

History 235: Drugs, Chemicals, & Health

Following substances through economies, environments, and bodies

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Social Sciences 136, T/Th 10:15-11:30am

Office Hours: W 1:30-3:30pm (Zoom – see Sakai for link) and by appointment

This course asks how we might think historically about synthetic chemicals, natural alternatives, and the benefits and hazards they pose to human health, society, and environments. Combining cultural, political, and economic history with interdisciplinary environmental history and science & technology studies, we will follow historical “biographies” and “genealogies” of drugs and chemicals through economies, environments, and bodies, from cellular to planetary scales, comparing and connecting different global settings (including North Carolina).



Sugar cane and refinery, Mississippi River corridor, Louisiana, 1998

[Misrach and Orff, Petrochemical America (New York: Aperture, 2012), 51. Photo by Richard Misrach.]

Acknowledgements*: Duke University sits on ancestral lands of the Eno and Occaneechi people who came to be affiliated within the Saponi Nation, as well as the Tuscarora Nation. These lands are home to present-day Native life and sovereignty: North Carolina's eight [state-recognized Native tribes](#), [urban Native organizations](#) such as the [Triangle Native American Society](#), and Duke's own [Native American Student Alliance](#). Duke, an institution with a [mission](#) to "help those who suffer, cure disease, and promote health," was financed historically by the proceeds of tobacco and electrical power generation, and is thus among the beneficiaries of products that also caused great harm to the health of humans and environments. Some of Duke's most prominent past patrons and leaders perpetuated exclusion, exploitation, and silencing of Black people, as did the long-segregated University itself. At the same time, Black students, faculty, staff and other contributors are and have long been pivotal contributors to the [university and its institutional evolution](#), including leadership in a present "journey to dismantle behaviors, practices, policies and institutions forged out of white supremacy."¹ None of these facts are unique to Duke. Yet as members of the Duke community, our collective relationship to them is. The same goes for further facts we may seek out regarding Duke's history and other histories lived before, beyond, within, alongside, and despite it, and their legacies at present-day Duke. Further, we're a disparate "we," each with our own individual and community histories we may wish to acknowledge and explore, histories inflecting our relationships to Duke's history and to each other.

What do we want to do about it? What does it mean to be responsible to these histories? This course is animated by the conviction that the study of history can be a stepping-stone toward an affirmative kind of responsibility, neither just a roster of blame for unjust harms and undeserved benefits, nor just a realist acquiescence to their inevitability seeking the most efficient means to discharge, erase, and forget such debts. As we tell histories by following substances, this course invites us not only to learn and acknowledge historical relations between lands, waters, materials, and peoples, but also to make this a starting point for fashioning affirmative individual and collective responsibilities for ourselves based on these histories, and figuring out how to act on them.

This syllabus is a product of many conversations with colleagues, particularly Nicole Barnes, Angela Creager, Ruth Goldstein, Michelle Murphy, Lissa Roberts, Nicholas Shapiro, Gabriela Soto Laveaga, and Keith Wailoo.

¹ The Hurston-James Society, "Juneteenth: An Open Letter to Duke," *The Chronicle*, 18 June 2020, <https://www.dukechronicle.com/article/2020/06/juneteenth-an-open-letter-to-duke>.

* These acknowledgements, a work in progress, draw on text and links generously shared by Prof. Juliana Barr and draw inspiration from the letter cited above and Theresa Stewart-Ambo and K. Wayne Yang, "Beyond Land Acknowledgment in Settler Institutions," *Social Text* 39, no. 1 (146) (March 1, 2021): 21–46.

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

Course requirements and grading:

- Participation 20%
- Compound Histories survey 5%
- Compound Histories project
 - Group submissions 3 * 12.5%
 - Individual submissions (reflecting, connecting, noticing) 3 * 12.5%

Course logistics: A typical week of this course will include:

- a) **Readings**, available digitally via Sakai.
- b) **Full-class lectures + discussion** (as a class, in small groups, or in sections).
- c) Ongoing **Compound Histories group project research**. Most weeks will set aside some class time for checking in with your group and planning next steps.
- d) **Compound Histories workshops**. These will give you a chance to present, discuss, and solicit feedback from peers and instructors on project work in progress. All workshops are oriented toward advancing our work on our projects and supporting others in doing so. All workshops take place during normal class meeting times.

