The 20th century gene, from eugenics to epigenetics

History of Science 350

Professor Nicole Nelson
Bradley Memorial Building, Room 207
ncnelson@wisc.edu
Office hours: M 1:00–3:00, or by appointment

Spring 2014
Van Vleck B 231
Monday, Wednesday 4:00–5:15 pm

The 20th century has been called the "century of the gene"—from the eugenics movement to the celebrated discovery of the structure of the double helix mid-century to the global initiative to sequence the human genome, the gene has figured prominently into the history of science in this century. This course investigates how heredity came to occupy a prominent place in both scientific and popular thinking, and the consequences of this rise of the gene. The first section of the course examines what kinds of ideas about the body and reproduction, and what kinds of technologies and institutions supported the emergence of scientific theories that some sort of biological substance was passed on from generation to generation. The second section treats the gene not just as a biological object, but as a cultural icon that is invoked in popular culture and public policy. The final section of the course focuses on the turn from classical genetics to molecular biology, and the implications of this new form of genetics for contemporary society.

The class is largely discussion based, with short, in-class lectures that provide additional background on topics not covered by the course readings. Assignments for this course include oral presentations and essays, with a focus on developing revision skills. This course is suitable for students in the sciences, social sciences, and humanities, and no prior knowledge of genetics is required.

Course Objectives

After successfully completing the course you will be able to:

- identify key people, events, technologies, and institutions in the history of genetics

- understand the historical circumstances that led to the emergence of heredity as a concept, and how genetic research has changed over the course of the twentieth century
- articulate the connections between scientific research on genetics and other domains such as medicine, public policy, and popular culture
- reflect on the insights that controversial moments in the history of genetics (such as the eugenics movement) hold for contemporary society
- accurately summarize the key points in individual articles, synthesize themes across bodies of academic scholarship, and present these findings orally
- develop and defend their own academic arguments in writing
- use revision techniques to evaluate and improve the quality of their oral and written assignments

Course materials

There are two required texts for this course, both available for purchase at the campus bookstore:

- Staffan Müller-Wille and Hans-Jörg Rheinberger. 2012. *A cultural history of heredity.* Chicago: University of Chicago Press
- Dorothy Nelkin and M. Susan Lindee. 1995. *The DNA mystique : the gene as a cultural icon.* New York: Freeman

Readings marked with † in the syllabus come from these required texts. In addition to these books, there are a number of other required readings. Articles in UW Madison's electronic library collections are marked with †† in the syllabus and can be downloaded using the provided links (you have to be connected to the university network). Reading selections marked with ††† are available either as a course pack for purchase (for required readings), or can be checked out from the library reserve (both required and suggested readings).

If you have trouble accessing any of the materials, please contact the library first! `http://www.library.wisc.edu/ask/`

Assignments and grading

Assignment	*% of final grade*	*Due date*
Section participation and exercises	25%	throughout full term
Oral presentation	20%	as assigned
Midterm writing assignment	20%	March 12, 2014, 5:00 pm
Final paper	10%	April 18, 2014, 5:00 pm
Revised final paper	25%	May 9, 2014, 5:00 pm

This is a discussion-based course, and *class participation* is worth 25% of your final grade. You are expected to arrive at class prepared to discuss the readings assigned for that week (note that the readings on which the mini-lectures are based are optional, but the references are provided in case you want to use this material for writing assignments). Arriving prepared for class means that you have completed the required readings, have brought the texts and your notes with you to class so that you can refer to them during discussion, and have one or two questions or comments in mind to offer during discussion. You will receive interim feedback on your participation class midway through the semester, and you will receive a letter grade for your overall participation in class throughout the semester.

For the *oral presentation*, you will choose one of the assigned readings and present on it at the beginning of class on the day that the reading is assigned. These presentations will develop and evaluate your skills at summarizing the most important points of a reading, connecting those arguments to the themes of the course, and stimulating discussion on the topic. Before your presentation, you *must* schedule a brief meeting with me (at least 48 hours before your presentation) to get feedback on your draft presentation. Presentations will be assigned a letter grade, and I will distribute a more detailed grading rubric along with the assignment in class.

