

SCIENCE IN AMERICA

History of Science/Medical History & Bioethics 394

Spring, 2006

- INSTRUCTOR:** Ronald L. Numbers
- OFFICE HOURS:** 10:00 - 11:00, Tues. & Thurs., 1432 MSC, 1300 University Ave.
- DESCRIPTION:** A survey from the colonial period to the present, with emphasis on the institutional growth of science and the ways in which science has influenced thought and life in America.
- TIME & PLACE:** 11:00 - 12:15, Tues. & Thurs., 1010 MSC, 1300 University Ave.
- FORMAT:** The course will consist of class discussions and presentations by the instructor.
- REQUIREMENTS:** All students are required to attend class, to read and discuss the assigned articles, to write a short research paper based on primary sources, to present their findings to the class, and to take a final examination. Undergraduate papers should not exceed 10 pages; graduate papers may be twice that long.
- READINGS:** The only required text for all students is Ronald L. Numbers and Charles E. Rosenberg, *The Scientific Enterprise in America: Readings from Isis* (Chicago: University of Chicago Press, 1996). Photocopies of the additional required readings will be available for purchase. Graduate students will, in addition, be required to read:
- Robert V. Bruce, *The Launching of Modern American Science, 1846-1876* (New York: Alfred A. Knopf, 1987).
- A. Hunter Dupree, *Science in the Federal Government: A History of Policies and Activities to 1940* (Cambridge, MA: Harvard University Press, 1957).
- Daniel J. Kevles, *The Physicists: A History of a Scientific Community in Modern America* (New York: Knopf, 1977).
- EVALUATION:** Students will be evaluated primarily on the basis of their papers and examinations, with attendance and participation in class playing a secondary role.

SCHEDULE

Jan. 17	Introduction
Jan. 19	Science in the Old World
Jan. 24	Colonial Science in the New World
Jan. 26	God and Nature
Jan. 31	Useful Knowledge
Feb. 2	Cultivating Science
Feb. 7	Supporting Science
Feb. 9	Diffusing Science
Feb. 14	Genesis, Geology, and the Origin of the Solar System
Feb. 16	Ethnology and Evolution
Feb. 21	Medical Science before Scientific Medicine
Feb. 23	Scientific Medicine
Feb. 28	Science and Technology
Mar. 2	Science and Industry
Mar. 7	Science and the American University
Mar. 9	Darwinism Comes to America

SPRING BREAK

Mar. 21	Evolution, Religion, and Scientific Naturalism
Mar. 23	Social Darwinism and Eugenics
Mar. 28	Creation and Evolution in the 1920s
Mar. 30	The Rise to World Scientific Power
Apr. 4	The Social Sciences
Apr. 6	The Behavioral Sciences
Apr. 11	Science between the World Wars
Apr. 13	World War II and the Bomb
Apr. 18	Cold War Science
Apr. 20	Big Science: The American Way?
Apr. 25	Science and Human Values
Apr. 27	The Morality of Science
May 2	Science, Pseudo-Science, and Quackery
May 4	Politics, Religion, and Science at the Turn of the Millennium

Science in the Old World

Required Reading:

I. Bernard Cohen, "The New World as a Source of Science for Europe," *Actes du IXe Congres International d'Histoire des Sciences* (Barcelona/Madrid, 1959), vol. 1, pp. 95-126.

Colonial Science in the New World

Required Reading:

Brooke Hindle, "The Natural History Circle," in *The Pursuit of Science in Revolutionary America, 1735-1789* (Chapel Hill: University of North Carolina Press, 1956), pp. 11-35.

Joyce E. Chaplin, "Nature and Nation: Natural History in Context," in *Stuffing birds, Pressing Plants, Shaping Knowledge: Natural History in North America, 1730-1860* (Philadelphia: American Philosophical Society, 2003), pp. 75-95.

Related Literature:

Raymond P. Stearns, *Science in the British Colonies of America* (Urbana: University of Illinois Press, 1970).

Brooke Hindle, *The Pursuit of Science in Revolutionary America, 1735-1789* (Chapel Hill: University of North Carolina Press, 1956).