Participation: To do your part in making for a productive class, please:

- a) **read** each week's assigned texts.
- b) **post twice a week on our Sakai Forum**, by 9am Tues and 9am Thurs, beginning in Week 2. Except where specified otherwise, all Tues posts should be brief response questions/comments addressing one or more of the week's readings, jump-starting our collective thinking for the week. You may point out something exciting, confusing, infuriating, etc. about the reading, or draw a comparison or contrast to another reading. You are encouraged, though not required, to reflect on an aspect of the reading bearing upon your group's project topic. A few sentences is plenty for full credit; feel free to write more if you'd like. We will occasionally ask a student or two to share their posts during class, to help us advance our class-wide discussion. Instructions for Thurs posts vary, often tied to project work. See details on syllabus.
- c) **attend** workshop sessions, engaging as both **speaker** and **listener** and bringing along Compound Histories project work in progress as applicable.
- d) **stay home from class and group meetings if warranted** based on symptoms related to COVID-19, a known exposure to COVID-19, or a positive test for COVID-19, or if attending would entail unreasonable risk to your health or the health of others with whom you are in close contact. **Please reach out to me and your academic dean** as soon as possible in any such circumstances so we can discuss arrangements for your continued participation in class and your group's project. **Please also be in touch should any other health concerns or university commitments preclude in-person participation.** We will figure it out!

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Compound Histories project: As a semester project, in groups of five, you will investigate aspects of the history, life cycle, and beneficial and/or harmful health consequences of a chemical substance. We will carry out this project in three stages, each concluding with a group submission and individual short essays reflecting on your research and drawing connections to our readings, lectures, and discussions. This project will give you the chance to address your chosen material(s) from a perspective of your choice, drawing on your field of study and/or other scholarly and creative perspectives you'd like to explore. It's going to be totally great. Details will be posted on Sakai.

Late submissions: Except with prior consultation and written consent of instructor, a **half letter grade** (A to A-, A- to B+, etc.) will be deducted from assignments submitted after the deadline listed on the syllabus. An **additional half-letter grade** will be deducted for each additional two days of late submission (including weekends). Questions? Ask! (We mean it: please do ask. Deadlines are there to support your progress, not to burden you.)

Collegiality and mutual support: We will grapple with some disturbing ideas, events, writing, and images, as well as topics that may be of significant personal experience to some of us and uncertain or unfamiliar to others. We will do our best in this syllabus and in class to make sure you know what's coming. If you have concerns, please let us know.

We all bring different perspectives, experiences, identities, and concerns to this class. You will all (we hope!) disagree with some of the arguments advanced by our authors, by your instructors, and/or by each other. We ask that you join us in supporting our mutual learning by posing frank questions, presenting sincere arguments, testing uncertain ideas, and listening and responding to each other in a tough-minded spirit of generosity.

Unforeseen conflicts: This is an unusual time. We're committed to being flexible and making accommodations that are fair to you and your fellow students. If you anticipate trouble, please speak with your instructors as soon as possible. The more we can stay ahead of challenging circumstances, the better we'll be able to navigate them.

Collaboration and academic integrity: Group project submissions are evaluated as the collective work of all group members. You are warmly encouraged to consult with others in and outside of class on all aspects of this project. Individual reflection/connection short essays should reflect your own reading, thinking, and writing. As a matter of intellectual generosity, please acknowledge especially substantial assistance you receive from anyone other than course instructors by including an "acknowledgements" note in your individual or group submission.

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This course is subject to the [Duke Community Standard](#)—make sure you're familiar with it. If you have questions on collaboration, [citation](#), or [appropriate use of sources](#), please ask!

Electronics: Like drugs and chemicals, classroom electronics are a *pharmakon*—at once remedy, poison, & scapegoat for our limitations and successes. With the exception of emergencies, please join me in directing all in-class multitasking toward activities that feed into our course (taking notes; consulting course readings; searching for materials that raise or answer questions relevant to in-class discussion) rather than distract from it.