The *midterm writing assignment* is a take-home assignment where you will choose three of four short essay questions to write on, using course readings as your sources. These shorter and more structured questions are designed to help you build up to writing a longer paper that defends an original argument later in the course. Papers will be assigned letter grades, and I will distribute a more detailed grading rubric along with the short essay questions in class.

For the *final paper*, you will choose from one of two essay prompts and write a five to six page paper using course readings and a limited number of outside sources. The grading of the paper is broken down into two parts, with 10% of the course grade allocated to the first version of the paper (note that this should be a complete and formatted paper, not simply an outline or rough draft) and 25% to the revised and resubmitted version of this paper. The grading of the revised paper will place particular emphasis on your ability to create and defend an original academic argument, and to use revision techniques to strengthen the argument and its written presentation.

Course policies

I am happy to discuss academic accommodations for students with disabilities. If you think you may qualify for accommodation, please contact the McBurney Disability Resource Center to establish your eligibility for services. If you already have a McBurney visa, please present it within the first three weeks of the semester so that appropriate arrangements can be made, except if there are unusual circumstances.

All students are expected to adhere to the University of Wisconsin–Madison's core values regarding academic integrity. Plagiarism or other academic misconduct may result in a zero on the assignment or exam, a lower grade in the course, or failure in the course. See the Dean of Students Office website for more information about the academic misconduct process (`http://students.wisc.edu/doso/acadintegrity.html`).

Unit 1: The emergence of the gene

Week 1: Course introduction

January 22: Mapping the history of genetics

No required readings

Week 2: Origin stories about genetics

January 27: Watson and Crick

- James D Watson. 1980. *The double helix: a personal account of the discovery of the structure of DNA*. New York: Atheneum, ch. 10–12, pp. 43–58[†††]
- Angela N. H. Creager and Gregory J. Morgan. 2008. "After the Double Helix." *Isis* 99 (2): 239–272. doi:10.1086/591412[††]
- Lecture reading: Nicole Nelson. 2012. "Shooting Genes, Distributing Credit: Narrating the Development of the Biolistic Gene Gun." *Science as Culture* 21 (2): 205–232. doi:10.1080/09505431.2011.614335[††]

January 29: Mendel's peas

- Staffan Müller-Wille and Hans-Jörg Rheinberger. 2012. *A cultural history of heredity.* Chicago: University of Chicago Press, pp. 1–13[†]
- Lecture reading: D. L. Hartl and V. Orel. 1992. "What Did Gregor Mendel Think He Discovered?" *Genetics* 131 (2): 245–253. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1205000/[††]

Week 3: The bodies supporting heredity

February 3: Making heredity thinkable

- Staffan Müller-Wille and Hans-Jörg Rheinberger. 2012. *A cultural history of heredity.* Chicago: University of Chicago Press, pg. 15–39[†]
- Lecture reading: Staffan Müller-Wille and Hans-Jörg Rheinberger. 2012. *A cultural history of heredity.* Chicago: University of Chicago Press, pg. 41–69[†]

February 5: Reproduction and the early modern body

- Lisa Cody. 1992. "'The Doctor's in Labour; or a New Whim Wham from Guildford.'" *Gender & History* 4 (2): 175–196. doi:10.1111/j.1468-0424.1992.tb00055.x[††]
- Lecture reading: Thomas Walter Laqueur. 1990. *Making sex: body and gender from the Greeks to Freud.* Cambridge, Mass.: Harvard University Press, pg. 63–113[†††]

Week 4: Establishing experimental genetics

February 10: Heredity as a site of experimental investigation

- Staffan Müller-Wille and Hans-Jörg Rheinberger. 2012. *A cultural history of heredity.* Chicago: University of Chicago Press, p. 127–160[†]
- Lecture reading: Staffan Müller-Wille and Hans-Jörg Rheinberger. 2012. *A cultural history of heredity.* Chicago: University of Chicago Press, p. 71–94[†]

February 12: Stabilizing the objects of investigation

- Aryn Martin. 2004. "Can't Any Body Count? Counting as an Epistemic Theme in the History of Human Chromosomes." *Social Studies of Science* 34 (6): 923–948. doi:10 . 1177 / 0306312704046843[††]