God and Nature

Required Reading:

Sara Schechner Genuth, "From Heaven's Alarm to Public Appeal: Comets and the Rise of Astronomy at Harvard," in *Science at Harvard University: Historical Perspectives*, ed. Clark A. Elliott and Margaret W. Rossiter (Bethlehem, Penn.: Lehigh University Press, 1992), pp. 28-54.

David Levin, "Giants in the Earth: Science and the Occult in Cotton Mather's Letters to the Royal Society," *William and Mary Quarterly* 45 (1988): 751-70.

Related Literature:

Donald Fleming, "The Judgment upon Copernicus in Puritan New England," *Mélanges Alexandre Koyré* (Paris: Hermann, 1964), vol. 2, pp. 160-75.

J. Rixey Ruffin, "'Urania's Dusky Vails': Heliocentrism in Colonial Almanacs, 1700-1735," *New England Quarterly* 70 (1997): 306-13.

Perry Miller, "The Experimental Philosophy," in *The New England Mind: From Colony to Province* (Cambridge, Mass.: Harvard University Press, 1953), pp. 437-46.

Maxine Van de Wetering, "Moralizing in Puritan Natural Science: Mysteriousness in Earthquake Sermons," *Journal of the History of Ideas* 43 (1982): 417-38.

John E. Van de Wetering, "God, Science, and the Puritan Dilemma," *New England Quarterly* 38 (1965): 501.

Henry F. May, *The Enlightenment in America* (New York: Oxford University Press, 1976).

David Jaffee, "The Village Enlightenment in New England, 1760-1820," *William and Mary Quarterly* 47 (1990): 327-46.

Herbert Leventhal, *In the Shadow of the Enlightenment: Occultism and Renaissance Science in Eighteenth-Century America* (New York: New York University Press, 1976).

David D. Hall, *Worlds of Wonder, Days of Judgment: Popular Religious Belief in Early New England* (New York: Knopf, 1989).

Paul Semonin, *American Monster: How the Nation's First Prehistoric Creature Became a Symbol of National Identity* (New York: New York University Press, 2000).

Useful Knowledge

Required Reading:

Maxine van de Wetering, "A Reconsideration of the Inoculation Controversy," *New England Quarterly* 58 (1985): 46-67.

I. Bernard Cohen, "Benjamin Franklin," in *Dictionary of Scientific Biography*, ed. Charles C. Gillespie, 18 vols. (New York: Scribners, 1970-1990), vol. 5, pp. 129-39.

Related Literature:

Silvio A. Bedini, *Thinkers and Tinkers: Early American Men of Science* (New York: Charles Scribner's Sons, 1975)

Meyer Reinhold, "The Quest for 'Useful Knowledge' in Eighteenth-Century America," *Proceedings of the American Philosophical Society* 119 (1975): 108-32.

Perry Miller, "The Judgment of the Smallpox," in *The New England Mind: From Colony to Province* (Cambridge, Mass.: Harvard University Press, 1953), pp. 345-366.

James H. Cassedy, "Meteorology and Medicine in Colonial America: Beginnings of the Experimental Approach," *Journal of the History of Medicine and Allied Sciences* 24 (1969): 193-204.

Ronald L. Numbers, ed., *Medicine in the New World: New Spain, New France, and New England* (Knoxville: University of Tennessee Press, 1987).

William R. Newman, *Gehennical Fire: The Lives of George Starkey, an American Alchemist in the Scientific Revolution* (Cambridge, MA: Harvard University Press, 1994).

Neil Kamil, *Fortress of the Soul: Violence, Metaphysics, and Material Life in the Huguenots' New World, 1517-1751* (Baltimore: Johns Hopkins University Press, 2005).

I. Bernard Cohen, *Benjamin Franklin's Science* (Cambridge, Mass.: Harvard University Press, 1990).

Joyce E. Chaplin, *The First Scientific American: Benjamin Franklin and the Pursuit of Genius* (New York: Basic Books, 2006).

Michael Brian Schiffer, *Draw the Lightning Down: Benjamin Franklin and Electrical Technology in the Age of Enlightenment* (Berkeley and Los Angeles: University of California Press, 2003).

