a new intellectual revolution surrounding evolution. So what does it mean, now, to talk about the “Darwinian revolution”? In this course we ask, How was Darwin’s achievement made? And is it now being unmade? In asking these questions, we will follow two chief aspects of evolutionary thinking: its scientific twists and turns, and its broader cultural significance, as it appeared in religious and sociopolitical realms.

Level: Advanced
Breadth: Humanities
Prerequisites: None
L&S Credit Type: C
Honors-optional (%)

Learning Outcomes: In successfully completing this course,

Undergraduates will:

- Identify the main features of Darwin’s own theory and its similarities and differences from evolutionary theories before and since, based on primary historical sources;
- Summarize, compare, and contrast leading social and religious issues involved in the reception of Darwin’s theory in different settings, based mainly on secondary historical sources;
- Identify the differences between primary sources and secondary sources in the history of science, and use them appropriately in analyzing historical questions;
- Practice accuracy in temporal succession through making timelines;
- Locate and summarize primary sources using standard historical methods;
- Present a persuasive argument using evidence and analysis to explain change over time in the history of evolutionary thought.

Honors undergraduates will develop and exercise these skills further through

- A primary-source based research paper of 8-11 pages plus bibliography.
- A presentation to the class on their research.

Graduate students will:

- Extract and analytically summarize arguments from secondary source books in the history of evolutionary theory;
- Develop an original historical argument based on primary sources and using secondary sources to construct a framework.
- Practice class leadership by running a discussion and presenting on their research.

Readings:

David Quammen, *The Tangled Tree: A Radical New History of Life* (New York: Simon & Schuster, 2018; paperback reprint 2019)

Charles Darwin, *Evolutionary Writings*, edited by James A. Secord (New York: Oxford, 2010).

All other readings will be in a course reader, with the first few classes' readings posted on Canvas.

A copy of all readings will be available on 3-hour reserve at College Library.

Course Requirements and Expectations:

This 3-credit course has 3 hours of group meetings per week (each class meeting counts as 1.5 hours according to UW-Madison's credit hour policy). The course also carries the expectation that you will spend an average of at least 2 hours outside of class for every hour in the classroom. In other words, in addition to class time, plan to allot an average of at least 6 hours per week for reading, writing, preparing for discussions for this class.

Undergraduate requirements:

20% Class participation: read the assigned readings; post a minimum of 10 discussion-starters (150-200 words) on the reading for class sessions (about 1 per week, due by 7 a.m. the day of class in order to receive credit); active listening and intelligent discussing in class.

5% Timelining (throughout the course; checked on **March 24** and **April 21**.)

15% Part I essay (1200-1500 words), due **Tuesday, Feb. 18 by 7 a.m.**

20% Part II essay (1200-1500 words), due **Sunday, March 29 by 11:59 p.m.**

20% Mini-Research Project (Part III):

A. On your assigned date between March 31 and April 16, upload primary source (found from Quammen) and 1-page written content summary in your own words of primary source. Uploads due in Canvas **by 7 a.m. of assigned class day**. Ungraded, but if you don't do this you will lose half the points for the project.

B. 10 min. oral report in your assigned class summarizing and explaining the significance of this primary source for the context of that day's discussion. Oral report is 25% of overall project grade.

C. Paper (approx. 1200 words) situating a primary source derived from Quammen in historical context. What makes this primary source significant in the history of evolutionary thought? Draft for workshopping due **April 23** in class (bring 3 copies).

Final version due **April 28** by 7 a.m.

20% Final Reflective Essay (1200-1500 words), due **May 5 by 2:30 pm**): How should we think of the situation in evolutionary biology that has developed in the past 50 years in relation to the "Darwinian revolution" that preceded it? Are we in another revolution now? Are we "extending" Darwinian evolution? Is this as profound a revolution as the previous one? More profound? Less? Is "revolution" even the right term? Use evidence from this course to support your argument.

All papers are to be submitted to Canvas (course 180028) by the deadline.

Honors papers are due on **April 28** by 7 a.m. Instead of a mini-research project, honors students will develop part C of the mini-research project into an 8-11 page research paper with a more extensive bibliography of primary and secondary sources. The overall grade for the research

project will be 35% of the final course grade, with 5% taken away from each of class participation, Essay II, and the final reflective essay.

Grad requirements:

50% class participation, including weekly postings and timelining like undergrads, and a separate 1-hour discussion approximately every other week on a separate reading list (time TBA). Grad students will be asked to run a class (or part of a class) as part of their class participation grade.

50% 20-25 page research paper on an approved topic of your choice. Grads are not required to write the undergrad essays. They will present their research in class on April 28.

Grading: Assignments in this course are graded on a 4-point scale:

A = 3.67-4.0

AB = 3.34-3.66

B = 2.76-3.33

BC = 2.26-2.75

C = 1.6-2.25

D = 1-1.6

F = below 1.0.