As much as is feasible and in accord with accessibility, we ask you to join us in using laptops or tablets rather than phones for these purposes, keeping phones away during lectures and discussions. For technology and accessibility support, please contact the [Academic Resource Center](#), [OIT](#), or other relevant campus resources.

Accommodations and accessibility: We want to do all we can to ensure that this class is accessible, inclusive, and equitable for all students. Please notify us within the first two weeks of class (or as soon as possible thereafter, for concerns arising mid-semester) with information about accommodations that we can provide to ensure accessibility, per the [Student Rights and Responsibilities](#) of the Duke accessibility office. If you have other concerns about classroom inclusiveness, please let us know. We will work with you!

Duke University is committed to providing equal access to students with documented disabilities. Students with disabilities may contact the Student Disability Access Office (SDAO) to ensure your access to this course and to the program. There you can engage in a confidential conversation about the process for requesting reasonable accommodations both in the classroom and in clinical settings. Students are encouraged to register with the SDAO as soon as they begin the program. Please note that accommodations are not provided retroactively. More information can be found online at access.duke.edu or by contacting SDAO at 919-668-1267, SDAO@duke.edu.

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Spraying DDT in Oregon, 1955.

[USDA Forest Service, Pacific Northwest Region, State and Private Forestry, Forest Health Protection. Portland Station Collection, image PS-1429; <https://www.flickr.com/photos/151887236@N05/32213742634/>]

UNIT 1 (WEEKS 1-2): DOING HISTORIES OF CHEMICALS AND DRUGS

Tues, Aug 24 *Pharmakon planet*

****No Forum posts during Week 1****

Thurs, Aug 26 *Compound histories*

- Timothy Mitchell, "Can the Mosquito Speak?," in *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 25-32 (through end of paragraph at top of 32 in ProQuest ebook edition).
- Lissa L. Roberts and Simon Werrett, eds., *Compound Histories: Materials, Governance and Production, 1760-1840* (Leiden: Brill, 2018), <https://brill.com/view/title/33694>, 1-19.

Tues, Aug 31 *What is a chemical? What is a pollutant?*

- Bernadette Bensaude-Vincent and Jonathan Simon, "Chemistry and Pollution," in *Chemistry: The Impure Science*, 2nd ed. (London: Imperial College Press, 2012), 11-32.
- Max Liboiron, *Pollution Is Colonialism* (Durham: Duke University Press, 2021), 1-37.

****First reading response Forum post (due 9am each Tues) ****

Use "What is a chemical/drug?" Forum section.

Thurs, Sept 2 *What is a drug?*

- Jeremy A. Greene and Sergio Sismondo, "Introduction," in Sismondo and Greene, *The Pharmaceutical Studies Reader* (Malden, MA: Wiley Blackwell, 2015), 1-11.
- Marcy Norton, *Sacred Gifts, Profane Pleasures: A History of Tobacco and Chocolate in the Atlantic World* (Ithaca: Cornell University Press, 2008), 1-27.

****Thurs. Forum (due 9am each Thurs): respond to a Tuesday post.****

*****Compound Histories Survey due Fri, Sept 3, 5pm*****

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UNIT 2: SUBSTANCES & SOCIETIES

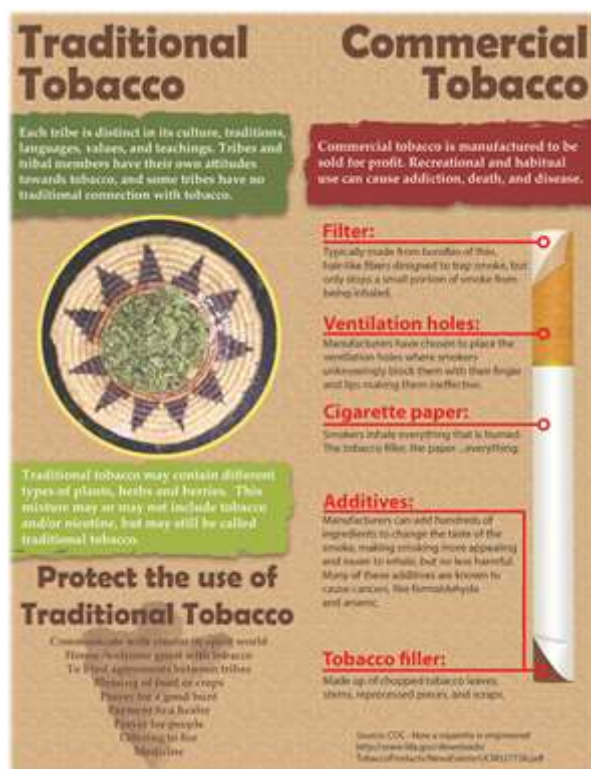
Tues, Sept 7 **Tobacco: Chemical responsibility**