Brooke Hindle, *David Rittenhouse* (Princeton, N.J.: Princeton University Press, 1964).

James Delbourgo, "Common Sense, Useful Knowledge, and Matters of Fact in the Late Enlightenment: The Transatlantic Career of Perkins's Tractors," *William and Mary Quarterly*, 3rd ser., 61 (2004): 643-84.

Cultivating Science

Required Reading:

George H. Daniels, "The Process of Professionalization in American Science: The Emergent Period, 1820-1860," in *The Scientific Enterprise in America: Readings from Isis*, ed. Ronald L. Numbers and Charles E. Rosenberg (Chicago: University of Chicago Press, 1996), pp. 21-36.

Sally Gregory Kohlstedt, "Creating a Forum for Science: AAAS in the Nineteenth Century," in *The Establishment of Science in America: 150 Years of the American Association for the Advancement of Science*, by Kohlstedt, Michael M. Sokal, and Bruce V. Lewenstein (New Brunswick, N.J.: Rutgers University Press, 1999), pp. 7-39.

Related Literature:

John C. Greene, *American Science in the Age of Jefferson* (Ames: Iowa State University Press, 1984).

George H. Daniels, *American Science in the Age of Jackson* (New York: Columbia University Press, 1968).

Robert V. Bruce, *The Launching of Modern American Science, 1846-1876* (New York: Knopf, 1987).

Ronald L. Numbers and Todd L. Savitt, eds., *Science and Medicine in the Old South* (Baton Rouge: Louisiana State University Press, 1989).

Charlotte M. Porter, *The Eagle's Nest: Natural History and American Ideas, 1812-1842* (University: University of Alabama Press, 1986).

Sally Gregory Kohlstedt, *The Formation of the American Scientific Community: The American Association for the Advancement of Science, 1848-1860* (Urbana: University of Illinois Press, 1976).

Mary Ann James, *Elites in Conflict: The Antebellum Clash over the Dudley Observatory* (New Brunswick, NJ: Rutgers University Press, 1987).

Sally Gregory Kohlstedt, "In from the Periphery: American Women in Science, 1830-1880," *SIGNS* 4 (1979): 81-96.

Silvio A. Bedini, *The Life of Benjamin Banneker* (New York: Charles Scribner's Sons, 1972).

Nathan Reingold, "Definitions and Speculations: The Professionalization of Science in American in the Nineteenth Century," in *The Pursuit of Knowledge in the Early American Republic: American Scientific and Learned Societies from Colonial Times to the Civil War*, ed. Alexandra Oleson and Sanborn C. Brown (Baltimore: Johns Hopkins University Press, 1976), 33-69.

Supporting Science

Required Reading:

Hugh R. Slotten, "The Dilemmas of Science in the United States: Alexander Dallas Bache and the U.S. Coast Survey," in *The Scientific Enterprise in America: Readings from Isis*, ed. Ronald L. Numbers and Charles E. Rosenberg (Chicago: University of Chicago Press, 1996), pp. 37-60.

Stanley M. Guralnick, "Sources of Misconception on the Role of Science in the Nineteenth-Century American College," in *The Scientific Enterprise in America: Readings from Isis*, ed. Ronald L. Numbers and Charles E. Rosenberg (Chicago: University of Chicago Press, 1996), pp. 83-97.

Related Literature:

A. Hunter Dupree, *Science in the Federal Government: A History of Policies and Activities to 1940* (Cambridge, Mass.: Harvard University Press, 1957).

Silvio A. Bedini, *Thomas Jefferson: Statesman of Science* (New York: Macmillan, 1990).

Michele L. Aldrich, *New York State Natural History Survey, 1836-1842: A Chapter in the History of American Science* (Ithaca, N.Y.: Paleontological Research Institution, 2000).

William H. Goetzmann, *Exploration and Empire: The Explorer and the Scientist in the Winning of the West* (New York: Knopf, 1966).

Todd Shallat, *Structures in the Stream: Water, Science, and the Rise of the U.S. Army Corps of Engineers* (Austin: University of Texas Press, 1994).