Week 5: At work in early 20th century genetics

February 17: The fly people

- Robert E. Kohler. 1994. *Lords of the fly: Drosophila genetics and the experimental life.* Chicago: University of Chicago Press, pg. 19–52[†††]

February 19: Experimental systems in genetics

- Staffan Müller-Wille and Hans-Jörg Rheinberger. 2012. *A cultural history of heredity.* Chicago: University of Chicago Press, pg. 161–186[†]
- Lecture reading: Hans-Jörg Rheinberger. 1997. *Toward a History of Epistemic Things: Synthesizing Proteins in the Test Tube.* Stanford, CA: Stanford University Press [†††]

Unit 2: Genetics outside of the laboratory

Week 6: The eugenics movement

February 24: Eugenics in popular culture and public policy

- Dorothy Nelkin and M. Susan Lindee. 1995. *The DNA mystique : the gene as a cultural icon.* New York: Freeman, pg. 19–37[†]
- Robert Proctor. 1988. *Racial hygiene: medicine under the Nazis.* Cambridge, Mass.: Harvard University Press, pg. 118–130[†††]
- Lecture reading: Daniel Kevles. 1985. *In the name of eugenics : genetics and the uses of human heredity.* New York: Knopf, pg. 85–112[†††]

February 26: The applied science of eugenics

- Staffan Müller-Wille and Hans-Jörg Rheinberger. 2012. *A cultural history of heredity.* Chicago: University of Chicago Press, 95–126†

Week 7: Genetics and medicine

March 3: Genetic counseling and screening

- M. Susan Lindee. 2000. "Genetic disease since 1945." *Nature Reviews Genetics* 1 (3): 236–241. doi:10.1038/35042097

- Lecture reading: Stefan Timmermans and Mara Buchbinder. 2013. *Saving babies?: the consequences of newborn genetic screening.* Chicago: University Of Chicago Press, pg. 34–64†††

Midterm writing assignment distributed in class !!!

March 5: Biomedical concepts and diseases

- Andrew J. Hogan. 2012. "Locating genetic disease: the impact of clinical nosology on biomedical conceptions of the human genome (1966–1990)." *New Genetics and Society*:1–19. doi:10.1080/14636778.2012.735855††

- Daniel Navon. 2011. "Genomic Designation: How Genetics Can Delineate New, Phenotypically Diffuse Medical Categories." *Social Studies of Science* 41 (2): 203–226. doi:10.1177/0306312710391923††

Week 8: Genetics and society

March 10: The gene as a cultural icon

- Dorothy Nelkin and M. Susan Lindee. 1995. *The DNA mystique : the gene as a cultural icon.* New York: Freeman, pg. 1–18†

- Lecture reading: Martin Richards. 1996. "Lay and professional knowledge of genetics and inheritance." *Public Understanding of Science* 5 (3): 217–230. doi:10.1088/0963-6625/5/3/003††

March 12: Co-producing genetics and society

- Jenny Reardon. 2001. "The Human Genome Diversity Project: A Case Study in Coproduction." *Social Studies of Science* 31 (3): 357–388. doi:10.1177/030631201031003002††

Midterm writing assignment due in class. !!!

Week 9: Break (March 15–23)

Week 10: The fruits of genetic determinism

March 24: Naturalizing social differences

- Dorothy Nelkin and M. Susan Lindee. 1995. *The DNA mystique : the gene as a cultural icon.* New York: Freeman, pg. 102–129; 149–168†
- Lecture reading: Richard Lewontin. 1984. *Not in our genes : biology, ideology, and human nature.* New York: Pantheon Books, pg. 83–130†††

March 26: Opposing determinism

- Evelyn Fox Keller. 1997. "Developmental Biology as a Feminist Cause?" *Osiris* 12:16–28. `http://www.jstor.org/stable/301896`††

Unit 3: From classical genetics to molecular biology

Week 11: The flexible gene

March 31: Epigenetic thinking

- Eva Jablonka and Marion J. Lamb. 2002. "The Changing Concept of Epigenetics." *Annals of the New York Academy of Sciences* 981 (1): 82–96. doi:`10.1111/j.1749-6632.2002.tb04913.x`††

Final essay assignment distributed in class !!!