The number grade tells you if your paper is at the high, middle, or low end of the grade range for any given assignment. Final grades will be tabulated from these ranges. See Grading Criteria on final page of this syllabus for more details on essay expectations. I will not be using the Canvas online Gradebook.

It is the University of Wisconsin's expectation (and mine) that you will know, understand, and abide by principles of **academic honesty and integrity**. Please review the Academic Guidelines and Expectations on page 9 of this syllabus for more details.

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 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, or by email (lknyhart@wisc.edu).

DETAILED COURSE SCHEDULE

T 1/21: Course Introduction: Getting to Know Each Other

What do you find interesting about evolution? What do you know about its history?

R 1/23: Revolutions in Evolution

Discussion questions: What do we mean when we talk about “the Darwinian Revolution”? (Ruse). What “surprises” have begun to change how we think about evolution, according to Quammen?

Reading:

Michael Ruse, “The Darwinian Revolution: Rethinking Its Meaning and Significance,” *PNAS* June 16, 2009, 106, Supplement 1: 10040-10047

David Quammen, *The Tangled Tree*, “Three Surprises: An Introduction,” ix-xvi. [book for purchase; not in reader]

Part I: The Emergence of Evolutionary Ideas, 1750-1859

Analytic Focus: Situating the origin and tracing the chronological intellectual development of Darwin’s theory.

Skills focus: close reading of primary sources for argument (including their structure); using secondary sources to offer context. Simple timeline construction.

T 1/28: How Is Nature Organized? Ideas ca. 1800.

Discussion questions: How did people living in the early nineteenth century think nature organized itself? What supported their beliefs that nature was organized at all? How did the new concept of extinction disrupt their ideas? Why did people such as Jefferson resist the idea of extinction, and with what arguments did they do so? On what grounds did Cuvier argue that extinction was part of nature’s order?

Reading:

Mark Barrow, *Nature’s Ghosts: Confronting Extinction from the Age of Jefferson to the Age of Ecology* (Chicago: University of Chicago Press, 2009), 15-46, 364-371.

Georges Cuvier, *Georges Cuvier, Fossil Bones, and Geological Catastrophes*, edited and translated by Martin J. S. Rudwick (Chicago: University of Chicago Press, 1997), 13-24.

Quammen, *Tangled Tree*, 10-16.

R 1/30: Lamarck’s Transformism

Discussion questions: What has been Lamarck’s reputation in the history of science? What were key features of Lamarck’s transformism? What was his vision of the order of nature? Be sure to read carefully through the “Analytical Table of Contents” as well as the later text so you can see the overall structure of his argument.

Reading:

Quammen, *Tangled Tree*, 17-20

Pietro Corsi, “Jean-Baptiste Lamarck: From Myth to History,” 9-18 in *Transformations of Lamarckism: From Subtle Fluids to Molecular Biology*, edited by Snait B. Gissis and Eva Jablonka (Cambridge: MIT Press, 2011), 9-18.

Jean Baptiste Pierre Antoine de Monet de Lamarck, *Zoological Philosophy*, trans. Hugh Elliot (New York: The Macmillan Company, 1914), Analytical Table of Contents (vii-xiv), 123-134.

T 2/4: Darwin's Public and Secret Sciences

*Discussion questions: What did Darwin include in his natural history writing, and when? Compare the 1839 and 1845 passages from his **Journal of Researches**. Read Quammen and Secord's Intro for clues to what might have changed.*

Reading:

Darwin, *Evolutionary Writings*, edited by James A. Secord [book for purchase or available on reserve]: Secord, "Introduction," **vii-xx**; Charles Darwin, *Journal of Researches* (1845) excerpts. Start at "At Port St. Julian" on pp. **11-19** (bottom), p. **22** (Dec. 25) -**39** (end of chapter), **44-47**. Charles Darwin, *Journal of Researches*, first edition (1839), selected passages. (In course reader.) Quammen, *Tangled Tree*, 3-9, 21-28.

R 2/6: *Origin of Species* 1: Natural Selection

In his first four chapters, Darwin sets up and introduces his theory of natural selection. How does he prepare the reader to be persuaded of its validity?

Reading:

Quammen, *Tangled Tree*, 29-34.

Secord, Intro, xx-xxiii; Charles Darwin, *On the Origin of Species*, 106-126, 132-151, 157-173.

T 2/11: *Origin of Species* 2: Evolution

*What sorts of **evidence** does Darwin bring to bear in favor of his theory? What does he set up as the alternative against which he is arguing?*

Reading: Darwin (in Secord, ed.) *Origin*, 179-211.

R 2/13: Responses to *Origin*

As soon as Darwin's book left his hands, his theory was out of his control. What did his readers think about it? What were the grounds of their objections? Of their praise? What responses did you find especially interesting?

Reading:

Reviews and responses to Darwin's *Origin*, in Secord, *Evolutionary Writings*, 212-230.

"Adam Sedgwick (1785-1873)" in David Hull, *Darwin and His Critics* (Chicago: University of Chicago Press, 1983), 155-170.

Alfred Russel Wallace, "Limits of Natural Selection in Human Evolution" (1869), excerpted in *The Alfred Russel Wallace Reader*, edited by Jane R. Camerini (Baltimore: Johns Hopkins University Press, 2002), 160-163.

T 2/18: Special Class at Memorial Library Special Collections, 9th Floor Memorial Library

Come see our first edition of Darwin's *Origin of Species* and other treasures!

First Essay due by 7 a.m.

Part II: Darwinism Evolving, 1860-1970

*Analytic Focus: Development of evolutionary theory after **Origin**; comparative reception of Darwinism in Britain, Germany, and the U.S., especially in relation to religious beliefs and cultural norms.*

Skills Focus: In addition to close reading skills developed in Part I, reading secondary sources for historical arguments and comparisons. Comparative timeline construction across countries.

R 2/23: Darwin on Human Descent and Sexual Selection

Discussion Questions: What features of evolution does Darwin's theory of sexual selection explain? How is sexual selection tied to race, in his theory? How should we understand Darwin's attitudes toward race and gender? Did he do "bad" science?

Reading:

Darwin, *Descent of Man*, Part I, 233-247, 251-258, 273-288; *Descent of Man*, Part II, 299-313, in Secord, ed.

T 2/25: Ernst Haeckel and German Darwinism

How was German Darwinism different from the original? To what extent do Quammen and Levit et al. attribute this to the ideas of Ernst Haeckel and his forceful personality? What broader aspects of the history of German biology and culture are also relevant, according to these historians? What do you think?

Reading:

Quammen, *Tangled Tree*, 165-184

Georgy S. Levit, Uwe Hossfeld, and Lennart Olsson, "The Darwinian Revolution in Germany: From Evolutionary Morphology to the Modern Synthesis," *Endeavour*, 2014, 38: 268-279. **Read only 268-272 (top)** for now.

R 2/27: Haeckel's Monism

What was "evolutionary monism," as propounded by Haeckel? Note and assess your own reaction to this "confession of faith of a man of science."

Reading:

Ernst Haeckel, *Monism as Connecting Religion and Science: The Confession of Faith of a Man of Science*. Translated by J. Gilchrist (London: Adam and Charles Black, 1894); digitally reproduced by Lee Dawei, Thomas Berger and Distributed Proofreaders; adapted/checked by Lynn Nyhart. 39 pages. Please note: Haeckel wrote very interesting endnotes to this essay, which are signaled by bracketed numbers in the text (e.g., [1]). The endnotes begin on p. 29 of the text. Be sure to read them!

T 3/3: Darwinism in the U.S. 1: The Scientists

What are the main characteristics of the response to Darwin's theory in the U.S., as described by Largent? What similarities and differences do they bear to the British responses? How could Asa Gray claim that natural selection was "not inconsistent" with natural theology?

Reading:

Mark A. Largent, "Darwinism in the United States, 1859--1930." In M. Ruse (Ed.), *The Cambridge Encyclopedia of Darwin and Evolutionary Thought*. Cambridge, UK: Cambridge University Press, 2013.

Asa Gray, "Darwin and his Reviewers: Natural Selection and Natural Theology, Part III: Natural Selection not Inconsistent with Natural Theology." *Atlantic Monthly*, October 1860, pp. 412-419. Reprinted in Asa Gray, *Darwiniana*, ed. A. Hunter Dupree. Cambridge, MA: Harvard/Belknap, 1963. 118-123.

R 3/5: Darwinism in the U.S. 2: Creationism and the Scopes Trial

How have historians interpreted the Scopes Trial within the contexts of the history of science, the history of religion, and American history? What different sources of evidence do they draw on for their interpretations?

Reading:

Ronald L. Numbers, "Creationism, Intelligent Design, and Modern Biology" [selection], pp. 302-316 and 414-418 (notes) in *Biology and Ideology from Descartes to Dawkins*, edited by Denis Alexander and Ronald Numbers. Chicago: University of Chicago Press, 2010 {**EVERYONE**}

Adam Shapiro, *Trying Biology: The Scopes Trial, Textbooks, and the Antievolution Movement in American Schools*. Chicago: University of Chicago Press, 2013. Chapter 1 {**EVERYONE**}; Ch. 5 (**1/2 the class**), pp. 87-110.

