

HISTORY OF SCIENCE 343: THE DARWINIAN REVOLUTION

Spring 2007

MWF 11:00 B223 Van Vleck

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7143 Social Science
262-3492

Office Hours: W 12-1:10, most weeks also W 1:10-2:15, and by appointment
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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 range across Britain, Europe and America; across audiences from elite scientists to the broader reading public; and across time from the late eighteenth century to the present.

Two books are for sale at UBS and Underground Textbooks:

Darwin, *On Evolution* (edited by Thomas F. Glick and David Kohn).

Peter J. Bowler, *Evolution: The History of an Idea*, 3ed (THIS EDITION ONLY! It is significantly revised from earlier editions.)

Also required is a course reader of photocopied materials, for sale at Dept. of the History of Science, 7143 Social Science (cash or check only.) Please note: READERS ARE NOT RETURNABLE; once you buy it, it's yours.

*A copy of all readings is on reserve at College Library.

Undergraduate Course Requirements:

- 20% Unit I take-home essay (1500-1700 words), due in class, Friday, March 2
- 10% "Darwinism and Society" research project, due in class, Wednesday, March 28
- 20% Unit II take-home essay, due in class, Friday, April 13
- 20% Unit III take-home essay (1500-1700 words), due Thursday, May 17 at 2:30 pm.
- 15% Class participation: attendance, participation in discussions.
- 15% five short written reading responses (3% each; see more below).

Course Website. We will be using "Learn@UW," an interactive course website, for posting the syllabus, handouts, reading responses, and other information. To access the Learn@UW site for this course, follow these two steps:

1. Open up an Internet browser and go to this website (which you should then bookmark):
<https://learnuw.wisc.edu/> (you can reach it from the UW home page, too). Type in your WiscWorld username and password to get to the next screen, which is your "portal page." Notice that on this page there is information about the "Help Desk" if you have any trouble navigating to the site or getting any of the information. The Help Desk is available to assist you around the clock, so please contact this number (264-HELP)!
2. Once on your Learn @UW portal page, you will see a box called "My Madison Courses" which

will list all your UW courses that have a Learn@UW website. Scroll down to "2007-Spring." If this is the first time you have opened this, you'll need to click on the '+' sign next to "2007-Spring" first, to expand the box. Then click on the link under this heading for "HistSci 343" and you'll arrive next at the course website.

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—see separate handout on class participation), usually but not always on Friday. To be fully prepared for discussion, 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. For each discussion, come prepared to discuss the questions on the syllabus for that class.

Reading Responses: For 5 of the discussions, you are to write on some aspect of the reading related to the discussion questions, distributed as follows: 1 reading response from weeks 1-3; 1 from weeks 4-5; 1 from weeks 6-10; 1 from weeks 11-12; 1 from weeks 13-14. Reading responses are to be posted on the Learn@UW course website by 8 a.m. of the day that is our main discussion class for any given week, and you must turn in a hard copy at that class. Late responses are not accepted. Any additional reading responses can be counted as extra credit for your class participation grade (these must also be posted and turned in on time).

Honors students will research one of the topics from weeks 13 and 14 and make a 25-minute presentation during the appropriate lecture time that week. In addition, you will hand in a 5-7 page paper describing your research process and results. It is expected that you and I will be in close consultation during the semester as you develop your research and whittle it down to a workable size. The honors project will count as 20% of your overall grade, with 5% taken away from each of the 3 essays and class participation. See Honors Handout for more details.

Graduate Student Course Requirements:

Grades will be based on class participation/discussion of common readings (20%), informal writing and presentations (20%) and formal writing (60%).

