

ILS 275 (7): Knowing Science through Its Objects

Meets: MWF 2:25-3:15 in Elvehjem L166

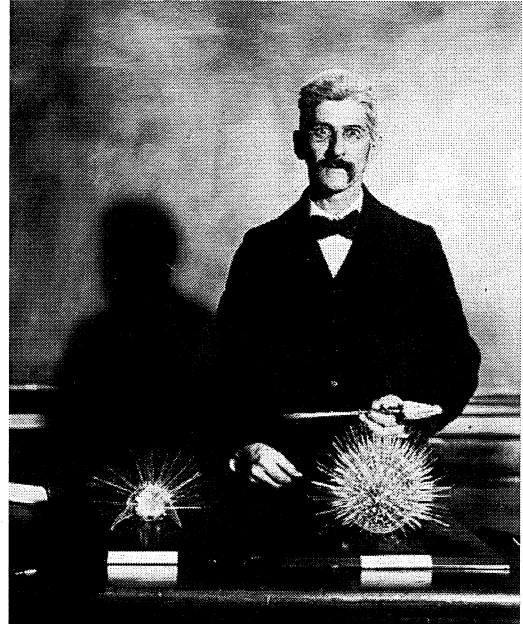
Prof. Lynn K. Nyhart

Office Hrs: Fridays 9:30-11:00 a.m., and by appt.

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When we think of science, we often think of scientific ideas (gravity, evolution, string theory), practices (the “scientific method,” experimental investigation, space exploration), and science-derived technologies (computers, biotechnology). This course takes a different tack, by looking at the history of scientific things, especially scientific instruments and natural history objects. What meanings do these things hold within science? How have such meanings come about, and how have they changed over time? How can we build on these meanings to make new knowledge in the history of science?



The goal of this course is to investigate these questions by thinking of yourself as a “science history detective.” In the first 6 weeks of the course, you will become familiar with the scene, by getting to know scientific objects located around the UW-Madison campus (and beyond) and learn more broadly about the history of scientific objects. In this part of the course, you will learn how to look at scientific things, how to think about their contexts, and how to find out more about both. All the while, you will be searching campus for YOUR main objects—the ones that you will pick (by the end of week 7) as a focus for your research, writing, and exhibition-making in the latter part of the course. In weeks 8 through 11, you will track down leads and, through four exhibition case studies, learn how to think about different ways to contextualize an object—to tell a story around it. And in weeks 12 through 15, you’ll work on telling those stories—making your “case”—about your objects, in both the form of exhibition and the form of writing.

Readings: There is one book available for purchase for this course: Thomas L. Hankins and Robert J. Silverman, *Instruments and the Imagination* (Princeton University Press, 1995; ISBN 0691005494). In addition, a course reader will be available for purchase at Student Print. One copy of all readings will also be placed on reserve at College Library.

Grading:

- 15% History detective hunt exercises (3 x 5% apiece)
- 30% short writing pieces (always due in L@UW Dropbox by noon of the due date)
 - 5% Close description exercise, due Friday 9/13
 - 10% Comparison/Contrast paper, due Friday 9/27
 - 15% Critical Analysis, due Friday 10/11
- 35% Final project:
 - 5% rationale ("My objects"), draft due 10/14, final due Wednesday 10/16
 - 5% research summary and preliminary bibliography (for both objects), due Friday 11/1;
 - 5% your own science-space interpretive proposal, due Monday, 11/18 (by 7 a.m.);
 - 10% final exhibited product, due when it's up (last week of class)
 - 10% Final Project Reflections, due Wednesday, 12/11
- 20% Class participation, including: attendance (unexcused absence from more than 2 classes will affect your grade); periodic brief written reflections on the FIG; and active engagement in class. "Participation" means being attentive to your peers and professor, not using the internet or phone AT ALL while in class, and being brave enough to jump into the discussion. Intelligent contributions are more important than the amount of air-time you take up.

Part I: Introducing Objects of Science

Week 1: Introductions

- W 9/4: Introduction (with Inter L&S 102): *What is the history of science? What is the history of material culture: How can they work together? Trajectories for the FIG courses.*
Receive Object Description and Detective Hunt Assignment #1

- F 9/6: A Wisconsin Scientific Icon: Situating the Babcock Butterfat Test

What are some different ways to think about an iconic UW object?

Read: "Babcock's Revolutionary Dairy Invention,"

<http://www.wisconsinhistory.org/museum/artifacts/archives/002824.asp>

Eric E. Lampard, *The Rise of the Dairy Industry in Wisconsin: A Study in Agricultural Change, 1820-1920* (Madison: State Historical Society of Wisconsin, 1963), pp. 196-204, [notes].