- Nan Enstad, "The Bright Leaf Tobacco Network" and "Conclusion: Called to Account," in *Cigarettes, Inc.: An Intimate History of Corporate Imperialism* (Chicago: University of Chicago Press, 2018), 86-119, 260-268.
- Keith Wailoo, "The FDA's Proposed Ban on Menthol Cigarettes," *New England Journal of Medicine* 380, no. 11 (March 14, 2019): 995-97, <https://doi.org/10.1056/NEJMp1900204>.
- "[Tobacco.](#)" *Last Week Tonight with John Oliver* (HBO), 2015.

Thurs, Sept 9 **Chemicals and cultures**

- James F. W. Johnston, "The Narcotics We Indulge In—Tobacco," in *The Chemistry of Common Life*, vol. 2 (New York: D. Appleton, 1855), 5-35.
- Rosalyn R. LaPier, "[Why Native Americans Do Not Separate Religion from Science.](#)" *The Conversation*, April 20, 2017.
- Kristina García, "Decolonizing the Syllabus," *Penn Today*, 15 Nov 2019, <https://penntoday.upenn.edu/news/global-history-science>.

****Thurs. Forum: post a picture/screenshot of a source you've found and a brief description of how you found it to your project group's Forum.****



Traditional Tobacco and Commercial Tobacco

[National Native Network, <http://keepitsacred.itcmi.org/2018/07/nnn-ihs-hdp-webinar-southwest-tribal-tobacco-coalition/>]

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Tues, Sept 14 **Mercury:** Alchemy and mining, gender and sexuality

- Tara E. Nummedal, "The Lion's Blood," in *Anna Zieglerin and the Lion's Blood: Alchemy and End Times in Reformation Germany* (Philadelphia: University of Pennsylvania Press, 2019), 70-100.
- Nicholas Casey and Brent McDonald, "How Tainted Gold May Have Ended Up in Your Phone," *The Weekly* (*The New York Times*), August 30, 2019, <https://www.nytimes.com/2019/08/30/the-weekly/gold-apple-iphone-colombia.html>.

Thurs, Sept 16 Workshop: Close-reading sources

****Thurs. Forum: post a short snippet of close-reading analysis to your group's Forum.****

Tues, Sept 21 Workshop: Checkpoint 1 work-in-progress presentations

****No Forum posts this week.****

*****Compound Histories Project: Group Checkpoint 1***
(Annotated bibliography + primary source analyses)
Due Weds, Sept 22, 5pm**

Thurs, Sept 23 No meeting: reflect & connect

*****Reflecting, Connecting, Noticing: Individual Assignment 1***
(3 short essays @ 300-500 words each)
Due Friday, Sept 24, 5pm**

UNIT 3: CHEMICAL GOVERNANCE

Tues, Sept 28 **Indigo:** Varieties of industrial chemistry

- Tiffany Lethabo King, *The Black Shoals: Offshore Formations of Black and Native Studies* (Durham: Duke University Press, 2019), 125-132.
- Prakash Kumar, "Introduction: The Odyssey of Indigo," in *Indigo Plantations and Science in Colonial India* (New York: Cambridge University Press, 2012), 1-24.

Thurs, Sept 30 Anthropocene or "plantationocene"?

