History 2881
History of Biotechnology
Prof. Evan Hepler-Smith
Spring 2019
MWF // 1-1:50pm // Gasson 310
heplers@bc.edu // Office Hours: W 10am-12pm + by appointment, Stokes 274

This course investigates the history of how humans have put other living things to work. What are the benefits and hazards of modifying plants, animals, and microbes to serve human interests? Is it appropriate to edit genes? To patent them? We will put hopes and fears regarding present-day biotechnology into historical perspective, through a survey of technological "uses of life" in global history. Focusing on the past two centuries but attending to histories stretching back to antiquity, we will investigate how applications of biotechnology have reshaped the natural world and human culture and have redrawn the boundary between them.

Biochemical sculptures on the campus of Rutgers University, New Brunswick, NJ.
Left: "Synergy" (Julian Voss-Andrae, 2013), depicting collagen, the primary structural protein in mammals.
Right: "The PhD Molecule" (Larry Kirkland, 2017), depicting (what else!) caffeine.

Syllabus subject to change at instructor's discretion. Latest version posted on Canvas.

Goals:
After taking this class, students will be able to…

- ***Content***
  - Situate specific instances of the manipulation of living systems for human interests within a long-term history of biotechnology.
  - Connect present-day biotechnologies and hopes and fears about biotechnology to historical ancestors and analogies.
  - Identify commonalities and differences in the values that have informed attitudes about biotechnology in different times and places, as well as how values have shaped the making of scientific facts and technological artifacts.
- ***Skills***
  - Read and interpret primary-source texts and objects, both as sources of evidence about the historical settings in which they were produced and in historical context provided by other sources addressing these settings.
  - Describe and assess the historical arguments of secondary sources.
  - Apply analytical concepts from scholarship in the history of science and technology and Science & Technology Studies (STS) to specific cases.
  - Research a specific topic in the history of science and technology and synthesize a range of scholarly findings and arguments.
  - Communicate and refine historical questions and arguments though class discussion, oral presentations, and written assignments.

Course requirements:

- Participation, including presentation and reading responses 40%
- Midterm exams I & II 15% each
- Biotech research project, parts I-III 10% each

Participation: Careful reading and thoughtful discussion are at the heart of this course. To do your part in making for a productive class (and to receive full credit for participation):

a) **read** each the assigned texts for each session;
b) **submit** three reading response emails;
c) **deliver** one short presentation on a reading;
d) **attend** class, arriving on time, and
e) engage in our discussions as both **speaker** and **listener**.

Readings: We will read secondary sources (analysis by historians and other scholars) and primary sources (materials produced in historical contexts by historical actors), including images, film, and other media as well as written texts. Except for required books (see below), all sources will be available on Canvas. Please complete readings by the **beginning** of the week or class for which they are assigned.

Reading responses: Before three assigned classes, I will ask you to submit an informal reading response (approximately 250 words). I encourage you to be informal and exploratory in these responses—ask questions, identify areas of confusion, make connections. Unless I indicate otherwise, please **email** these responses to me **by 6pm the evening before** the class for which the reading is assigned.

Presentations: In groups of two or three, you will present a short overview (5 minutes is great; 10 minutes at most) of one of our weekly readings. I encourage you to draw connections to previous readings and discussions in our course, as well as to any outside interests/experiences/readings that you find relevant.

Midterm examinations: We will have two **cumulative** examinations on February 25 and April 17. Midterms will be based on readings and material covered in our class meetings.

Research project: As a three-stage, semester-long project, you will select an episode, technology, or issue involving biotechnology and investigate its history. You will develop this project through three separate assignments:

- an annotated bibliography,
- a short essay analyzing an image or object, and
- a final assignment, which you may complete in several ways, including a report synthesizing your research findings, an interdisciplinary and/or creative submission, or a history of biotech-informed research or fellowship proposal.

We will meet early in the semester to discuss your topic and plans for this project.

Field trip: Professor Robin Scheffler of MIT will take us on a guided walking tour of the history of biotechnology in Kendall Square, tentatively scheduled for Friday, March 29. This field trip is optional but highly encouraged.

Collaboration and academic integrity: You are warmly encouraged to consult with one another and with others outside of class in studying for exams, on your research, and on your writing and presentations. All work that you submit for evaluation should reflect your own research, thinking, and writing about the topic. This course is subject to the university's Academic Integrity policy—make sure that you're familiar with it. If you have questions on collaboration, please ask!

Attendance: You are responsible for all material covered during all of our class meetings. You are permitted three "personal day" absences, no questions asked. Additional absences will be excused provided you a) submit a note from a physician or documentation of required university activities and b) complete a make-up assignment.

Classroom collegiality: We will grapple with some challenging and disturbing ideas, events, writings, and images. I will do my best to make sure you know what's coming; if you have concerns, please let me know. Please also maintain civil respect for your colleagues and the perspectives, experiences, and identities that they bring to this class, including through frank questions and sincere arguments. Personal attacks are out of bounds.

Electronics: You are welcome to use laptops and tablets in class for accessing readings and taking notes. *Only course-related uses of electronics are permitted during class time*, and all mobile devices must be silenced and put away. Repeated digital distractions will negatively impact your participation grade.

Deadlines: A **half letter grade per day** (A to A-, A- to B+, etc.) will be deducted from assignments submitted after the deadline listed on the syllabus, except with prior consultation and written consent of the instructor. Questions? Ask!

Unforeseen conflicts*:* If you anticipate trouble, speak with me as soon as possible. If you can inform me of serious adverse circumstances in advance, we can make accommodations that are fair to you and your fellow students. It is more difficult to do so after the fact.

Disability and inclusion: If you have a documented disability, please notify me within the first two weeks of the semester and provide me with a letter from the Disability Services Office or The Connors Family Learning Center regarding accommodations that will help you succeed in this course. If you have other concerns about classroom inclusiveness, please talk with the Connors Center and with me. I will work with you!

Required Books: *Available at the BC bookstore and online:*

Hallam Stevens, *Biotechnology and Society: An Introduction* (Chicago: University of Chicago Press, 2016). **** Textbook – cited in syllabus as "B&S" ****

Elizabeth F. S. Roberts, *God's Laboratory: Assisted Reproduction in the Andes* (Berkeley: University of California Press, 2012). ****Available online via BC libraries***:* https://www-jstor-org.proxy.bc.edu/stable/10.1525/j.ctt1pnvpk

Sophia Roosth, *Synthetic: How Life Got Made* (Chicago: University of Chicago Press, 2017).

Tiago Saraiva, *Fascist Pigs: Technoscientific Organisms and the History of Fascism* (Cambridge, MA: MIT Press, 2016).

Hallam Stevens, *Life out of Sequence: A Data-Driven History of Bioinformatics* (Chicago: University of Chicago Press, 2013).

UNIT 1: WHAT IS BIOTECHNOLOGY?

Week 1

Mon, Jan 14 *Introduction*

Weds, Jan 16 *Defining biotech*
- *B&S*, 1–32, 207–219.

Fri, Jan 18 *The "ghastly kitchen" of experimental life science*
- Claude Bernard, *An Introduction to the Study of Experimental Medicine* (1865), 5–15, 87–105.

Week 2

- H. G. Wells, *The Island of Dr. Moreau* (1896)

Mon, Jan 21 *No class – Martin Luther King Jr. Day*

Weds, Jan 23 *Biotechnology and hybrids*

Fri, Jan 25 *Quasi-objects and imaginaries* ***R-A***
- Bruno Latour, *We Have Never Been Modern* (1993), 1–12, 51–55.
- Sheila Jasanoff, "Future Imperfect," in *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power* (2015), 1–13.

UNIT 2: ORGANISMS

Week 3

- Saraiva, *Fascist Pigs* (first half)

Mon, Jan 28 *Agriculture as technoscience* ***P1***

Weds, Jan 30 *Breeding and cloning*
- *B&S*, 236–249.

Fri, Feb 1 *Food* ***R-B***
- *B&S*, 97–115.

Week 4

- Saraiva, *Fascist Pigs* (second half)

Mon, Feb 4 *Agriculture and colonialism* ***P2***

Weds, Feb 6 *No class meeting – read Stevens*

Friday, Feb 8 *No class meeting – read Stevens*

UNIT 3: DATA

Week 5

- Stevens, *Life out of Sequence* (first half)
- *B&S*, 35–62.

Mon, Feb 11 *Molecular biology* ***P3***

Weds, Feb 13 *Alchemy and chemistry*

Fri, Feb 15 *Genomics* ***R-C***
- *B&S*, 174–191.

Week 6

- Stevens, *Life out of Sequence*, 108–220.

Mon, Feb 18 *Data* ***P4***

Weds, Feb 20 *Natural history & bioprospecting*
- *B&S*, 327–342.

Fri, Feb 22 *Units I-III review* ***R-A***

INTERLUDE: PROPERTY I

Week 7

Mon, Feb 25 ***Midterm I***

Weds, Feb 27 *The biotech business*
- *B&S*, 65–78.

Fri, Mar 1 *Patenting life* ***R-B***
- *B&S*, 79–94, 116–129.

UNIT 4: REPRODUCTION

Week 8

- Roberts, *God's Laboratory* (first half)

Mon, Mar 11 *Religion and biotechnology* ***P5***

Weds, Mar 13 *Eugenics* ***R-C***
- *B&S*, 159–173, 313–326.

Fri, Mar 15 *No class meeting;* ***Assignment I (annotated bibliography) due***

Week 9

- Roberts, *God's Laboratory* (second half)
- *B&S*, 195–206, 223–235.

Mon, Mar 18 *Reproductive technologies* ***P6***

Weds, Mar 20 *Identity* (Class discussion w/ author Amy Bonnaffons) ***R-A***

- Amy Bonnaffons, "Horse," in *The Wrong Heaven* (2018), 53–88.

Fri, Mar 22 *Designing, editing, & discrimination*

- *B&S,* 269–276.

UNIT 5: LIFE

Week 10

- Roosth, *Synthetic* (first half)

Mon, Mar 25 Plants as technologies, plants as kin (class discussion with ethnobotanist Ruth Goldstein of UC Irvine)

Weds, Mar 27 *How life got made* ***P7***

Fri, Mar 27 *The engineering ideal* ***R-B***

- *B&S*, 345–357.

Week 11

- Roosth, *Synthetic* (second half)

Mon, Apr 1 *De-extinction* ***P8***

Weds, Apr 3 *Biotechnology between lab, field, and market* (class discussion with anthropologist Ashawari Chaudhuri of MIT)

Fri, Apr 5 *No class meeting* – ***Assignment II (image analysis) due***

INTERLUDE: PROPERTY II

Week 12 (*BC Green Week*)

- *B&S*, 133–155; 253–268; 279–309.

Mon, Apr 8 *Tissues and cells*

Weds, Apr 10 *Molecules and data*

Fri, Apr 12 *No class meeting – Study for midterm!*

Week 13

Mon, Apr 15 *No class – PATRIOTS' DAY*

Weds, Apr 17 ***Midterm II***

Fri, Apr 19 *No class – EASTER HOLIDAYS*

UNIT 6: FUTURES PAST AND PRESENT

Week 14

Mon, Apr 22 *No class – EASTER HOLIDAYS*

Weds, Apr 24 *Food* ***R-C***

- Erik Jönsson, "Benevolent Technotopias and Hitherto Unimaginable Meats: Tracing the Promises of *in vitro* Meat," *Social Studies of Science* 46, no. 5 (2016): 725–748.
- Bill Davidson, "Bread from the Sea," *Collier's* (April 1954): 62–66.

Fri, Apr 26 *Bio-art*

- *B&S*, 358–374.

Week 15

- Film: *Jurassic Park* (1993)

Mon, Apr 29 *Sci-fi*

Weds, May 1 *Wrap-up*

******Assignment III (final paper) due by end of day on Friday, May 10******