Campus trip (starting in classroom) to Biochemistry Building and Babcock Dairy. Meet with Prof. David Nelson, retired biochemist and instrument collector (and famous textbook author).

For background on Prof. Nelson, please see: http://host.madison.com/daily-cardinal/science/dave-nelson-researcher-teacher-and-collector/article_a9f7d6b8-910e-11e2-90cd-001a4bcf887a.html

Week 2: Looking at Things

M 9/9: Objects' Lives and the Life of Science

How is the "life" of an object different from the life of a person? What does Blume mean when he talks of the "life of science"?

Read: Stuart Blume, "Whatever happened to the string and sealing wax?" in *Invisible Connections: Instruments, Institutions, and Science*, ed. Robert Bud and Susan E. Cozzens (Bellingham, Washington: SPIE Optical Engineering Press, 1992), pp. 87-101

Lynn K. Nyhart, "Life after Death: The Gorilla Family of the Senckenberg Museum (Frankfurt/Main)," ms., forthcoming in *Endeavour*, Dec. 2013.

W 9/11: The microscope: Seeing the invisibly small

How is the early history of the microscope contextualized in each of the readings for today?

Read: Brian J. Ford, "Robert Hooke: Natural History through the Microscope," and "Antony van Leeuwenhoek," in Robert Huxley, ed. *The Great Naturalists* (London: The Natural History Museum, 2007), pp. 98-110.

Everett Mendelsohn, "The social locus of scientific instruments," in *Invisible Connections*, pp. 5-19.

F 9/13: Telescopes and observatories: Seeing the invisibly distant

What does it mean to "see" with a telescope or an observatory, and how has this changed over time?

Read: J. B. Zirker, *An Acre of Glass: A History and Forecast of the Telescope*, pp.1-26, 309-12.

Joel Stebbins, "The Washburn Observatory, 1878-1958," *Publications of the Astronomical Society of the Pacific*, October 1958, 70: 437-449.

View: IceCube South Pole Neutrino Observatory: <http://icecube.wisc.edu/>. Read front page, About Us>IceCube Explained, FAQ, and any other sections you like. Compare with the physics department's introduction at: <<http://icecube.physics.wisc.edu/>>

Object Description and Detective Hunt Assignment #1 due in Learn@UW Dropbox by NOON

Receive Comparison/Contrast Analysis and Detective Hunt Assignment #2 in class

SPECIAL SATURDAY FIELD TRIP: Milwaukee Art Museum and Milwaukee Public Museum

Part II: Doing Scientific Things with Scientific Things

Week 3: Discovering

M 9/16: Discovering places

According to Sorrenson, the ships of Captain Cook's voyages were more than vehicles; they were "scientific instruments." What does he mean by that? Do you buy Sorrenson's argument?

Read: Richard Sorrenson, "The Ship as a Scientific Instrument in the 18th Century," *Osiris*, 1996, 11: 221-236;

Trace the *Endeavour* voyage at: http://southseas.nla.gov.au/journals/maps/01_world.html

Explore the sub-maps by clicking around. Note that if you click on a date, you can see what some travelers wrote in their diaries during the voyage ("On this day").

W 9/18: Discovering peoples: material *cultures*

In Holmes' account, what cultural valuations of particular things, and of "things" in general, were revealed through the English voyagers' encounters with the Society Islanders? To what ends were plant and animal specimens collected?

Read: Richard Holmes, *The Age of Wonder* (NY: Random House, 2008), 1-21, 33-35, 38-40, 498-99.

View: On the *Endeavour* voyage map see Monday's assignment), find Tahiti. Click around to find some of the diary entries for that period, checking out the entries for Banks and others. How did the editors of the interactive voyage map handle the stay on Tahiti?

Optional, just for fun: Washburn Observatory Open House (if clear sky), 9-11 pm

F 9/20: Chazen Galleries and Collections with Martha Glowacki, artist and curator, Wisconsin Academy of Sciences, Arts, and Letters.

Week 4: Collecting and Ordering Nature

M 9/23: Taxonomic Ordering: Collecting and Comparing

What roles did comparison, visual culture, taxidermic skill, and artistry play in the development of Darwin's theory?

Read: Julia Voss, *Darwin's Pictures: Views of Evolutionary Theory, 1837-1874* (New Haven: Yale University Press, 2010), Chapter 1: "The Galápagos Finches," pp. 14-60, 262-73.

W 9/25: The Scientific Natural History Collection

How are natural history collections organized for science? What is a scientifically organized natural history collection good for? How has this changed over time?

