

HIST 427/527: SCIENCE IN NINETEENTH-CENTURY EUROPE

Prof. Ian F. McNeely – University of Oregon – Fall 2009

Meeting times: TR 10:00-11:20 in 175 LIL

Office hours: M 10:00-11:00, R 12:00-1:00

Web: <http://www.uoregon.edu/~imcneely>

CRNs: 16770/16771

Email: imcneely@uoregon.edu

Office: 319 MCK

Phone: 541-346-4791

Description

Scientists in nineteenth-century Europe revolutionized our view of the world in several interlocking ways. They showed that the Earth is far, far older than the few thousand years envisioned by the Biblical creation story. They showed that its vast history is long enough for new species to have evolved from previous ones—as, indeed, humans have evolved from other primates. They showed that all life forms are in fact governed by intelligible natural processes, whether physical, chemical, or biological, from the tiniest microbes to the human mind itself. They showed that the laws of nature, operating invisibly through particles and forces, energy and fields, give rise to fantastic phenomena that we can harness and control. They showed that society itself exhibits lawlike properties: personal decisions to spend money or have children, commit crimes or even commit suicide, do in aggregate follow predictable statistical and psychological patterns.

In this course we examine how these discoveries transformed European culture. We want to know what people believed before they occurred and why they changed their minds. We want to know who championed these changes and who resisted them. And we want to know how they were understood by people living at the time—in ways that often differ markedly from our understandings of science today. To answer these questions, it is not enough to treat just the great men and ideas, the new experiments and instruments, or the big conceptual and technical breakthroughs. This would assume that science is a well-defined, autonomous activity, which it wasn't. The nineteenth century was instead a time when the institutions of science and the role of the “scientist” were still in formation. Divisions we take for granted today—between science and religion, natural science and social science, expert science and popular science, real science and pseudoscience—were all much more fluid than they are now. This is exactly what makes the period fascinating.

Requirements

- Prospectus for research paper, 3-4pp., due Tue. 10/20 in class (15%)
- Midterm exam, Thu. 11/5 in class (25%)
- Sample source, due Tue. 12/1 and Thu. 12/3 in class (5%)
- Final exam, Tue. 12/8 from 8:00am-10:00am in our classroom (25%)
- Research paper, 10-12pp.* (30%), due Fri. 12/11 by 3:00pm in 319 MCK

Policies

Midterm and final exams: These will be largely non-cumulative and conventional in format, with identification, short-answer, and essay questions.

Research paper: Due at the end of exam week, this paper should focus on one of the major course themes, frame a question using secondary sources, and answer it through analysis of primary sources, which are unbelievably rich and surprisingly accessible for this period.

Clinics: Many class meetings will feature a mini research “clinic” where students can pose research problems and get feedback from the class. Clinics will also provide occasions to discuss the conceptualization, research, writing, and formatting of the research paper. Guidelines on these matters cannot be distilled into a policy handout, so it is imperative that you attend class regularly.

Prospectus: By the beginning of the fourth week of term, you should have (1) identified a topic for your research paper, (2) located relevant sources, both primary and secondary, and (3) read enough of them to formulate a tentative argument for your paper. Your prospectus should cover all these things, plus (4) identify further questions and challenges that will drive the rest of your research.

Sample source: During the last week of class, you should bring five copies of a one-page primary-source excerpt to be discussed in your research paper and be prepared to discuss it in groups and/or before the entire class.

Formatting: Please use Times New Roman 12pt or the equivalent, margins of 1-1¼”, and double spacing. Follow Chicago style or a rough equivalent for footnotes and include a separate bibliography at the end.

Grading standards: A- and B-level work demonstrates mastery of key facts and ideas and an ability to organize evidence clearly around topic sentences and a thesis statement or argument. A-level work must, in addition, demonstrate facility with abstract historical concepts and use them creatively to evaluate evidence and generate new insights. C-level work exhibits mere competence, whereas D-level work does not even rise to that standard. Fs are given for missing or incomplete work.

***Graduate students:** Students in HIST 527 must prepare a longer (ca. 20 pp.) research paper tilted more toward the secondary literature in the history of science and/or European cultural history. This will entail additional readings at a more advanced level, readings that do not simply deepen or expand individual students’ topical interests but that model general historiographical approaches toward research in these fields. We will consult via email and/or in office hours to discuss research papers.

Schedule

* = available as a PDF on [Blackboard](#). Other readings are at UO Bookstore and [Knight library reserves](#).

<u>Date</u>	<u>Topic</u>	<u>Readings</u>
9/29	Introduction	(handout)
	The earth unfathomably old	
10/1	The geological discovery of deep time	*Rudwick
10/6	Evolution before Darwin	Larson, 5-75; Darwin, 53-63
	Man descended from apes	
10/8	Natural history as gentlemanly science	Larson, 79-101; Darwin, 65-81, 89-100
10/13	<i>The Origin of Species</i>	Darwin, 114-72, 293-7, 435-60
10/15	The impact of Darwinism	Larson, 105-47
10/20	Eugenics and race theory	Larson, 153-7, 177-91; *Galton → Prospectuses due
	Brain and body like any other matter	
10/22	Phrenology and social reform	*Combe; Rabinbach, 1-7
10/27	Physiology, energy, and the human motor	Rabinbach, 45-162
10/29	The study of life as laboratory science	*Virchow
11/3	The germ theory of disease	*Otis 2002; *Otis 1999
11/5	Midterm	
	Invisible forces subject to human control	
11/10	Physics: modeling the imponderable	*Dear
11/12	The powers of electromagnetism	*Hunt; *Winter
11/17	Mesmerism, spiritualism, and science fiction	Bulwer-Lytton
	Society subject to lawlike patterns	
11/19	Statistics as social science: crime and suicide	*Hacking
11/24	The psychology of crowds	Le Bon
11/26	Thanksgiving	
	Universities the best places for research	
12/1	Student research presentations	(none)
12/3	Student research presentations	(none)
12/8	Final exam (8:00-10:00am)	

Readings

Books

- Edward Bulwer-Lytton, *Vril: The Power of the Coming Race* (Sioux Falls, SD: Nuvision Publications, 2007 [1871]). ISBN 978-1595478856, \$14.99 [also known as *The Coming Race*; any edition is fine].
- Charles Darwin, *The Origin of Species by Means of Natural Selection, or: The Preservation of Favoured Races in the Struggle for Life* (Harmondsworth: Penguin, 1982). ISBN 978-0140432053, \$12.00.
- Edward J. Larson, *Evolution: The Remarkable History of a Scientific Theory* (New York: Modern Library, 2004). ISBN 978-0812968491, \$14.95.
- Gustave Le Bon, *The Crowd: A Study of the Popular Mind* (Mineola, NY: Dover Publications, 2002 [1895]). ISBN 978-0486419565, \$8.95 [other editions fine].
- Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (Berkeley: University of California Press, 1992). ISBN 978-0520078277, \$26.95 [recommended].

Articles

- George Combe, *The Constitution of Man* (1847, 8th ed.), excerpted in Alan S. Weber (ed.), *Nineteenth-Century Science: An Anthology* (Peterborough, ON: Broadview Press, 2000), 161-71.
- Peter Dear, “Dynamical Explanation: The Aether and Victorian Machines,” in *The Intelligibility of Nature: How Science Makes Sense of the World* (Chicago: University of Chicago Press, 2006), 115-40.
- Francis Galton, “Eugenics: Its Definition, Scope, and Aims,” *American Journal of Sociology* 10 (July 1904): 1-25.
- Ian Hacking, *The Taming of Chance* (Cambridge: Cambridge University Press, 1990), 55-72, 115-24.
- Bruce J. Hunt, “Doing Science in a Global Empire: Cable Telegraphy and Victorian Physics,” in Bernard Lightman (ed.), *Victorian Science in Context* (Chicago: University of Chicago Press, 1997), 312–33.
- Laura Otis (ed.), *Literature and Science in the Nineteenth Century: An Anthology* (Oxford: Oxford University Press, 2002), 181-97 [Louis Pasteur, “On the Organized Bodies Which Exist in the Atmosphere” (1861); Sir Joseph Lister, “Illustrations of the Antiseptic System” (1867); Anonymous, “Dr. Koch on the Cholera” (1884)].
- Laura Otis, “Virchow and Koch: The Cell and the Self in the Age of Miasmas and Microbes,” in *Membranes: Metaphors of Invasion in Nineteenth-Century Literature, Science, and Politics* (Baltimore: Johns Hopkins University Press, 1999), 8-36.
- Martin J.S. Rudwick, “The Shape and Meaning of Earth History,” in David C. Lindberg and Ronald Numbers (eds.), *God and Nature: Historical Essays and the Encounter between Christianity and Science* (Berkeley: University of California Press, 1986), 296-321.
- Rudolf Virchow, “On the Mechanistic Interpretation of Life” (1858), in *Disease, Life, and Man: Selected Essays* (Stanford: Stanford University Press, 1958), 102-19.
- Alison Winter, *Mesmerized: Powers of Mind in Victorian Britain* (Chicago: University of Chicago Press, 1998), 1-5, 276-305.

Sample research topics

This is by no means an exhaustive list; it is instead meant to showcase good examples of research topics. You are welcome to pick one of them or develop your own in consultation with me. As your research progresses, you will no doubt want to tighten your focus. I've provided hyperlinks in cases where there is one obvious book to start with.

Phrenology and crime

[Non-phrenological experiments on the localization of brain functions](#)

[Alfred Russell Wallace's spiritualism \(or Oliver Lodge's\) \(or Dmitrii Mendeleev's\)](#)

[Faraday's popular demonstrations of electricity and electromagnetism](#)

[Helmholtz's popularization of science \(e.g. music, vision, the planets\)](#)

[Evolution and the scientific study of language: F. Max Müller vs. Darwin](#)

[Herbert Spencer \(evolutionist, philosopher, sociologist, polymath - pick a specific topic\)](#)

The persistence of [vitalism](#) in microbiology and organic chemistry

[Reader response to Darwin](#) (or to *Vestiges of the Natural History of Creation*)

The nebular hypothesis and its relation to theories of evolution

[The recent scholarly rehabilitation of German Romantic *Naturphilosophie*](#)

[Degeneration](#), crime, and race as scholarly and popular obsession

The Huxley-Wilberforce debate (science vs. religion) as myth and reality

The discovery of dinosaurs (Gideon Mantell, Richard Owen) and their visual depiction

The mathematization of economics (Stanley Jevons, Alfred Marshall, and others)

Heredity, germ plasm, and the discovery of chromosomes

["Paper tools" and the culture of organic chemistry](#)

The Haeckel-Virchow debate on the scientific validity of evolution

Haeckel's polygenism (theory of multiple origins of the human species)

[Mesmerism](#) and anesthesia/hypnotism/phrenology/spiritualism

Industrial chemistry (fertilizer, dyes, medicines) or electricity (telegraphy, electroplating)

Cholera epidemics: medical, political, and social responses

[The ethics of Pasteur's experiments](#)

Mendelian genetics, its initial neglect, and contemporary responses to its rediscovery

[Darwinism in the Victorian novel](#)

[Colonial botany and the science of empire](#)

Lord Kelvin's reduction of the age of the earth

[The science of sexual difference \(Darwinism, phrenology, conservation of energy, anthropology\)](#)

[Evolution and revolution: radical politics and Darwinism](#)

Frankenstein and radical science

Nerves, nervous ailments, neurasthenia

Social medicine as a medical complement and left-liberal political rival to germ theory

[The advent of social and racial hygiene in Germany](#)

The development of the atomic theory

[National differences](#) in chemistry, the modeling of electromagnetic fields, the ether, etc.