William Stanton, *The Great United States Exploring Expedition of 1838-1842* (Berkeley and Los Angeles: University of California Press, 1975).

Hugh Richard Slotten, *Patronage, Practice, and the Culture of American Science: Alexander Dallas Bache and the U.S. Coast Survey* (Cambridge: Cambridge University Press, 1994).

Albert E. Moyer, *Joseph Henry: The Rise of an American Scientist* (Washington, DC: Smithsonian Institution Press, 1997).

Robert Post, "Science, Public Policy, and Popular Precepts: Alexander Dallas Bache and Alfred Beach as Symbolic Adversaries," in *The Sciences in the American Context: New Perspectives*, ed. Nathan Reingold (Washington: Smithsonian Institution Press, 1979), pp. 77-98.

Stanley M. Guralnick, *Science and the Anti-Bellum American College* (Philadelphia: American Philosophical Society, 1975).

Miriam R. Levin, *Defining Women's Scientific Enterprise: Mount Holyoke Faculty and the Rise of American Science* (Hanover, N.H.: University Press of New England, 2005).

Deborah Jean Warner, "Science Education for Women in Antebellum America," *Isis* 69 (1978): 58-67.

Howard S. Miller, *Dollars for Research: Science and Its Patrons in Nineteenth-Century America* (Seattle: University of Washington Press, 1970).

Diffusing Science

Required Reading:

Sally Gregory Kohlstedt, "Parlors, Primers, and Public Schooling: Education for Science in Nineteenth-Century America," in *The Scientific Enterprise in America: Readings from Isis*, ed. Ronald L. Numbers and Charles E. Rosenberg (Chicago: University of Chicago Press, 1996), pp. 61-82.

Margaret W. Rossiter, "Benjamin Silliman and the Lowell Institute: The Popularization of Science in Nineteenth-Century America," *New England Quarterly* 44 (1971): 602-26.

Related Literature:

Donald Zochert, "Science and the Common Man in Ante-Bellum America," *Isis* 65 (1974): 448-73.

Kim Tolley, *The Science Education of American Girls: A Historical Perspective* (New York: RoutledgeFalmer, 2003).

Kim Tolley, "Science for Ladies, Classics for Gentlemen: A Comparative Analysis of Scientific Subjects in the Curricula of Boys' and Girls' Secondary Schools in the United States, 1794-1850," *History of Education Quarterly* 36 (1996): 129-53.

John L. Rudolph, "Turning Science to Account: Chicago and the General Science Movement in Secondary Education, 1905-1920," *Isis* 96 (2005): 353-89.

Elizabeth B. Keeney, *The Botanizers: Amateur Scientists in Nineteenth-Century America* (Chapel Hill: University of North Carolina Press, 1992).

Richard Rhodes, *John James Audubon: The Making of an American* (New York: Knopf, 2004).

Mark V. Barrow, Jr., *A Passion for Birds: American Ornithology after Audubon* (Princeton, N.J.: Princeton University Press, 1998).

Sally Gregory Kohlstedt, "Nature, Not Books: Scientists and the Origins of the Nature-Study Movement in the 1890s," *Isis* 96 (2005): 324-52.

M. Susan Lindee, "The American Career of Jane Marcet's *Conversations on Chemistry*, 1806-1853," *Isis* 82 (1991): 8-23.

Joel J. Orosz, *Curators and Culture: The Museum Movement in America, 1740-1870* (Tuscaloosa: University of Alabama Press, 1990).

R. J. Hoage and William A. Deiss *New Worlds, New Animals: From Menagerie to Zoological Park in the Nineteenth Century* (Baltimore: Johns Hopkins University Press, 1996), pp. 109-25.

Fred Nadis, *Wonder Shows: Performing Science, Magic, and Religion in America* (New Brunswick, N.J.: Rutgers University Press, 2005).

Neal C. Gillespie, "Preparing for Darwin: Conchology and Natural Theology in Anglo-American Natural History," *Studies in History of Biology* 7 (1984): 93-145.

William J. Astore, *Observing God: Thomas Dick, Evangelicalism, and Popular Science in Victorian Britain and America* (Aldershop, U.K.: Ashgate, 2002).

John D. Davies, *Phrenology--Fad and Science: A 19th-Century American Crusade* (New Haven, Yale University Press, 1955).

Peter McCandless, "Mesmerism and Phrenology in Antebellum Charleston: 'Enough of the Marvellous,'" *Journal of Southern History* 43 (1992): 199-230.

Theodore Dwight Bozeman, *Protestants in an Age of Science: The Baconian Ideal and Antebellum American Religious Thought* (Chapel Hill: university of North Carolina Press, 1977).

Herbert Hovenkamp, *Science and Religion in America, 1800-1860* (Philadelphia: University of Pennsylvania Press, 1978).

Walter H. Conser, Jr., *God and the Natural World: Religion and Science in Antebellum America* (Columbia: University of South Carolina Press, 1993).

E. Brooks Holifield, "Science and Theology in the Old South," in *Science and Medicine in the Old South*, ed. Ronald L. Numbers and Todd L. Savitt (Baton Rouge: Louisiana State University Press, 1989), pp. 127-46.

Ronald L. Numbers, "Charles Hodge and the Beauties and Deformities of Science," in *Charles Hodge Revisited: A Critical Appraisal of His Life and Work*, ed. John W. Stewart and James H. Moorhead (Grand Rapids, Mich.: Eerdmans, 2002), pp. 77-102.

Genesis, Geology, and the Origin of the Solar System

Required Reading:

Ronald L. Numbers, "Cosmogonies from 1700 to 1900," in *The History of Science and Religion in the Western Tradition: An Encyclopedia*, ed. Gary B. Ferngren and Others (New York: Garland, 2000), pp. 350-355.

James R. Moore, "Geologists and Interpreters of Genesis in the Nineteenth Century," in *God and Nature: Historical Essays on the Encounter between Christianity and Science*, ed. David C. Lindberg and Ronald L. Numbers (Berkeley and Los Angeles: University of California Press, 1986), pp. 322-50.

Related Literature:

Ronald L. Numbers, *Creation by Natural Law: Laplace's Nebular Hypothesis in American Thought* (Seattle: University of Washington Press, 1977).

Rodney L. Stiling, "Scriptural Geology in America," in *Evangelicals and Science in Historical Perspective*, ed. David N. Livingstone, D. G. Hart, and Mark A. Noll (New York: Oxford University Press, 1999), pp. 177-92.

Morgan B. Sherwood, "Genesis, Evolution, and Geology in America before Darwin: The Dana-Lewis Controversy, 1856-1857," in *Toward a History of Geology*, ed., Cecil J. Schneer (Cambridge, Mass.: MIT Press, 1969), pp. 304-316.

Donald Fleming, *John William Draper and the Religion of Science* (Philadelphia: University of Pennsylvania Press, 1950).

Ethnology and Evolution

Required Reading:

G. Blair Nelson, "Men before Adam!": American Debates over the Unity and Antiquity of Humanity," in *When Science and Christianity Meet*, ed. Lindberg and Numbers (Chicago: University of Chicago Press, 2003), pp. 161-81.

Herbert Hovenkamp, "Coming from Nowhere," in *Science and Religion in America, 1800-1860* (Philadelphia: University of Pennsylvania Press, 1978), pp. 187-210, 262-64.

Related Literature:

William Stanton, *The Leopard's Spots: Scientific Attitudes toward Race in America, 1815-59* (Chicago: University of Chicago Press, 1960).

Stephen Jay Gould "Morton's Ranking of Races by Cranial Capacity: Unconscious Manipulation of Data May Be a Scientific Norm," *Science* 200 (1978): 503-509; reprinted as "American Polygeny and Craniometry before Darwin," in *The Mismeasure of Man* (New York: W. W. Norton, 1981), pp. 30-72.

Bruce Dain, *A Hideous Monster of the Mind: American Race Theory in the Early Republic* (Cambridge, Mass.: Harvard University Press, 2002).

Reginald Horsman, *Josiah Nott of Mobile: Southerner, Physician, and Racial Theorist* (Baton Rouge: Louisiana State University Press, 1987).

Terry A. Barnhart, *Ephraim George Squier and the Development of American Anthropology* (Lincoln: University of Nebraska Press, 2005).

Lester D. Stephens, *Science, Race, and Religion in the American South: John Bachman and the Charleston Circle of Naturalists, 1815-1895* (Chapel Hill: University of North Carolina Press, 2000).

David N. Livingstone, *The Preadamite Theory and the Marriage of Science and Religion*, vol. 82, part 3, of the *Transactions of the American Philosophical Society* (Philadelphia: American Philosophical Society, 1992).

Robert E. Bieder, *Science Encounters the Indian, 1820-1880: The Early Years of American Ethnology* (Norman: University of Oklahoma Press, 1986).

Reginald Horsman, "Scientific Racism and the American Indian in the Mid-Nineteenth Century," *American Quarterly* 27 (1975): 152-68.

Curtis M. Hinsley, Jr., *Savages and Scientists: The Smithsonian Institution and the Development of American Anthropology, 1846-1910* (Washington: Smithsonian Institution Press, 1981).

Thomas R. Trautmann, *Lewis Henry Morgan and the Invention of Kinship* (Berkeley and Los Angeles: University of California Press, 1987).

Medical Science before Scientific Medicine

Required Reading:

Gregg Mitman and Ronald L. Numbers, "From Miasma to Asthma: The Changing Fortunes of Medical Geography in America," *History and Philosophy of the Life Sciences* 25 (2003): 391-412.

Stephanie Browner, "Ideologies of the Anesthetic: Professionalism, Egalitarianism and the Ether Controversy," *American Quarterly* 51 (1999): 108-43.

Related Literature:

Conevery Bolton Valenčius, *The Health of the Country: How American Settlers Understood Themselves and Their Land* (New York: Basic Books, 2002), pp. 114-17.

John Harley Warner, *The Therapeutic Perspective: Medical Practice, Knowledge, and Identity in America, 1820-1885* (Cambridge, Mass.: Harvard University Press, 1986).

John Harley Warner, *Against the Spirit of System: The French Impulse in Nineteenth-Century American Medicine* (Princeton, N.J.: Princeton University Press, 1998).

Michael Sappol, *A Traffic of Dead Bodies: Anatomy and Embodied Social Identity in Nineteenth-Century America* (Princeton, N.J.: Princeton University Press, 2002).

Ronald L. Numbers, "William Beaumont and the Ethics of Human Experimentation," *Journal of the History of Biology* 12 (1979): 113-35.

Ronald L. Numbers and William J. Orr, Jr., "William Beaumont's Reception at Home and Abroad," *Isis* 72 (1981): 590-612.

Todd L. Savitt, "The Use of Blacks for Medical Experimentation and Demonstration in the Old South," *Journal of Southern History* 48 (1982): 331-48.

Richard J. Wolfe, *Tarnished Idol: William Thomas Green Morton and the Introduction of Surgical Anesthesia: A Chronicle of the Ether Controversy* (San Anselmo, Calif.: Norman Publishing, 2001).

Charles E. Rosenberg, *The Cholera Years: The United States in 1832, 1849, and 1866* (Chicago: University of Chicago Press, 1962).

Scientific Medicine

Required Reading:

Bert Hansen, "New Images of a New Medicine: Visual Evidence for Widespread Popularity of Therapeutic Discoveries in America after 1885," *Bulletin of the History of Medicine* 73 (1999): 629-678.

Nancy Tomes, "The Private Side of Public Health: Sanitary Science, Domestic Hygiene, and the Germ Theory, 1870-1900," *Bulletin of the History of Medicine* 64 (1990): 509-39.

Related Literature:

Ronald L. Numbers and John Harley Warner, "The Maturation of American Medical Science," in *Scientific Colonialism, 1800-1930: A Cross-Cultural Comparison*, ed. Nathan Reingold and Marc Rothenberg (Washington: Smithsonian Institution Press, 1987), pp. 191-214.

W. F. Bynum, *Science and the Practice of Medicine in the Nineteenth Century* (Cambridge: Cambridge University Press, 1994).

W. Bruce Fye, *The Development of American Physiology: Scientific Medicine in the Nineteenth Century* (Baltimore: Johns Hopkins University Press, 1987).

Gerald L. Geison, "Divided We Stand: Physiologists and Clinicians in the American Context," in *The Therapeutic Revolution: Essays in the Social History of American Medicine*, ed. Morris J. Vogel & Charles E. Rosenberg (Philadelphia: University of Pennsylvania Press, 1979), pp. 67-90.

Susan E. Lederer, "The Controversy over Animal Experimentation in America, 1880-1914," in *Vivisection in Historical Perspective*, ed. Nicolaas A. Rupke (London: Croom Helm, 1987), pp. 236-58.

Kenneth M. Ludmerer, *Learning to Heal: The Development of American Medical Education* (New York: Basic Books, 1985).

Ronald L. Numbers, ed., *The Education of American Physicians: Historical Essays* (Berkeley and Los Angeles: University of California Press, 1979).

Robert E. Kohler, *From Medical Chemistry to Biochemistry: The Making of a Biomedical Discipline* (Cambridge: Cambridge University Press, 1982).

Victoria A. Harden, *Inventing the NIH: Federal Biomedical Research Policy, 1887-1937* (Baltimore: Johns Hopkins University Press, 1986).

George W. Corner, *A History of the Rockefeller Institute, 1901-1953: Origins and Growth* (New York: Rockefeller Institute Press, 1964).

James C. Mohr, *Doctors and the Law: Medical Jurisprudence in Nineteenth-Century America* (New York: Oxford University Press, 1993).

Nancy Tomes, *The Gospel of Germs: Men, Women, and the Microbe in American Life* (Cambridge, Mass.: Harvard University Press, 1998).

Regina Markell Morantz-Sanchez, *Sympathy and Science: Women Physicians in American Medicine* (New York: Oxford University Press, 1985).

Michael Bliss, *Harvey Cushing: A Life in Surgery* (New York: Oxford University Press, 2005).

Science and Technology

Required Reading:

Iwan R. Morus, "Telegraphy and the Technology of Display: The Electricians and Samuel Morse," *History of Technology* 13 (1991): 20-40.

Paul Lucier, "Commercial Interests and Scientific Disinterestedness: Consulting Geologists in Antebellum America," *Isis* 86 (1995): 245-67.

Related Literature:

Kenneth Silverman, *Lightning Man: The Accursed Life of Samuel F. B. Morse* (New York: Alfred A. Knopf, 2003).

Nathan Reingold and Arthur P. Molella, "Theorists and Ingenious Mechanics: Joseph Henry Defines Science," *Science Studies* 3 (1973): 323-51.

Yakup Bektas, "Displaying the American Genius: The Electromagnetic Telegraph in the Wider World," *British Journal for the History of Science* 34 (2001): 199-232.

Margaret W. Rossiter, *The Emergence of Agricultural Science: Justus Liebig and the Americans, 1840-1880* (New Haven, Conn.: Yale University Press, 1975).

John Alfred Heitmann, *The Modernization of the Louisiana Sugar Industry, 1830-1910* (Baton Rouge: Louisiana State University Press, 1987).

Todd Shallat, *Structures in the Stream: Water, Science, and the Rise of the U.S. Army Corps of Engineers* (Austin: University of Texas Press, 1994).

Edward W. Stevens, Jr., *The Grammar of the Machine: Technical Literacy and Early Industrial Expansion in the United States* (New Haven: Yale University Press, 1995).

Bruce Sinclair, *Philadelphia's Philosopher Mechanics: A History of the Franklin Institute, 1824-1865* (Baltimore: Johns Hopkins University Press, 1974).

Robert C. Post, *Physics, Patents, and Politics: A Biography of Charles Grafton Page* (New York: Science History Publications, 1976).

Science and Industry

Required Reading:

Ronald Kline, "Construing 'Technology' as 'Applied Science': Public Rhetoric of Scientists and Engineers in the United States, 1880-1945," *Isis* 86 (1995): 194-221.