Enlightenment Britain,” *British Journal for the History of Science*, FirstView, Sept. 2012, pp. 1-29; available on CJO doi: 10.1017/S0007087412000787

F 10/11: Joint Discussion: Exhibition Objects and Themes

Critical Analysis and Detective Hunt #3 Assignments Due by NOON in Dropbox

Week 7: Midterm Summing-up: Where are we now?

M 10/14: Field Trip: Wisconsin Historical Society.

“My Objects” (draft) rationale due in dropbox

W 10/16: Joint session: “My Objects” final list

“**My Objects**” (final) rationale due in dropbox.

F 10/18: Joint Session: Discussion of all three Detective Hunt Exercises and general review.

Part III: Exhibition Case Studies

Week 8: Subject Matter: Limnology

M 10/21: Birge and Limnology: Science at Wisconsin

Read: David Frey, “Wisconsin: The Birge-Juday Era,” in *Limnology in North America*, ed. by David G. Frey (Madison: University of Wisconsin Press, 1966), pp. 3-54

Review *Anandrous Journey* readings from 9/23.

W 10/23: Limnology as a “Border Science” between Lab and Field

Read: Robert E. Kohler, *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology* (Chicago: University of Chicago Press, 2002), pp. 97-99, 108-118.

M. L. Hartridge, *The Anandrous Journey: Revealing Letters to a Mentor* (Amherst, WI: Palmer Publications, 1997), xiii-xvii, 1-7, 15-17, 24-25, 41-3, 47-49, 81-2, 178-190.

F 10/25: Field Trip: University Archives (LKN) or Special Collections (ASM)

Week 9: Materials: Glass

M 10/28: Glass in instrumentation

Read: Alan Macfarlane and Gerry Martin, *Glass: A World History* (Chicago: University of Chicago Press, 2002), chapter 5: “Glass and Later Science,” pp. 79-98, 204-13.

W 10/30: Glass models: The Blaschkas

Read: Lorraine Daston, “The Glass Flowers,” in idem, ed., *Things that Talk: Object Lessons from Art and Science* (New York: Zone Books, 2008), pp. 223-54, 406-14.

Research exercise: use your internet skills to find out what else you can about the glass

Read: Rachel Poliquin *The Breathless Zoo* (University Park, PA: Penn State Press, 2012), Chapter 5: "Order," pp. 111-140.

Do: Make sure you have visited the WI State Herbarium by classtime today (for Detective Hunt #2) so we can discuss it.

F 9/27: Field Trip: Zoology Museum

Comparison/Contrast Analysis and Detective Hunt Assignment #2 due by NOON in L@UW Dropbox

Week 5: Using Scientific Instruments

M 9/30: Demonstrating

Why has "demonstration" been important in science (as opposed to, say, just reading stuff)? What has it meant? How has its role changed over time?

Read: Hankins and Silverman, *Instruments and the Imagination* (Princeton University Press, 1995), chapters 1 and 3, pp. 3-13, 37-71 (this is your purchased book)

Receive Critical Analysis and Detective Hunt #3 Assignments in class

W 10/2: Detecting and Recording; Delicacy

What do Hankins and Silverman mean by talking about "the universal language of instruments"? How is this "language" spoken?

Read: Hankins and Silverman, *Instruments*, chapter 6, pp. 113-147.

F 10/4: Field Trip: Physics Museum and Demonstration Collection

Read: Simon Schaffer, "Easily Cracked: Scientific Instruments in States of Disrepair," *Isis* 102, 2011, 706-717

Week 6: Systems of Display

Question for both Monday and Wednesday: what does it mean to consider displayed objects as a "system"? What different sorts of features make a collection a "system"? This week: work on picking your exhibit objects. If you haven't already done so, talk to an appropriate curator early in the week. Why this object?

M 10/7: Science and Artistry

Read: Rebecca Messbarger, "The re-birth of Venus in Florence's Museum of Physics and Natural History," *Journal of the History of Collections*, May 2012, 1-21.

Gavin Tullis, "Caveman Dioramas and Racial Sculptures: Telling the 'Story of Man' at the Field Museum" unpublished paper for History of Science 555, Spring 2013.

W 10/9: The Anatomical Collection as a Didactic Device

Read: Carin Berkowitz, "Systems of display: the making of anatomical knowledge in

Academic Performance and Accommodation:

Grading: I grade on a 4-point scale parallel to the UW's grade-point system. That is: A = 4.0, AB = 3.5, B = 3.0, etc. However, in practice I use a "penumbra" system on any given assignment, so that you can get a "high" or a "low" grade in a grade range. Thus:

A = 3.67-4.0; AB = 3.35-3.66; B = 2.76-3.34; BC = 2.26-2.75; C = 1.6-2.25; D = 1.0-1.5 (note: there is no "CD" final grade at the UW); F = below 1.0.