April 2: Non-Mendelian genes

- N. C. Comfort. 1995. "Two Genes, No Enzyme: A Second Look at Barbara McClintock and the 1951 Cold Spring Harbor Symposium." *Genetics* 140 (4): 1161–1166. `http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1206683/`††
- Rosemary J. Redfield. 2012. ""Why Do We Have to Learn This Stuff?"—A New Genetics for 21st Century Students." *PLoS Biology* 10 (7): e1001356. doi:`10.1371/journal.pbio.1001356`††

Week 12: Changing conceptions of the gene

April 7: The gene as laboratory tool

- review Staffan Müller-Wille and Hans-Jörg Rheinberger. 2012. *A cultural history of heredity.* Chicago: University of Chicago Press, pg. 161–186
- Jonathan Weiner. 2000. *Time, love, memory: a great biologist and his quest for the origins of behavior.* New York: Vintage Books, pg. 98–111; 145–175†††

April 9: The gene as information

- Lily E. Kay. 1995. "Who Wrote the Book of Life? Information and the Transformation of Molecular Biology, 1945–55." *Science in Context* 8 (04): 609–634. doi:10.1017/S0269889700002210, pg.??††

Week 13: Biotechnology, industry, and futuricity

April 14: Biotechnology and the scientific self

- Steven Shapin. 2008. "I'm a Surfer." *London Review of Books* (March 20): 5–8. http://www.lrb.co.uk/v30/n06/steven-shapin/im-a-surfer††

- Lecture reading: Elizabeth Popp Berman. 2008. "Why Did Universities Start Patenting?: Institution-building and the Road to the Bayh-Dole Act." *Social Studies of Science* 38 (6): 835–871. doi:10.1177/0306312708098605††

April 16: Privatizing and speculating on genetic knowledge

- Michael Fortun. 2001. "Mediated speculations in the genomics futures markets." *New Genetics and Society* 20 (2): 139–156. doi:10.1080/14636770124557††

- Stephen Hilgartner. 2012. "Selective flows of knowledge in technoscientific interaction: information control in genome research." *The British Journal for the History of Science* 45 (Special Issue 02): 267–280. doi:10.1017/S0007087412000106††

April 18: Final paper due

You have to submit the first version of your final paper by 5 pm. !!!

Week 14: A new eugenics?

April 21: Contemporary eugenic concerns

- Dorothy Nelkin and M. Susan Lindee. 1995. *The DNA mystique : the gene as a cultural icon.* New York: Freeman, pg. 169–205†

April 23: The re-emergence or the disappearance of eugenics?

- Diane B. Paul. 1991. "The Rockefeller Foundation and the Origins of Behavior Genetics." In *The Expansion of American Biology,* edited by Keith Rodney Benson, Jane Maienschein, and Ronald Rainger, 262–283. New Brunswick, NJ: Rutgers University Press †††

- Carlos Novas and Nikolas Rose. 2000. "Genetic risk and the birth of the somatic individual." *Economy and Society* 29 (4): 485–513. doi:10.1080/03085140050174750††

Week 15: Living with the gene

April 28: Biosociality

- Duana Fullwiley. 2006. "Biosocial Suffering: Order and Illness in Urban West Africa." *BioSocieties* 1 (04): 421–438. doi:10.1017/S1745855206004042††

- Lecture reading: Michelle L. McGowan, Jennifer R. Fishman, and Marcie A. Lambrix. 2010. "Personal genomics and individual identities: motivations and moral imperatives of early users." *New Genetics and Society* 29 (3): 261–290. doi:10.1080/14636778.2010.507485††

April 30: Molecular kinship

- Dorothy Nelkin and M. Susan Lindee. 1995. *The DNA mystique : the gene as a cultural icon.* New York: Freeman, pg. 58–78†

- Gísli Pálsson. 2002. "The life of family trees and the Book of Icelanders." *Medical Anthropology* 21 (3-4): 337–367. doi:10.1080/01459740214078††

Week 16: The end of genetics?

May 5: Postgenomics

- Staffan Müller-Wille and Hans-Jörg Rheinberger. 2012. *A cultural history of heredity.* Chicago: University of Chicago Press, pg. 187–218†

May 7: Conclusions

No required readings

May 9: Revised final paper due

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