George Wise, "Ionists in Industry: Physical Chemistry at General Electric, 1900-1915," in *The Scientific Enterprise in America: Readings from Isis*, ed. Ronald L. Numbers and Charles E. Rosenberg (Chicago: University of Chicago Press, 1996), pp.187-202.

Related Literature:

David Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism* (New York: Alfred A. Knopf, 1977).

Edwin Layton, "Mirror-Image Twins: The Community of Science and Technology," in *Nineteenth-Century American Science: A Reappraisal*, ed. George H. Daniels (Evanston, Ill.: Northwestern University Press, 1972), pp. 210-30.

Reese V. Jenkins, *Images and Enterprise: Technology and the American Photographic Industry, 1839-1925* (Baltimore: Johns Hopkins University Press, 1975).

David A. Hounshell and John K. Smith, Jr., *Science and Corporate Strategy: Du Pont R & D, 1902-1980* (Cambridge: Cambridge University Press, 1988).

Jonathan Liebenau, *Medical Science and Medical Industry: The Formation of the American Pharmaceutical Industry* (Baltimore: Johns Hopkins University Press, 1986).

John P. Swann, *Academic Scientists and the Pharmaceutical Industry: Cooperative Research in Twentieth-Century America* (Baltimore: Johns Hopkins University Press, 1988).

Leonard S. Reich, *The Making of American Industrial Research: Science and Business at GE and Bell, 1876-1926* (Cambridge: Cambridge University Press, 1985).

George Wise, Willis R. Whitney, *General Electric, and the Origins of U.S. Industrial Research* (New York: Columbia University Press, 1985).

Robert V. Bruce, *Bell: Alexander Graham Bell and the Conquest of Solitude* (Boston: Little, Brown, 1973).

Paul Israel, *Edison: A Life of Invention* (New York: John Wiley, 1998).

Ronald R. Kline, *Steinmetz: Engineer and Socialist* (Baltimore: Johns Hopkins University Press, 1992).

Margaret W. Rossiter, "The Organization of the Agricultural Sciences," in *The Organization of Knowledge in Modern America, 1860-1920*, ed. Alexandra Oleson and John Voss (Baltimore: Johns Hopkins University Press, 1979), pp. 211-48.

Charles E. Rosenberg, "Science, Technology, and Economic Growth: The Case of the Agricultural Experiment Station Scientist, 1875-1914," in *Nineteenth-Century American Science: A Reappraisal*, ed. George H. Daniels (Evanston, Ill.: Northwestern University Press, 1972), pp. 181-209.

Alan I. Marcus, *Agricultural Science and the Quest for Legitimacy: Farmers, Agricultural Colleges, and Experiment Stations, 1870-1890* (Ames: Iowa State University Press, 1985).

Linda O. McMurtry, *George Washington Carver: Scientist and Symbol* (New York: Oxford University Press, 1981).

Deborah Fitzgerald, *The Business of Breeding: Hybrid Corn in Illinois, 1890-1940* (Ithaca, NY: Cornell University Press, 1990).

Richard C. Sawyer, *To Make a Spotless Orange: Biological Control in California* (Ames: Iowa State University Press, 1996).

Alfred D. Chandler, Jr., *Inventing the Electronic Century: The Epic Story of the Consumer Electronic and Computer Industries* (New York: Free Press, 2003).

Alfred D. Chandler, Jr., *Shaping the Industrial Century: The Remarkable Story of the Evolution of the Modern Chemical and Pharmaceutical Industries* (Cambridge, Mass.: Harvard University Press, 2005).

Science and the American University

Required Reading:

George H. Daniels, "The Pure-Science Ideal and Democratic Culture," *Science* 156 (1967): 1699-1705.

Robert E. Kohler, "The Ph.D. Machine: Building on the Collegiate Base," in *The Scientific Enterprise in America: Readings from Isis*, ed. Ronald L. Numbers and Charles E. Rosenberg (Chicago: University of Chicago Press, 1996), pp. 98-122.

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