- "The Plantationocene and Plantation Legacies Today," *Edge Effects*, January 22, 2019, <https://edgeeffects.net/plantation-legacies-plantationocene/>.
- Gabriela Soto Laveaga, "Largo Dislocare: Connecting Microhistories to Remap and Recenter Histories of Science," *History & Technology* 34, no. 1 (March 2018): 21-30, <https://doi.org/10.1080/07341512.2018.1516850>.

****Thurs. Forum: respond to a Tuesday post in another group's Forum.****

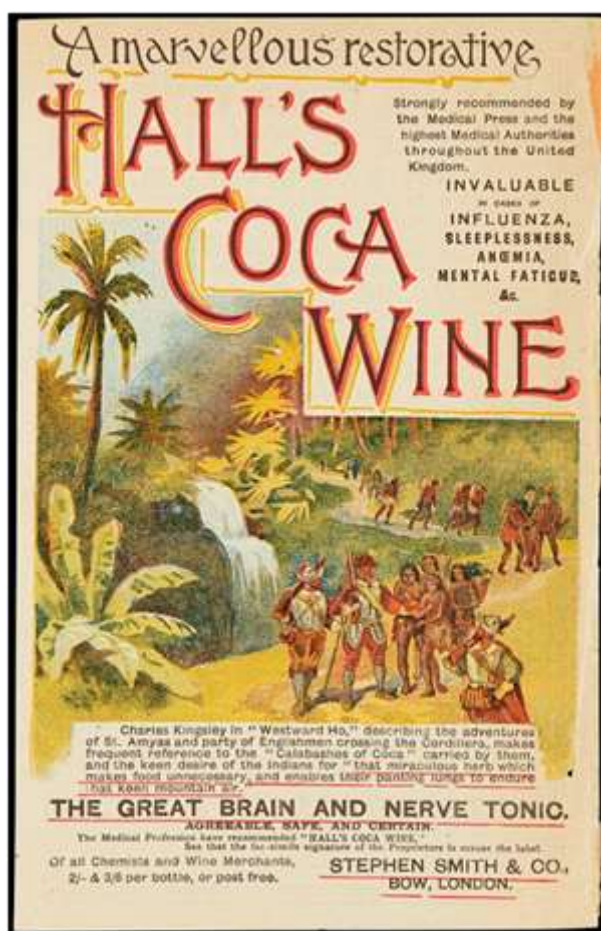
Tues, Oct 5 FALL BREAK

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

Thurs, Oct 7 Quinine & Artemisinin: Drugs and empire

- Youyou Tu, "Artemisinin—A Gift from Traditional Chinese Medicine to the World (Nobel Lecture)," *Angewandte Chemie International Edition* 55, no. 35 (2016): 10210–26.
- Matthew James Crawford, "Quina as a Medicament from the Andean World," in *The Andean Wonder Drug: Cinchona Bark and Imperial Science in the Spanish Atlantic, 1630-1800* (Pittsburgh, PA: University of Pittsburgh Press, 2016), 23-42.

****Thurs. Forum: reading response post.****



Advertisement for Hall's Coca Wine, circa 1890s.

[Wellcome Images, <https://wellcomeimages.org/indexplus/image/L0063964.html>, accessed 21 June 2018]

Mon, Oct 11: INDIGENOUS PEOPLES' DAY

- (Have you read Robin Wall Kimmerer, *Braiding Sweetgrass* (2013)? Highly recommended!)

Tues, Oct 12: Fertilizers & waste: Recycling and "metabolic history"

- Hannah Landecker, "A Metabolic History of Manufacturing Waste: Food Commodities and Their Outsides," *Food, Culture & Society* 22, no. 5 (2019): 530–47, <https://doi.org/10.1080/15528014.2019.1638110>.

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

Thurs, Oct 14: *Workshop: Locating compound histories*

****Thurs. Forum: post a snippet of Locating analysis to your group's Forum.****

Tues, Oct 19: ***Pesticides, vaccines, antibiotics: Governance by eradication***

- Julie Livingston, Keith Wailoo, and Barbara M. Cooper, "Vaccination as Governance," in *Three Shots at Prevention: The HPV Vaccine and the Politics of Medicine's Simple Solutions* (Baltimore: Johns Hopkins University Press, 2010), 231-253.
- Bharat Jayram Venkat, "Of Cures and Curses: Toward a Critique of Curative Reason," *Public Culture* 30, no. 2 (May 1, 2018): 277-82.

Thurs, Oct 21: *Workshop: Comparing & connecting compound histories*

****Thurs Forum: post a snippet of Comparing/Connecting analysis to your group's Forum.****

Tues, Oct 26: ***Air & water: Racism, justice, & privilege in environmental health***

- Kristen Simmons, "Settler Atmospherics," *Cultural Anthropology*, November 20, 2017, <https://culanth.org/fieldsights/1221-settler-atmospherics>.
- Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers* (Durham: Duke University Press, 2006), 1-16.
- Vann R. Newkirk II, "Fighting Environmental Racism in North Carolina," *The New Yorker*, January 16, 2016.

Thurs, Oct 28: *Catching our breath*

****Thurs. Forum: respond to a Tuesday post in another group's Forum.****

Tues, Nov 2: *Workshop: Checkpoint 2 work-in-progress presentations*

****No Forum posts this week.****

*****Compound Histories Project Part II*****

(Contextual sources analyses, comparisons and/or connections linking them, and final submission proposal)

Due Wednesday, Nov 3, 5pm

Thurs, Nov 4: *No meeting: reflect & connect*

*****Reflecting, Connecting, Noticing: Individual Assignment II*****

(3 short essays @ 300-500 words each)

Due Friday, Nov 5, 5pm

UNIT 4: DRUGS AND CHEMICALS OTHERWISE?

Tues, Nov 9: ***Safer chemicals? Green chemistry and civic science***

- Sara Wylie, Nick Shapiro, and Max Liboiron, "Making and Doing Politics Through Grassroots Scientific Research on the Energy and Petrochemical Industries," *Engaging Science, Technology, and Society* 3 (2017): 393-425.

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

Thurs Nov 11: **Better drugs?** Precision medicine and pharma justice

- Francis S. Collins and Harold Varmus, "A New Initiative on Precision Medicine," *New England Journal of Medicine* 372, no. 9 (February 26, 2015): 793–95.
- Muin J. Khoury and Sandro Galea, "Will Precision Medicine Improve Population Health?," *JAMA* 316, no. 13 (October 4, 2016): 1357–58.
- Jeremy A. Greene, "Making Medicines Essential: The Emergent Centrality of Pharmaceuticals in Global Health," *BioSocieties* 6, no. 1 (March 1, 2011): 10–33.

****FINAL Thurs. Forum: Post a question for Tuesday Nov. 16 session.****

Tues, Nov 16: *Catching up, looking back, and/or guest speaker panel*

Thurs Nov 18: *No class – work on final projects*

*****We would be happy to provide feedback on partial or full drafts of project Final Submission materials. Drafts are due by 5pm Monday, Nov 22. We will return feedback by 5pm Monday, Nov 29.*****

Tues, Nov 23: *Catching up and looking back*

Thurs Nov 25: *THANKSGIVING*

Tues, Nov 30: *Wrap-up: final thoughts and open questions*

Thurs Dec 2: *Open office hours – continuing conversations, project questions*

*****Compound Histories Project Final Submission***
(Research paper, podcast, mixed-media web presentation, video, or other work + Bibliography)
Due Friday, Dec 3, 5pm**

Mon-Tues Dec 6-7: OPTIONAL Compound Histories Festival (day & time TBD) – share your final projects with other groups, over pizza if circumstances allow.

*****Reflecting, Connecting, Noticing: Individual Assignment III***
(3 short essays @ 300-500 words each)
Due Sunday, Dec 12, 5pm**

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SUPPLEMENTARY BIBLIOGRAPHY

Overviews and miscellanies

- *General chemical and pharmaceutical reference works:*
 - See <https://guides.library.duke.edu/chemistry/gettingstarted>
 - *Ullmann's Encyclopedia of Industrial Chemistry*, 6th-7th ed. (Weinheim: Wiley-VCH, 2003-2020), <https://onlinelibrary-wiley-com.proxy.lib.duke.edu/doi/book/10.1002/14356007>.
 - *Merck Manual of Diagnosis and Therapy*, <https://www.merckmanuals.com/professional>
- *Blogs and series:*
 - *Global interconnections of materials and society in the Anthropocene: Technosphere Magazine*, <https://technosphere-magazine.hkw.de/>, esp. the issues on "Materials," "Metabolic Systems," "Phosphorus," "Spheres," and "Substances."
 - *Drug discovery: Derek Lowe, "In the Pipeline,"* <https://blogs.sciencemag.org/pipeline/>
- *Chemicals and "chemistries"*
 - Lissa L. Roberts and Simon Werrett, eds., *Compound Histories: Materials, Governance and Production, 1760-1840* (Leiden: Brill, 2018), <https://brill.com/view/title/33694>.
 - Roald Hoffmann, *The Same and Not the Same* (New York: Columbia University Press, 1995), esp. xiii-51.
 - Lissa Roberts, "Exploring Global History through the Lens of History of Chemistry: Materials, Identities and Governance," *History of Science* 54, no. 4 (2016): 335-61.
 - Projit Bihari Mukharji, "Parachemistries: Colonial Chemopolitics in a Zone of Contest," *History of Science* 54, no. 4 (2016): 362-82.
 - Evan Hepler-Smith, "Molecular Bureaucracy: Toxicological Information and Environmental Protection," *Environmental History* 24, no. 3 (2019): 534-60.
 - Carsten Reinhardt, ed., "Focus: What's in a Name: Chemistry as a Nonclassical Approach to the World," *Isis* 109, no. 3 (2018): 559-607.
 - Bernadette Bensaude-Vincent and Jonathan Simon, *Chemistry: The Impure Science*, 2nd ed. (London: Imperial College Press, 2012).
 - W. H. Brock, *The Chemical Tree: A History of Chemistry* (New York: Norton, 2000).
 - Fred Aftalion, *A History of the International Chemical Industry: From the Early Days to 2000*, 2nd ed. (Philadelphia, PA: Chemical Heritage Press, 2001).
- *Drugs:*
 - Jeremy A. Greene, *Generic: The Unbranding of Modern Medicine* (Baltimore: Johns Hopkins University Press, 2014), esp. 1-17.
 - Sergio Sismondo and Jeremy A. Greene, eds., *The Pharmaceutical Studies Reader* (Malden, MA: Wiley Blackwell, 2015).
 - Joseph Dumit, *Drugs for Life: How Pharmaceutical Companies Define Our Health* (Durham: Duke University Press, 2012).
- *Pollution and toxicity:*
 - Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Columbus: Ohio University Press, 2006).

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- Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers* (Durham: Duke University Press, 2006).
- Gregg Mitman, *Breathing Space: How Allergies Shape Our Lives and Landscapes* (New Haven: Yale University Press, 2007).
- David Arnold, *Toxic Histories: Poison and Pollution in Modern India* (Cambridge: Cambridge University Press, 2017).
- Scott Frickel and James R. Elliott, *Sites Unseen: Uncovering Hidden Hazards in American Cities* (New York: Russell Sage Foundation, 2018).
- Soraya Boudia et al., "Residues: Rethinking Chemical Environments," *Engaging Science, Technology, and Society* 4 (2018): 165–78, <https://doi.org/10.17351/ests2018.245>.
- *Health and disease:*
 - Annemarie Goldstein Jutel, *Putting a Name to It: Diagnosis in Contemporary Society* (Baltimore: Johns Hopkins University Press, 2011), 1-14.
 - Charles E. Rosenberg, "Framing Disease," in *Framing Disease: Studies in Cultural History*, ed. Charles E. Rosenberg and Janet Lynne Golden (New Brunswick: Rutgers University Press, 1992), xiii–xvi.
 - Linda Lorraine Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowledge* (Berkeley: University of California Press, 2006).
- *Following substances:*
 - Arjun Appadurai, ed., *The Social Life of Things: Commodities in Cultural Perspective* (New York: Cambridge University Press, 1986), esp. 3-63.
 - Timothy J. LeCain, *The Matter of History: How Things Create the Past* (New York: Cambridge University Press, 2017).
- *Natural/synthetic boundaries:*
 - Sophia Roosth, *Synthetic: How Life Got Made* (Chicago: University of Chicago Press, 2017).
 - Hallam Stevens, *Biotechnology and Society: An Introduction* (Chicago: University of Chicago Press, 2016).

Substance and Societies

- *Chemicals, empire, and colonialism:*
 - Wolfgang Schivelbusch, *Tastes of Paradise : A Social History of Spices, Stimulants, and Intoxicants*, trans. David Jacobson (New York: Vintage, 1993).
- *Race, drugs, nations, opioids:*
 - Anne Pollock, "BiDiL: Medicating the Intersection of Race and Heart Failure," in *The Pharmaceutical Studies Reader*, 87-105.
 - Keith Wailoo, *Pain: A Political History* (Baltimore: Johns Hopkins University Press, 2014).
 - Eric C. Schneider, *Smack: Heroin and the American City* (Philadelphia: University of Pennsylvania Press, 2008).
 - Zheng Yangwen, *The Social Life of Opium in China* (Cambridge University Press, 2005).

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- Julia Lovell, *The Opium War: Drugs, Dreams and the Making of China* (London: Picador, 2011).
- *Tobacco*:
 - Sarah Milov, *The Cigarette: A Political History* (Cambridge: Harvard University Press, 2019).
 - Nan Enstad, *Cigarettes, Inc.: An Intimate History of Corporate Imperialism* (Chicago: University of Chicago Press, 2018).
 - Allan M. Brandt, *The Cigarette Century: The Rise, Fall, and Deadly Persistence of the Product That Defined America* (New York: Basic Books, 2007).
- *Alchemy*
 - Lawrence Principe, *The Secrets of Alchemy* (University of Chicago. Press) (Chicago: University of Chicago Press, 2013).
 - William R. Newman and Lawrence Principe, *Alchemy Tried in the Fire: Starkey, Boyle, and the Fate of Helmontian Chymistry* (Chicago: University of Chicago Press, 2002).
- *Mining and metals*:
 - Allison Margaret Bigelow, *Mining Language: Racial Thinking, Indigenous Knowledge, and Colonial Metallurgy in the Early Modern Iberian World* (Chapel Hill: Omohundro Institute and UNC Press, 2020).

Varieties of industrial chemistry

- *Synthetic organic chemistry*:
 - Hugo Schweitzer, "The Influence of Sir William Henry Perkin's Discovery Upon Our Science," *Science* 24, no. 616 (1906): 481-88.
 - Roger Adams, "Synthetic versus Natural Products," *Industrial & Engineering Chemistry* 18, no. 11 (November 1, 1926): 1182-86.
 - John Hedley Brooke, "Overtaking Nature? The Changing Scope of Organic Chemistry in the Nineteenth Century," in *The Artificial and the Natural: An Evolving Polarity*, ed. William Royall Newman and Bernadette Bensaude-Vincent (Cambridge, MA: MIT Press, 2007), 275-292.
- *Knowing plants*:
 - Suzanne Simard, *How Trees Talk to Each Other*, 2016, https://www.ted.com/talks/suzanne_simard_how_trees_talk_to_each_other.
 - Richard Powers, *The Overstory* (New York: Norton, 2018), esp. 112-144.
 - Ruth Goldstein, "Ethnobotanics of Refusal: Methodologies in Respecting Plant(ed)-Human Resistance," *Anthropology Today* 35, no. 2 (2019): 18-22, <https://doi.org/10.1111/1467-8322.12495>.
- *Indigo and dyes*:
 - Anthony S. Travis, *The Rainbow Makers: The Origins of the Synthetic Dyestuffs Industry in Western Europe* (Bethlehem, PA: Lehigh University Press, 1993).
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Residents protest a lead smelter near Mombasa, Kenya, in 2013.

Photo by Norbert Allen, in Human Rights Watch, “Kenya: Toxic Lead Threatening Lives,” 24 June 2014, <https://www.hrw.org/news/2014/06/24/kenya-toxic-lead-threatening-lives>, accessed 21 June 2018.

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