Jeffrey Moran, "Reading Race into the Scopes Trial: African Americans, Science, and Fundamentalism," *Journal of American History*, Dec. 2003, 90: 891-911 (**1/2 the class**)

T 3/10: The Evolutionary Synthesis

What was the Evolutionary Synthesis? How did it involve Darwin's "reputation" [Amundson]? What features of this history are thrown into relief by comparing the Anglo-American "evolutionary synthesis" with what happened in Germany [Levit et al.]?

Readings:

Ronald Amundson, "Charles Darwin's Reputation: How It Changed During the Twentieth Century and How It May Change Again," *Endeavour* 38: 257-267

Levit et al., "The Darwinian Revolution in Germany," 272-279.

R 3/12: Evolutionary Utopianism

What is Esposito's argument about British utopianism in the evolutionary synthesis? How do you see it at play in our reading by Huxley?

Readings:

Maurizio Esposito, "Utopianism in the British Evolutionary Synthesis," *Studies in History and Philosophy of Biological and Biomedical Sciences* 2011, 42: 40-49

Julian Huxley, "Man's Place and Role in Nature," in idem, *New Bottles for New Wine* (London: Chatto & Windus, 1959), 41-60.

Receive question for Part II comparative essay (covering through 3/12)

Spring Break March 14-22

T 3/24: Comparative Contexts Workshop/Review. Part II Timelines due. (Bring your laptop!)

Part III. Unmaking Darwinian Evolution?

Analytical Themes: Rethinking our assumptions about evolution; techniques and arguments in modern evolutionary biology; personal dynamics in the scientific community

Skills: library research combined with textual and comparative analysis

R 3/26: Stephen Jay Gould: Challenging Gradualism and Progress

What were Stephen Jay Gould's problems with the standard view of evolution in the 1980s?

Reading:

Stephen Jay Gould, "Darwinism and the Expansion of Evolutionary Theory," *Science*, 23 April 1982, 216: 380-387.

Stephen Jay Gould, *Wonderful Life: The Burgess Shale and the Nature of History*. New York: W. W. Norton, 1989. Chapter 1, "The Iconography of an Expectation," 23-52.

Sunday, March 29: Comparative (Part II) Essay due by 11:59 pm in Canvas.

T 3/31- R 4/16:

Over the next three weeks we will read most of the rest of Quammen's *Tangled Tree*. Each of you will be assigned to one section (about two of you per class meeting), for which you will locate a primary source article (not a historian's description) starting from Quammen's endnote references and bibliography. You must find a copy of the source, upload it to Canvas, and come to class prepared to speak for 10 minutes on what it says and why it's significant for the history of evolutionary thought. You can start out with Quammen's contextualization, but you should strive to bring your own insights, historical understanding, and close reading of the text to your presentation. Note that for the Part III paper, if you get interested in a different primary source from the one you originally chose (but still deriving from Quammen), you may use it—with my permission in advance, no later than 4/21.

T 3/31 Molecular Phylogenetics

Quammen, *Tangled Tree*, pp. 37-70, chapters 9-15.

R 4/2: A New Kingdom? Carl Woese and "Archaeobacteria"

Quammen, *Tangled Tree*, pp. 71-110, chapters 16-27.

T 4/7: Endosymbiosis

Quammen, *Tangled Tree*, 113-162

R 4/9: Big Tree

Quammen, *Tangled Tree*, 185-212

T 4/14: Horizontal Gene Transfer (HGT)

Quammen, *Tangled Tree*, 215-268

R 4/16: Implications of HGT for the Tree of Life

Quammen, *Tangled Tree*, 271-312

T 4/21: Timeline workshop: putting the Quammen stories next to one another. (Bring your laptops!)

R 4/23: Workshop on primary source research paper in context. Bring 3 copies of your draft paper.

T 4/28: Part III paper due. Discussion of what you learned in part III paper; presentations on honors and graduate research papers.

R 4/30: Course Wrap-up; discussion of Final Essay

FINAL ESSAY DUE Tuesday May 5, 2020, by 2:30 pm.

ACADEMIC GUIDELINES AND EXPECTATIONS

Essays: 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 point for every working day late. For example, if the paper on its merits deserves a B (3.0), after one day it would receive a B/BC (2.75), after two days a BC (2.5), after three a BC/C (2.25), after four a C (2.0). NOTE: LATE FINAL ESSAYS WILL NOT BE ACCEPTED.

Academic Credit and Plagiarism: Students may not copy sentences or ideas from others (including authors, websites, or other students) without giving credit to those sources; if someone else's words are so wonderful that you cannot substantially rephrase them, you must put them inside quotation marks, using the exact same words. If you omit the quotation marks or the credit, you are plagiarizing. Plagiarism is grounds for failure on the assignment plagiarized; repeated plagiarism is ground for failure in the course. If you use 3 or more words in a row from another source, they 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, the Writing Lab, or the History Lab.

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

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: For solid, workmanlike essays. 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 classes 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 above); 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.