Theories of the spontaneous generation of life from inorganic matter

Anthropological museums in Britain and [Germany](#)

[Medical electrotherapy](#)

Durkheim's study of suicide and its precursors

[The roots of energy physics in British engineering culture](#)

[Statistics and the rise of life insurance, biometrics, theories of crime, theoretical physics](#)

Intelligent design: the Bridgewater Treatises (or William Paley's natural theology)

Galton's study of hereditary genius

See also *this* [primary-source anthology](#) on phrenology, mesmerism, memory, consciousness, hysteria, insanity, nerves, idiocy, criminality, childhood, race, sex, and other topics

Tips for research

The starter bibliography below, together with your course texts, will help you get started with your research. Items are hyperlinked to Google Books so you can preview the items easily. Some tips:

- As you read, mine footnotes and bibliography for leads to further sources.
- It is often best to use secondary sources to “drill down” to primary sources.
- Favor secondary sources published by university presses in the 1980s, 1990s, or 2000s.
- Remember to use Summit and/or Interlibrary Loan to get books that UO may not own.

Once you have identified a topic, I recommend several online aids to help you flesh out your bibliography:

- [Google Books](#). Previews of many monographs; some coverage of nineteenth-century sources
- [Historical Abstracts](#). Index of modern journal articles, often with abstracts and/or fulltext
- [JSTOR](#). Fulltext archive of select scholarly journals in history and other fields.
- [Academic Search Premier](#). Good for book reviews and some academic articles
- [Journal Title Search](#). Use to see if UO owns and/or has online access to a particular journal

Note that Knight Library has almost full runs of major nineteenth-century periodicals, including [The Edinburgh Review](#) (Whig), [The Westminster Review](#), (Radical), and [The Quarterly Review](#) (Tory)

Starter bibliography

(+ = on two-hour [reserve at Knight Library](#))

[Peter J. Bowler, *The Norton History of the Environmental Sciences* \(New York: W.W. Norton & Co., 1993\)](#). Covers natural history, geology, geography, botany, evolution, Darwinism, and the organization of science.

+[Peter J. Bowler and Iwan Rhys Morus, *Making Modern Science: A Historical Survey* \(Chicago: University of Chicago Press, 2005\)](#). Up-to-date survey text with chapters on both scientific fields and thematic issues. Covers the entire modern period, not just the nineteenth century.

[W.F. Bynum, *Science and the Practice of Medicine in the Nineteenth Century* \(Cambridge: Cambridge University Press, 1994\)](#). Introduction to medicine in the period; pair with Hagner’s essay in Cahan.

+[David Cahan \(ed.\), *From Natural Philosophy to the Sciences: Writing the History of Nineteenth-Century Science* \(Chicago: University of Chicago Press, 2003\)](#). Historiographical surveys on biology, medicine, earth sciences, mathematics, physics, chemistry, technology and industry, social sciences, institutions, and religion.

[Michael J. Crowe, *Modern Theories of the Universe from Herschel to Hubble* \(Mineola, NY: Dover Publications, 1994\)](#). Coverage of astronomy during the period.

+David C. Lindberg and Ronald Numbers (eds.), *The Cambridge History of Science* (Cambridge: Cambridge University Press, 2003). Vols. 5 (“[The Modern Physical and Mathematical Sciences](#)”), 6 (“[The Modern Life and Earth Sciences](#)”), and 7 (“[The Modern Social Sciences](#)”). Chapter-length overviews of each major scientific field and most major thematic issues, written by experts and filled with references. *Only vol. 5 is on reserve at Knight.*

[Iwan Rhys Morus, *When Physics Became King* \(Chicago: University of Chicago Press, 2005\)](#). Culturally inflected survey of physics in the period; brief treatment of mesmerism and spiritualism.

[Mary Jo Nye, *Before Big Science: The Pursuit of Modern Chemistry and Physics, 1800-1940* \(Cambridge, MA: Harvard University Press, 1999\)](#). Survey of laboratory science with ample technical detail.

[Richard Olson, *Science and Scientism in Nineteenth-Century Europe* \(Champaign, IL: University of Illinois Press, 2007\)](#). Survey of science in the period; useful if with some idiosyncratic choices of topic.

[Michael Ruse, *The Darwinian Revolution: Science Red in Tooth and Claw* \(Chicago: University of Chicago Press, 1999\).](#) Dense but very well-written intellectual history contextualizing Darwin amidst his scientific peers, their researches, and their theories.

[Roger Smith, *The Norton History of the Human Sciences* \(New York: W.W. Norton & Co., 1997\).](#) Good coverage of physiology, race, prehistory, sociology, evolution, psychology, and institutions.