Readings and grad discussions (marked "GS" in syllabus): We will have an introductory meeting **Jan. 24**. In addition to the common readings, there will be three readings just for graduate students, which we will discuss at our separate discussion time: James Secord's *Victorian Sensation* (for **Feb. 7**); "Special Issue: The 'Darwinian Revolution': Whether, What, and Whose?" *Journal of the History of Biology*, spring 2005 (38:1), articles by Ruse, Bowler, Smocovitis, Herbert, Corsi, Hodge, and Hull (for **March 7**); and David Hull's *Science as a Process* (for **April 25**). For each of these meetings, you are to write a brief (600-800 word) analysis of a central issue you would like to present as a discussion-starter in the graduate discussion. These analyses are to be posted on the graduate discussion section of the Learn@UW website by 8 a.m. the day of the discussion, and a hard copy is to be turned in at the discussion. We will devote the last grad discussion (**May 9**) to your presentation of your major project.

Formal 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, an historiographic review essay, or some other form that we agree upon, due **May 17**, with interim deadlines to follow individuals' schedules.

Lectures and Readings, Week by Week

* = Course Reader; GS = Graduate students

Unit I. Ordering Nature, 1750-1859

Week 1: Setting the Scene

1/22: Introduction: Evolution and the Western Tradition

1/24: Understanding Nature in a Non-Evolutionary World

Bowler, pp. 1-26

GS: Intro discussion

1/26: Discussion

*Holy Bible, Genesis 1-7

*William Paley, *Natural Theology*, 12th ed., (London: Faulder, 1809; e-text edition), front matter, 1-19, 38-42

Discussion questions: Suppose that the Bible and Paley were the only written sources you had to guide your understanding of the natural world. How would you understand nature? What relations among humans, nature, and God might you glean from these readings? With what moral qualities is nature (and humanity's relationship with nature) invested in these texts?

Week 2: The Historical Order of Nature

1/29: Classification and Progress

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

*J.B. Lamarck, *Zoological Philosophy* (1809), trans. Hugh Elliot (Chicago: Univ. of Chicago Press, 1984) pp. 19-26, 106-133, 169-180

1/31: The Ordered World of Georges Cuvier

Bowler, 108-120

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

*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

*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. 216-234, 239, 248-252

2/2: Discussion: On what points—metaphysical, physical, and methodological—do Lamarck and Cuvier disagree? How should we account for the differences in their views of nature and science?

Week 3: Philosophical Anatomy and Zoology

2/5: "Philosophical Anatomy" in France

Bowler, 100-102

*Hervé Le Guyader, *Étienne Geoffroy Saint-Hilaire 1772-1844: A Visionary Naturalist* (University of Chicago Press, 2004), 1-19; 135-146, 152-165

2/7: Continental ideas come to Britain

Bowler, 102-106, review 115-120, 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

*Robert Chambers, *Vestiges of the Natural History of Creation* [1844] (reprint ed. New York: Humanities Press, 1969), pp. 191-205, 212-13, 217-235

GS: James Secord, *Victorian Sensation* (all).

2/9: Discussion: How did the British scientific, social, and religious context shape the reception of French ideas about evolution and the order of nature?

Saturday, Feb. 10: **Darwin Day at the Geology Museum!** Come to talks and posters!
(More info to come.)

Week 4: Darwin's World: 1826-1856

2/12: The Further History of Life on Earth

Bowler 129-134, 141-164

Darwin 1-45

2/14: Pigeons and Barnacles: The Development of Darwin's Theory

Bowler, 164-173

Darwin, 46-87 (browse)

2/16: Discussion: What intellectual resources did Darwin draw on in developing his theory of evolution?

Week 5: "Darwinian" Evolution

2/19: Darwin's and Wallace's Evolutionary Theories

Bowler, 173-176

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

2/21: The Argument of the *Origin* and the Great Gestalt Shift

Bowler 177-183

Darwin 156-216 (*Origin* selections)

2/23: 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?

Unit II: "Darwinian" Evolution and Society, 1859-1930

Week 6: The Reception of Darwin's Theory

2/26: The Comparative Reception of Darwin's Theory in Europe

Bowler, 183-223

2/28: Evolution and Belief I: The Late 19th Century (lecture/discussion)

*Alfred Russel Wallace, "Limits of Natural Selection in Human Evolution," in *The Alfred Russel Wallace Reader*, ed. Jane R. Camerini (Baltimore: Johns Hopkins, 2002), 160-163. Originally from "Geological Climates and the Origin of Species," *Quarterly Review*, 1869, 126: 391-94.

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

*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: Harvard/Belknap, 1963), pp. 118-123

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

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?

3/2: **Unit I Paper due.** *Meet at Memorial library* for “Darwinism and Society” research project.

Week 7: Evolution and Society, 1859-1918

3/5: Type Casting: Evolution, Race, and Class

Bowler, 211-214, 292-297

Darwin, 240-277

3/7: Evolution and “the Woman Question”

Bowler, 313-315

*Nancy Leys Stepan, “Race and Gender: The Role of Analogy in Science,” *Isis*, 1986, 77: 261-277.

GS: Revisiting the “Darwinian Revolution”—*J. Hist. Biol.*, Spring 2005

3/9: *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?*

Week 8: The Public Faces of Evolution in America, 1890-1930

3/12: Museum Evolution

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)

3/14: Evolution and Belief II: Creationism in America

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 [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

*Henry Fairfield Osborn, “Evolution and Religion,” *New York Times*, Mar. 5, 1922

*Edward Grant Conklin, “Bryan and Evolution,” *New York Times*, Mar. 5, 1922

*Jeffrey Moran, “Reading Race into the Scopes Trial: African Americans, Science, and Fundamentalism,” *Journal of American History*, Dec. 2003, 90: 891-911

3/16: *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?*

SUNDAY, 3/18 (or Tuesday, 3/20), 7-9 PM: MOVIE NIGHT: HOMO SAPIENS 1900

Week 9: The Mechanisms of Evolution

3/19: The Problem of Heredity (Darwin to Weismann)

Bowler, 199-202, 251-256

Darwin, 216-239

3/21: Darwinism vs. Mendelism

Bowler, 224-226, 236-247, 256-273

Lecture/Discussion: Why was heredity such an important issue in the debates over evolution in the late nineteenth century?

3/23: student workshop of “Darwinism and Society” research projects

Week 10: Controlling Evolution

3/26: Breeding and Eugenics (lecture/discussion)

*Screen *Homo Sapiens* 1900 if you couldn't make movie night last week.

Bowler, 307-313

*Diane B. Paul, "Darwin, Social Darwinism, and Eugenics," in *The Cambridge Companion to Darwin*, ed. Jonathan Hodge and Gregory Radick (Cambridge: Cambridge University Press, 2003), pp. 214-239.

*Henry Fairfield Osborn, "The Second International Congress of Eugenics: Address of Welcome," *Science*, Oct. 7, 1921, 65: 311-313.

3/28: *Unit Overview/Discussion*; "Darwinism and Society" research projects due

3/30 (and earlier in the week by appointment): individual meetings with professor on Unit 2 essays, as desired.

Unit III: "Modern" Evolution, 1937-Present

Week 11: The Modern Synthesis

4/9: From Population Genetics to the Modern Synthesis

Bowler, 325-339

*Julian Huxley, *Evolution: The Modern Synthesis* (New York: Harper, 1942), pp. 29-46

*Ernst 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)

4/11: Unifying Biology

*Vassiliki Betty Smocovitis, *Unifying Biology: The Evolutionary Synthesis and Evolutionary Biology* (Princeton: Princeton University Press, 1996), pp. 132-171

4/13: *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?*

Unit 2 Essays due.

Week 12: Evolutionary Humanism

4/16: The Unity and Diversity of Humanity: Human Evolution after World War II

Bowler, 340-346

*Theodozios Dobzhansky, "Chapter 9: Polymorphism, Class, and Caste," in idem, *Mankind Evolving: The Evolution of the Human Species* (NY: Bantam Books, 1962), 230-265

*Donna Haraway, Chapter 8: "Remodeling the Human Way of Life: Sherwood Washburn and the New Physical Anthropology" (selection), in idem, *Primate Visions: Gender, Race, and Nature in the World of Modern Science* (NY: Routledge, 1989), 197-217

4/18: Evolution and Belief III: Evolution as a Belief System

Bowler, 340-346

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

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

4/20: *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 13: Phylogeny and Systematics in a Molecular World

4/23: Making phylogenetics "scientific"? From numerical taxonomy to molecular evolution

Bowler 369-374

*Joel B. Hagen, "Naturalists, Molecular Biologists, and the Challenges of Molecular Evolution," *Journal of the History of Biology*, 1999, 32: 321-341

4/25: Re-imagining the phylogenetic tree

*Jan Sapp, "Molecular Evolution and Microbial Phylogeny," chapter 18 in idem, *Genesis: The Evolution of Biology*, 221-233

*Carl Woese, "The universal ancestor," PNAS 95, June 1998, 6854-6859

*Ernst Mayr, "Two empires or three?" PNAS 95, August 1998, 9720-9723

*Carl Woese, "Default taxonomy," PNAS 95, September 1998, 11043-11046

GS: David L. Hull, *Science as a Process* (all)

4/27: Discussion: What happened to the evolutionary tree when molecular biology got involved? Has it been basically the same story, transferred to the molecular level? Or is the study of phylogeny in some way fundamentally different than it was earlier?

Week 14: Evolution, Design, and Democracy

4/30: Evolution and Belief IV: From Creationism to Intelligent Design

Bowler, 369-381;

*Numbers, "The Creationists," 404-415 (filed earlier in reader);

*Numbers, *The Creationists: From Scientific Creationism to Intelligent Design*, rev. ed.. (Harvard University Press, 2006), 373-398, 546-557

*Michael J. Behe, "Molecular Machines: Experimental Support for the Design Inference," *Cosmic Pursuit*, 1998, 1: 27-35, reprinted in *Intelligent Design Creationism and its Critics: Philosophical, Theological, and Scientific Perspectives*, ed. Robert T. Pennock (Cambridge: MIT Press, 2001), 241-256

5/2: Evolution, Design, and Democracy

*Alvin Plantinga, "Creation and Evolution: A Modest Proposal," and Robert Pennock, "Reply to Plantinga's 'Modest Proposal,'" pp. 779-797 in *Intelligent Design Creationism and its Critics: Philosophical, Theological, and Scientific Perspectives*, ed. Robert T. Pennock (Cambridge: MIT Press, 2001).

**Kitzmiller v. Dover Area School District*, 400 F. Supp.2nd 707 (M.D. Pa. 2005). Taken from: http://www.pamd.uscourts.gov/kitzmiller/kitzmiller_342.pdf, Judge John E. Jones III, "Memorandum Opinion," on December 20, 2005, pp. 64-89

5/4: Discussion: Is there anything legitimate about the claims of Intelligent Design advocates, either as a matter of science or as a matter of democracy? Do you see any echoes here of earlier battles over evolution, religion, and who controls knowledge?

Week 15: Course Overview

5/7: Taking the Long View

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

GS: presentations

5/11: Last class day; no discussion

****FINAL ESSAY DUE Thursday, May 17, 2:30 pm in my mailbox.****

Academic Performance and Accommodation:

Grading: I grade on a 4-point scale. I use a “penumbra” system for essays so you know whether you have a high or low grade within the grade range. That is, an A = 4.0-3.66; AB= 3.65-3.3; B = 3.25-2.8; BC=2.75-2.3; C = 2.25-1.7; D = 1-1.7; F = anything below a 1.

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; see also the grading scale on the last page of the syllabus.)

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 the UW Writing Center (linked from Learn@UW) or a style manual.

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@wisc.edu), or by leaving a message with the History of Science department administrator (262-1406).

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>).