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. Assignments received after the new due date will be subject to late penalties.

Late assignment policy: Any piece of writing that you hand in late without an extension will have the following penalties assessed: .25 for every day late. For example, if the paper on its merits deserves a 3.5 (AB), after one day it would receive a 3.25 (high B), after two days a 3.0 (B), after three a 2.75 (high BC), after four a 2.5 (BC). NOTE: LATE FINAL PAPERS WILL NOT BE ACCEPTED.

Academic Credit and Plagiarism: Students may not copy sentences or ideas from others (including authors, websites, or other students) without giving credit to those sources; if someone else's words are so wonderful that you cannot substantially rephrase them, you must put them inside quotation marks, using the exact same words. If you omit the quotation marks or the credit, you are plagiarizing. Plagiarism is grounds for failure on the assignment plagiarized; repeated plagiarism is ground for failure in the course. Rule of thumb: if you use 3 or more words in a row from another source, they 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 a style manual or the Writing Lab. An excellent source of all the ways you can go wrong is:
<<http://students.wisc.edu/doso/docs/Plagiarism.pdf>>

Appealing a Grade: If you have questions about a grade, come speak to me. If the problem is not resolved, please contact the ILS Chair, Prof. Mike Van den Heuvel. 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; www.mcburney.wisc.edu] 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).

Journal of American History:

<http://jah.oxfordjournals.org/content/98/3/776.full?keytype=ref&ijkey=keFzbpv52NqcZFm>

Harvard Magazine: <http://harvardmagazine.com/2011/03/out-of-place>

F 11/15: Field Trip TBA

Part IV: Making the Exhibitions

Week 12: The Exhibitor and the Visitor

M 11/18: Brainstorming science exhibitions

Interpretive Proposal due MONDAY BY 7 a.m.

W 11/20: Group Work

Read: Lawrence Weschler, *Mr. Wilson's Cabinet of Wonder: Pronged Ants, Horned Humans, Mice on Toast, and Other Marvels of Jurassic Technology* (New York: Vintage, 1996). (Begin).

Research, write, and trade drafts!

F 11/22: Group Work

Read: Continue reading *Mr. Wilson's Cabinet*.

Research, write, and revise!

Week 13: Exhibition Truth(s)?

M 11/25: Discuss *Mr. Wilson's Cabinet*

Exhibition brainstorming session (Ann)

W 11/27: Discuss *Mr. Wilson's Cabinet*

F 11/29: Thanksgiving break: No Class

Week 14: Produce Exhibitions! M 12/2, W 12/4, F12/6

Week 15: Final Touches

M 12/9: Last bits

W 12/11: Everything is in place. Exhibition opening!

F 12/13: Last class day! Evaluations, pats on the back, discuss what we've learned.

Final Project Reflections due Wednesday, 12/18

flower- and invertebrate-model makers Rudolph and Leopold Blaschka and their models. Write down your favorite facts and the URL from which they come, and deposit in L@UW. Which website has the best images? Which has the best information? What makes these “best”?

F 11/1: Glass demonstration

Research summary and preliminary bibliography due

Week 10: Science Education: The Physics of Light and Sound

M 11/4: Modeling Nature with Machines

Read: Hankins and Silverman, *Instruments*, chapter 7 (Stereoscope) and 8 (Speaking machines)

W 11/6: From Persuading to Teaching:

Read: Paolo Brenni, “The evolution of teaching instruments and their use between 1800 and 1930,” *Science and Education* (2012), 21: 191-226

Howard A. L. Dawes, “Wheatstone’s Wave Machine: A Physical Model of Light,” in *Making Instruments Count: Essays on Historical Scientific Instruments presented to Gerard L’Estrange Turner*, edited by R. G. W. Anderson, J. A. Bennett, W. F. Ryan (Brookfield, VT: Ashgate, 1993), pp. 127-138.

F 11/8: Curator Discussion

Week 11: Creative Juxtapositions

M 11/11: Birds and Eggs

How have personal stories intersected with professional ones in the history of ornithology? How have they remained separate?

Read: Carrol L. Henderson: *Oology and Ralph’s Talking Eggs: Bird Conservation Comes Out of Its Shell* (Austin: University of Texas Press, 2007), pp. 1-23

Mark V. Barrow, Jr., *A Passion for Birds: American Ornithology after Audubon* (Princeton: Princeton University Press, 1998), pp. 154-75, 253-59.

View: “Cordelia’s Story”: <<http://www.birdsacre.com/cordie.html>>

W 11/13: Objects in and out of place: Guest curator: Sarah Carter

Read: online reviews and discussions of “Tangible Things” Exhibition: