William Barton Rogers and the Idea of MIT
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Abbreviations

BSNH  Boston Society of Natural History
CWE   Charles W. Eliot
ES    Emma Savage/Emma Rogers
HDR   Henry Darwin Rogers
JBR   James Blythe Rogers
JDR   John Daniel Runkle
PKR   Patrick Kerr Rogers
RER   Robert Empie Rogers
UVA   University of Virginia
WBR   William Barton Rogers
WBRP-MITA  William Barton Rogers Papers, Massachusetts Institute of Technology Archives, Cambridge, MA

Preface

4. Louis Agassiz to Governor John A. Andrew, December 16, 1862, John Andrew Papers, Massachusetts Historical Society.

Chapter One • An Uncertain Future

1. WBR was in Williamsburg, Va., from 1819 to 1825. During this time he enrolled as a student and assisted his father, who was William and Mary’s professor of chemistry and natural philosopher. It is unclear, however, whether William completed all the requirements for graduation. The institution listed him as “in attendance” until 1821 (*A Provisional List of Alumni, Grammar School Students, Members of the Faculty and Members of the Board of Visitors of the College of William and Mary in Virginia from 1693 to 1888* [Richmond, Va.: Division of Purchase and Printing, 1941], 35). But the records for those who received degrees at the college during Rogers’s years of attendance have been destroyed. Valuable manuscript collections on Rogers’s early years as well as later family developments can be found in the Massachusetts Institute of Technology Archives holdings among the Rogers Family Papers; William Barton Rogers Papers; and William Barton Rogers II Papers.


14. PKR to Thomas Jefferson, May 21, 1819, LL, 1:10; Thomas Jefferson to PKR, June 23, 1819, LL, 1:11–12. UVA, chartered in 1819, formally opened in 1825.


17. Charter reprinted in Godson et al., William and Mary, 1:13. Guralnick’s Antebellum American College mentions William and Mary’s academic distinction: “There is no record of how the early program operated, but an actual professorship of mathematics and natural phi-
losophy was established in 1712. Reverend Hugh Jones, educated in England, occupied the position from 1717 to 1729 and was the first professor of science in America” (9); Parker Rouse Jr., *Virginia: The English Heritage in America* (New York: Hastings House, 1976), 103.


24. WBR (Williamsburg, Va.) to JBR (Baltimore), January 19, 1822, WBRP-MITA; WBR to JBR, January 19, 1822, WBRP-MITA.


26. Godson et al., *William and Mary*, 1:214, 218–20. After the Panic of 1819 William and Mary matriculants fell from an average of eighty-seven students annually to an average of thirty-four students from 1820 to 1825. Some observers in Williamsburg blamed the decline in student enrollments on the decline in the quality of students attending the institution. One resident of the college town stated that “the last session closed with six students—and unless some important change is effected in the institution, one Professor after another will probably resign” (“William and Mary College,” *Richmond Family Visitor*, July 17, 1824).


Notes to Pages 13–18

31. ES, Preface, LL, 1:iii; JBR to WBR, November 9, 1821, LL, 1:20.
32. WBR to PKR, November 3, 1826, LL, 1:35–36.
34. WBR to PKR, March 31, 1826, LL, 1:41.
35. HDR to PKR, April 20, 1828, LL, 1:48.
36. WBR to the governors of the Maryland Institute, April 13, 1828, LL, 1:49.
37. Gerstner, Henry Darwin Rogers, 7.
38. WBR to PKR, May 19, 1828, LL, 1:51; WBR to PKR, June 26, 1828, LL, 1:53.

Chapter Two · Tenure in the Tumult

1. As noted previously, the extant records make it unclear whether WBR ever received a degree from William and Mary; LL, 1:62.
2. The entire speech was published as “Address of Professor Rogers” in Williamsburg’s Phoenix Plough-Boy, November 12, 1828.
3. Historian David Grimsted, in American Mobbing, 1828–1861 (New York: Oxford University Press, 1998), has argued that the main difference in patterns of social violence between North and South was not in the number of occurrences but in the tendencies or nature of the attacks. “Northern criminals and mobs,” he states, “tended to endanger property rather than injure people, while prototypical Southern rioters, like their counterparts in crime, attacked persons more than property. Southern mobs were much likelier to be murderous in intent and/or sadistic in mode than were their Northern counterparts” (86). Along these lines E. Merton Coulter, in College Life in the Old South (Athens: University of Georgia Press, 1951), hinted at the North-South differences in student violence by quoting Ralph Waldo Emerson: “The Southerner asks concerning any man, ‘How does he fight?’ The Northerner asks, ‘What can he do?’” (88). Other studies on the character of southern violence include Dickson D. Bruce Jr., Violence and Culture in the Antebellum South (Austin: University of Texas Press, 1979); Edward L. Ayers, Vengeance and Justice: Crime and Punishment in the 19th Century American South (New York: Oxford University Press, 1984); Elliott J. Gorn, “‘Gouge and Bite, Pull Hair and Scratch’: The Social Significance of Fighting in the Southern Backcountry,” American Historical Review 90 (February 1985): 18–43; Bertram Wyatt-Brown, Honor and Violence in the Old South (New York: Oxford University Press, 1986); Grady McWhiney, Cracker Culture: Celtic Ways in the Old South (Tuscaloosa: University of Alabama Press, 1988); on student uprisings, see Steven J. Novak in The Rights of Youth: American Colleges and Student Revolt, 1789–1815 (Cambridge: Harvard University Press, 1977); Jennings L. Wagoner, “Honor and Dishonor at Mr. Jefferson’s University: The Antebellum Years,” History of Education Quarterly 26 (Summer 1986): 155–79; Robert F. Pace and Christopher A. Bjornsen, “Adolescent Honor and College Student Behavior in the Old South,” Southern Cultures (Fall 2000): 9–28; Robert F. Pace, Halls of Honor: College Men in the Old South (Baton Rouge, Louisiana State University Press, 2004), chap. 4; Craig Thompson Friend and Lorri Clover, eds., Southern Manhood: Perspectives on Masculinity in the Old South (Athens: University of Georgia Press, 2004).
4. Thomas Jefferson, *Notes on the State of Virginia* (1774; rpt., Chapel Hill: University of North Carolina Press, 1955), 162; Jefferson noted that “there must doubtless be an unhappy influence on the manners of our people produced by the existence of slavery among us,” especially for children who are “thus nursed, educated, and daily exercised in tyranny” (162). For a case study on the interplay between the culture of slavery and student behavior, see Lewis S. Feuer, “America’s First Jewish Professor: James Joseph Sylvester at the University of Virginia,” *American Jewish Archives* 36 (November 1984): 152–201. McCardell, *Southern Nationalism*, reviews Jefferson’s comparisons between temperaments, North and South, describing northerners as “cool, sober, laborious, independent, interested, chicaning” and southerners as “fiery, voluptuary, indolent, unsteady, generous, candid” (13). Charles Coleman Wall Jr., “Students and the Student Life at the University of Virginia, 1825 to 1861” (Ph.D. diss., University of Virginia, 1979), provides an interpretation of student violence that focuses on the southern code of honor. See also Wagoner, “Honor and Dishonor at Mr. Jefferson’s University,” 155–79.

5. College of William and Mary, *Minutes of the Faculty*, March 1820.

6. College of William and Mary, *Minutes of the Faculty*, March 10, 1832; see also Manuscript Collections at the College of William and Mary Archive: PKR, Faculty and Alumni Papers; WBR, Faculty and Alumni Papers; and College Papers (1819–35). These collections provide additional background on student culture (i.e., study habits, festivities) and faculty experiences (i.e., teaching, perspectives on discipline).


10. WBR to HDR, January 2, 1830, box 1, folder 7, WBRP-MITA.

11. WBR to HDR, January 2, 1830, box 1, folder 7, WBRP-MITA.


14. WBR to HDR, November 30, 1834, LL, 1:113; WBR to HDR, February 11, 1835, LL, 1:116–17; GV, 762; Journal of the House of Delegates of the Commonwealth of Virginia... 1835 (Richmond, Va.: Samuel Shepherd, 1835), 76.


17. WBR to HDR, March 8, 1838, LL, 1:152–53.


19. WBR to HDR and RER, January 18, 1841, LL, 1:181.


21. Joseph Henry on the issue of slavery quoted in Moyer, American Scientist, 199; letter
of recommendation from Joseph Henry, July 6, 1835, LL, 1:126; for references to Rogers’s appointment, see University of Virginia, Minutes of the Board of Visitors, July 8, 1835; Joseph C. Cabell to James Madison, July 25, 1835, WBR Faculty/Alumni File, College of William and Mary.


24. WBR to RER, September 11, 1841, LL, 1:192; for an extended discussion of Sylvester’s initial reception, see Feuer, “Sylvester,” 154 ff.; and Parshall, James Joseph Sylvester: Jewish Mathematician.


26. John A. G. Davis, An Exposition of the Proceedings of the Faculty of the University of Virginia in Relation to the Recent Disturbances at That Institution (Charlottesville: J. Alexander, 1836), reprinted in December 16, 1836, LL, 1:139. The chairmanship was equivalent to the presidency of the University of Virginia at the time. This incident is also discussed in Feuer,
“Sylvester,” 175–77; Feuer adds an account of the horsewhipping of classics professor Gessner Harrison by his students in 1839. WBR to Brothers in Philadelphia, November 16, 1840, LL, 1:176–177; see also Gorn, “Fighting in the Southern Backcountry,” 18–43.

27. Student unrest described in Bruce, University of Virginia, 3:113–14; WBR to HDR, April 4, 1845, LL, 1:247.

28. JBR to WBR [WBR and RER], January 10, 1845, box 2, folder 22, WBRP-MITA; WBR to HDR, April 29, 1845, LL, 1:249.


32. William R. Johnson to WBR, February 14, 1845, LL, 1:241; WBR to William R. Johnson, March 15, 1845, LL, 1:242; WBR to HDR, April 5, 1846, LL, 1:264.


34. Quotation on the Savages in George Stillman Hillard, Memoir of the Hon. James Savage, LL, D., Late President of the Massachusetts Historical Society (Boston: John Wilson and Son, 1878), 17, 32; WBR to HDR, March 13, 1846, LL, 1:259; James Savage to his daughter and her husband, November 23, 1852, reprinted in Emma Rogers, ed., Letters of James Savage to His Family (Boston: n.p., 1906), 167.

35. WBR to HDR, April 29, 1845, LL, 1:250.

Chapter Three · From Soils to Species

1. WBR often grumbled about the difficulty of establishing his scientific career while at UVA: “We who are in collegiate harness” he wrote, “may well envy the lot of those happy fellows who, free from all such restraints, can go whithersoever, the love of research impels, and can devote all their hours of vigorous thought to extending the boundaries of knowledge” (LL, 1:227). Nicholas Jardine, James A. Secord, and Emma C. Sparry, eds., Cultures of Natural History (New York: Cambridge University Press, 1996), include a cultural survey of approaches to nineteenth-century natural history; Michael Dettelbach, “Humboldtian Science,” in Jardine et al., Natural History, 288–89.


3. The two most important influences on WBR’s geological thought were Patrick, his father, and Henry, his brother. See “Address of Professor Rogers,” Phoenix Plough-Boy, Novem-


12. Browne to Floyd, September 30, 1833, reprinted in GV, 752, 750; see also Jennings L. Wagoner Jr., “Honor and Dishonor at Mr. Jefferson’s University: The Antebellum Years,” *History of Education Quarterly* 26 (Summer 1986): 155–79. Wagoner discusses the place of religion in the Old South: “Not until late in the antebellum period did evangelical Christianity severely alter the dominant characteristics that defined the ideal southern gentleman. The anticlerical tradition associated with Jefferson and other southern gentry under the spell of the rationalism of the Enlightenment, coupled with planter resistance to church power and patronage, served to limit the status of ministers and diminish the appeal of the church in much of southern society. . . . [O]nly a fifth to a third of all southern whites before the Civil War were churchgoers” (161–62).


15. GV, 24.

16. GV, 26, 27, 543.

17. GV, 41–51.

18. GV, 156, 134, 281–82.

19. GV, 91.


23. HDR to WBR, April 10, 1836, LL, 1:330; WBR to HDR, December 22, 1840, Geological Survey Papers, Library of Virginia. I am indebted to Aldrich and Leviton, “Virginia Geological Survey,” for calling my attention to these letters. This collection has an extensive repository of correspondence between Rogers and his associates on the survey. Some of these
materials have been effectively mined to analyze the organization of the survey in Cohen, “Surveying Nature.”


25. Gerstner, “Nomenclature of the American Paleozoic Rocks,” interprets the failure of the Rogers system of stratigraphy as stemming from the brothers’ ineffective efforts at publicizing the numbering arrangement. By Hall’s desire for priority I refer to his interest in claiming credit for establishing the names used in American stratigraphy.

26. For a detailed description of the paper and its impact on the scientific community of the period, see Patsy Gerstner, “A Dynamic Theory of Mountain Building: Henry Darwin Rogers, 1842.” Isis 66 (1975): 26–37; Gerstner, however, gives William less credit than he merited in the creation of the theory. For one thing William’s name was listed first in the publication. He often published with his brothers and regularly traded first authorship depending on their involvement in the research. Moreover, Gerstner overlooked the significant amount of interest William had in natural philosophy. The “dynamic theory” likely emerged from William’s natural philosophy research, an area of research to which Henry gave far less attention.


28. WBR and HDR, “On the Physical Structure of the Appalachian Chain as Exemplifying the Laws Which Have Regulated the Elevation of Great Mountain Chains Generally,” reprinted in GV, 624, 642; Greene, Geology in the Nineteenth Century, provides a survey of the North American debates over mountain formation theory by such figures as James Hall, James Dwight Dana, and Joseph LeConte.


33. Rogers and Rogers, “Voltaic Battery,” 60.
34. For a brief survey of natural philosophy texts of the early to mid-nineteenth century, see Edward W. Stevens Jr., *The Grammar of the Machine: Technical Literacy and Early Industrial Expansion in the United States* (New Haven: Yale University Press, 1993), 65–71. Most science and mathematics texts of this period, argues Stevens, were written by only a few individuals.
40. WBR, *Address before the Lyceum*, 12.


49. BSNH, Proceedings 7 (1861): 168.


52. BSNH, Proceedings 7 (1861): 232, 233–35. One observer wrote to Rogers on what he believed to be the general sentiment after the final debate: “I have been much interested—somewhat instructed—and highly amused at last by the late discussions opened by Agassiz to say as much as possible about Darwin and closed by him with the ‘desire to say as little as possible.’ Time settles all things and Darwin can take of himself. Meantime I enjoyed your surprise to find Agassiz so ingeniously turn the tables on you about the shallow seas . . . the last geological idea expressed by Agassiz which startled and astonished everybody” (C. F. Winslow to WBR, April 5, 1860, WBRP-MITA); see also Nathaniel Southgate Shaler, The Autobiography of Nathaniel Southgate Shaler (Boston: Houghton Mifflin, 1909), 105.

53. BSNH, Proceedings 7 (1861): 234–35; WBR to HDR, February 20, 1860, WBRP-MITA.

54. BSNH, Proceedings 7 (1861): 244–45, 274.

55. BSNH, Proceedings 7 (1861): 168, 173, 231, 232, 234–35, 244–45, 274; American Academy of Arts and Sciences, Proceedings 4 (1860): 360; on the relationship between Agassiz and the Socratic method, see Lane Cooper, Louis Agassiz as Teacher: Illustrative Extracts on His Method of Instruction (Ithaca: Comstock Publishing Co., 1917), 3–4. A. E. Verrill recounted his years as student and later as assistant to Agassiz and said that under the great zoologist and geologist “any independence of action or of thought (if expressed) is nearly impossible” (A. E. Verrill to WBR, Dec. 7, 1868, WBRP-MITA).


57. Gray and a cohort of evolutionists, including but not limited to Alpheus Hyatt, Edward D. Cope, and Othaniel C. Marsh, were active in the diffusion of evolutionary thought in the mid- to late nineteenth century. Rogers’s scientific research, meanwhile, rarely dealt directly with Darwinism or other branches of evolution after the debates with Agassiz. See Pfeifer, “United States,” 181–206; Dexter, “Impact of Evolutionary Theories,” 148. On Alexan-

Chapter Four • Advancing and Diffusing


7. Reports of the First, Second, and Third Meetings, 72.

8. WBR to J. W. Bailey, October 22, 1843, cited in Kohlstedt, “Model for National Science,” 188.

10. HDR to RER, November 5, 1848, LL, 1:293. The invitations from London and Copenhagen were sent in 1844.


12. *Reports of the First, Second, and Third Meetings*, 68.


15. WBR to his brothers, September 21, 1849, LL, 1:305.

16. WBR to HDR, July 13, 1849, LL, 1:299; WBR to HDR, August 19, 1849, LL, 1:302; WBR to HDR, October 5, 1849, LL, 1:309.


18. HDR to WBR, May 16, 1848, LL, 1:288. By “popularization” of science I refer to the Lazzaroni’s equating of practical forms of science with charlatanism. See Lilian B. Miller, *The Lazzaroni: Science and Scientists in Mid-Nineteenth Century America* (Washington, D.C.: Smithsonian Institution Press, 1972); as well as Presidential Addresses by members of the Lazzaroni printed in the *Proceedings* of the American Association for the Advancement of Sciences, particularly during the 1850s.


26. Bruce, *Modern American Science*, 265. Sally Kohlstedt identifies John Warner and Daniel Vaughn as the authors of the appellation “Washington-Cambridge Clique” (Kohlstedt, *American Scientific Community*, 156). Miller, in *The Lazzaroni*, lists Asa Gray, WBR, CWE, and Matthew Fountaine Maury as the main opponents; during this controversy at the AAAS, however, Rogers reported being joined or supported by a different group of Lazzaroni dissenters that included Ormsby M. Mitchell, Chester Dewey, Edward Hitchcock, and J. W. Bailey (WBR to HDR, September 1, 1856, WBRP-MITA); Kohlstedt adds that J. Lawrence Smith and William Hackley aided Rogers as well.
30. WBR to HDR, September 1, 1856, WBRP-MITA.

32. *Proceedings of the American Association for the Advancement of Science* (Philadelphia: John C. Clark, 1857), 231; WBR to Lorin Blodgett, September 1, 1856, WBRP-MITA; Kohlstedt, *American Scientific Community*, 184; WBR to HDR, September 1, 1856, WBRP-MITA.

Chapter Five • Thwarted Reform


7. RER to HDR, December 6, 1829, LL, 177–78.

8. WBR to HDR, December 6, 1828, LL, 168–69.

9. UVA, *Catalogue* (1835–36), 15; UVA, *Catalogue* (1843–44), 14. The courses differed markedly between those offered by Rogers’s predecessor in 1834–35 and those offered immediately after Rogers’s arrival; the variety of courses taught and texts used by Rogers are cited in the *Catalogue* of the university from 1835 to 1853.


12. For a discussion on methods of instruction in nineteenth-century American higher education, see Linda Armstrong Chisholm, “The Art of Undergraduate Teaching in the Age of the Emerging University” (Ph.D. diss., Columbia University, 1982); Caroline Winterer, in *The Culture of Classicism: Ancient Greece and Rome in American Intellectual Life*, 1780–1910 (Baltimore: Johns Hopkins University Press, 2002), discusses the resistance that even reform-minded classicists met from their colleagues as they attempted to teach more about “worlds” than “words.”

hardly a monolithic group and differed among themselves on how and what to teach their students. Most focused primarily on teaching grammar, while others called attention to ancient culture. Those attending to culture debated the merits of using translations versus the original texts. Still others favored the scholarship on the classical languages emanating from Germany, while others frowned on it. Even questions about the superiority of Latin versus Greek entered into their debates. Whatever their differences, however, they all benefited from the impact that Yale had in reasserting the significance of classical studies. On classicists of the period, see Winterer, *Culture of Classicism.*


17. *For the Establishment of a School of Arts. Memorial of the Franklin Institute, of the State of Pennsylvania, for the Promotion of the Mechanic Arts, to the Legislature of Pennsylvania* (Philadelphia: J. Crissy, 1837), 7–9.


21. On the development of the scientific disciplines in the early to mid-nineteenth century undergraduate curriculum, see Guralnick, *Antebellum American College*. Chisholm, in “Undergraduate Teaching,” argues that “for good or ill, recitation was synonymous with nineteenth century classroom teaching” (31); see her discussion on the recitation, the laboratory, and mid-nineteenth-century attempts at instructional reform.


24. WBR to HDR, October 3 and 13, 1847, *LL*, 1:274. According to Chisholm, “Under-
graduate Teaching,” laboratories for student use were not a central part of college science until the postbellum period. At Yale students did not use laboratories until the twentieth century, in part, because nonundergraduate programs such as the Sheffield Scientific School delayed developments at the college. Harvard laboratories for instruction remained a scattered and unofficial part of the undergraduate program until the last quarter of the nineteenth century. At Amherst facilities for laboratories appeared in the 1890s. Columbia made its first official declaration of support for the laboratory in 1897.

27. WBR, “Plan for a Polytechnic School in Boston (1846),” LL, 1:420, 421.

Virginia instituted full coeducation in 1970.


Virginia instituted full coeducation in 1970.


Chapter Six • Instituting a New Education

1. During this period, it should be noted, many American colleges had expanded in varying degrees their scientific offerings. What is most impressive is the gradual but steady change that occurred in the faculty and curriculum of traditional institutions. In 1828, for instance, Williams College had only one lecturer for science, but by 1830 it had four of seven faculty members involved in science instruction. The University of Pennsylvania underwent a similar change in faculty distribution, with three of six members teaching math or science by 1836.

Most colleges had only one professor of scientific studies in 1800. But by the mid-nineteenth century almost all colleges had positions for distinguished professors of math and science, with many colleges having more than half of their faculty in these disciplines. See Guralnick, Antebellum American College, ix.

For Rogers, of course, the quantitative change mattered little if not coupled with a qualitative change. Having more students learning outmoded science by way of recitation offered
no reason to celebrate for reformers like Rogers. He wanted an independent program of science that would be free to enact the kinds of quantitative and qualitative changes in higher education that he believed would be necessary for instruction to keep abreast of research. To his mind such an institute would need to be comprehensive (i.e., covering a variety of practical and theoretical topics) as well as specialized (i.e., depth of scientific studies beyond that of traditional programs).


3. In large measure WBR’s views of military academies were expressed earlier in his opposition to the military system of the Virginia Military Institute and in his defense of the UVA’s mission (intellectual freedom). Forman, *West Point*, 167.


7. Several institutes of the kind that interested Rogers had appeared in Germany, Sweden, and Switzerland during the early to mid-nineteenth century. For a brief survey of the
practical and theoretical values of these European institutions, see Rolf Torstendahl, “The Transformation of Professional Education in the Nineteenth Century,” in Sheldon Rothblatt and Bjorn Wittrock, eds., The European and American University since 1800: Historical and Sociological Essays (New York: Cambridge University Press, 1993), 109–41. Torstendahl argues that European technical education emerged for two basic reasons: “demand from the State for a labour force” and the “industrial economy and . . . capitalist agriculture” (125). The French polytechnic schools, more so than others in Europe, deeply influence the documents that Rogers would later prepare for the founding of MIT. See Objects and Plan of an Institute of Technology (Boston: J. Wilson, 1861); Frederick B. Artz, The Development of Technical Education in France, 1500–1850 (Cleveland: Society for the History of Technology, 1966), 145. For an alternate interpretation of Rogers’s European influences, see Stratton and Mannix, Mind and Hand, 435–36, 540–41. They offer evidence that suggests Germany’s Karlsruhe influenced his ideas about museum organizing, rather than scientific instruction. Many classic works in history of education by such scholars as Frederick Rudolph, Hugh Hakins, and others have emphasized German traditions of scientific studies in American higher education and have not fully considered the French influences. See, for example, Lawrence Veysey’s The Emergence of the American University (Chicago: University of Chicago Press, 1965), 125–33; for a recent analysis of the making of modern European higher education, see Walter Ruegg, Universities in the Nineteenth and Early Twentieth Centuries, 1800–1945 (New York: Cambridge University Press, 2004).


9. WBR to HDR, September 16, 1851, LL, 1:319.

10. “Governor’s Address,” Acts and Resolves Passed by the General Court of Massachusetts in the Year 1859 (Boston: Secretary of the Commonwealth, 1859), 488–89; LL, 2:2.


14. LL, 2:3.


16. “House No. 13,” Documents Printed by Order of the House of Representatives of the Commonwealth of Massachusetts during the Session of the General Court, A.D. 1860 (Boston: Dutton and Wentworth, 1860), reprinted in LL, 2:416. While Stratton and Mannix, Mind and Hand, argue that the museum was the foremost part of the three-part MIT plan, Rogers’s Address before the Lyceum of Natural History of Williams College, August 14, 1855 (Boston: T. R. Marvin and Son, 1855), suggests that he favored the school over the other two parts.


18. “House No. 160,” Documents Printed by Order of the House of Representatives of the Commonwealth of Massachusetts during the Session of the General Court, A.D. 1859 (Boston: Dutton and Wentworth, 1859), 11; Paul Goodman, “Ethics and Enterprise: The Values of a Boston Elite, 1800–1860,” American Quarterly 18 (Fall 1966): 437–51; Ronald Story, The Forging of an Aristocracy: Harvard and the Boston Upper Class, 1800–1870 (Middletown: Wesleyan University Press, 1980); Betty Farrell, Elite Families: Class and Power in Nineteenth-Century Boston (Albany: State University of New York Press, 1993). A classic study of the “Boston Brahmin” class can be found in David Tyack, George Ticknor and the Boston Brahmins (Cambridge: Harvard University Press, 1967), 173–83. Tyack suggests that this New England “caste” had difficulty translating its economic, social and intellectual authority into political power. . . Consequently Ticknor and a number of his conservative friends sought to bypass parties and legislature and to influence the course of the nation in other ways. They sought to control institutions—schools, churches, libraries, the legal system, the republic of letters—which would stabilize society” (183). While a dated interpretation, the thrust of Tyack’s depiction of the so-called Brahmins applies to the milieu in which Rogers proposed ideas about education for the industrial classes.


20. Objects and Plan of an Institute of Technology (Boston: J. Wilson, 1861); An Account of the Proceedings Preliminary to the Organizations of the Massachusetts Institute of Technology (Boston: J. Wilson and Son, 1861). Each of the three parts, whether he intended them to or not, paralleled the scientific, professional, and educational values he had sustained across his career. The Society of Arts satisfied his research and professional interests, while the museum and science programs followed from his educational reform ambitions.

21. Objects and Plan, 6, 8.

22. Objects and Plan, 9, 10–11.

23. Objects and Plan, 13, 15.


27. Objects and Plan, 25, 28.


32. Account of the Proceedings, 17, 23.
33. WBR to HDR, February 5, 1861, LL, 2:67; WBR to HDR, March 19, 1861, LL, 2:73.
36. WBR to Governor Andrew, March 28, 1861, Governor John Andrew Papers, Massachusetts Historical Society, cited in Tachikawa, “Two Religions,” 259.

Chapter Seven • Convergence of Interests

2. WBR to HDR, April 16, 1862, LL, 2:116; Robert V. Bruce, Lincoln and the Tools of War (Indianapolis: Bobbs-Merrill, 1956); Robert V. Bruce, The Launching of Modern American Science (New York: Knopf, 1987), chap. 20; A. Hunter Dupree, Science in the Federal Government: A History of Policies and Activities (Baltimore: Johns Hopkins University Press, 1986), 120–48; Bruce, Launching of American Science, chap. 23. The heaviest wartime grief felt by Rogers and his family was most likely over the loss of James Savage Jr. Basic information on the members and organization of NAS, see the following holdings in the National Academy of Sciences Archives: A. D. Bache Member File; Joseph Henry Member File; Benjamin Peirce Member File; RER Member File; and WBR Member File. “An Act to Incorporate the Massachusetts Institute of Technology, and to Grant Aid to Said Institute and to the Boston Society of Natural History,” Acts and Resolves Passed by the General Court of Massachusetts in the Year 1861 (Boston: Secretary of the Commonwealth, 1861), 492–95; LL, 2:78.
3. “An Act for the Inspection of Gas Meters, the Protection of Gas Consumers and the Protection and Regulation of Gas Light Companies,” Acts and Resolves Passed by the General Court of Massachusetts in the Year 1861 (Boston: Secretary of the Commonwealth, 1861), 480–85; WBR was appointed in June, 1861; LL, 2:90; WBR to Governor John A. Andrew, June 20, 1861, LL, 2:90–91; WBR to HDR, June 25, 1861, LL, 2:91–92. Rogers also conducted geological work for the state. When Governor Andrew asked him review a proposal for surveying select coal regions in the state, Rogers replied in characteristic useful arts fashion: “If there it be thought expedient for the state to engage in such an investigation, it should not I think
be content with a merely local and partial exploration, but should do the work so thoroughly as to decide the question as to the extent and availableness of the coal of this region once and for all” (WBR to Governor Andrews, December 27, 1862, WBRP-MITA).

4. WBR to HDR, June 25, 1861, LL, 2:292.

5. WBR to HDR, June 25, 1861, LL, 2:92; WBR to HDR, January 20, 1863, LL, 2:147; WBR to HDR, July 7, 1861, LL, 2:93.

6. WBR to HDR, September 17, 1861, LL, 2:96.

7. WBR to HDR, September 17, 1861, LL, 2:96; WBR to HDR, December 1, 1861, LL, 2:102–3; WBR to HDR, April 28, 1862, LL, 2:117–18.

8. WBR to HDR, April 28, 1862, LL, 2:119; WBR to HDR, October 13, 1862, LL, 2:133; WBR to HDR, March 31, 1863, LL, 2:157; LL, 2:173; WBR to HDR, January 19, 1864, LL, 2:185; WBR to Governor John A. Andrew, February 1, 1864, LL, 2:187.


10. WBR to James Savage Sr., June 25, 1867, LL, 2:272; Brain, Going to the Fair, 32, 46; WBR to James Savage Sr., July 27, 1867, LL, 2:275. Rogers became ill and never completed the report on the Paris Exposition. For correspondence on the stalled report, see CWE to WBR, July 12, 1869, WBRP-MITA; F. H. Storer to WBR, July 17, 1869, WBRP-MITA; WBR to Governor William Claffin, January 29 and 31, 1870, WBRP-MITA.


13. Haskell, Emergence of Professional Social Science, 115.


17. WBR, “Memoranda of the Meeting”; WBR to HDR, April 28, 1863, LL, 2:162; two very rich collections that contain references to the professionalization of science during this period are located in the Houghton Library at Harvard University: Benjamin Peirce Papers and A. D. Bache Papers.


21. Prescott, *Boston Tech*, 35–37; Loretta H. Mannix, “Communications to the Society of Arts at Its Regular Meetings Beginning with the Meeting of December 12, 1862” (MS, MIT Archives, 1979); see also the MIT Annual Reports of the 1870s for accounts of the Society of Arts meetings. Although the society claimed to award noteworthy innovations prizes or honors, Rogers did not want his or the Institute’s name used for endorsements. See WBR to Mr. Peylis, February 6, 1865, WBRP-MITA; WBR to Dr. Whelpley, June 6, 1867, WBRP-MITA.


23. Louis Agassiz to Governor John A. Andrew, December 16, 17, and 22, 1862, John Andrew Papers, Massachusetts Historical Society.
24. Louis Agassiz to Governor John A. Andrew, December 22, 1862, John Andrew Papers, Massachusetts Historical Society.

25. Governor John A. Andrew to WBR, December 22 and 30, 1862, WBRP-MITA; WBR to William Walker, May 4, 1863, LL, 2:163–64. In the May 4 letter Rogers provided an extract of his reply to Governor Andrew.

26. Record of BSNH meeting, February 18, 1859, WBRP-MITA.


30. “Governor’s Address,” Acts and Resolves Passed by the General Court of Massachusetts in the Year 1863 (Boston: Secretary of the Commonwealth, 1863), 618.

31. WBR to HDR, March 31, 1863, LL, 2:157; WBR to HDR, March 17, 1863, LL, 2:153; An Account of the Proceedings Preliminary to the Organizations of the Massachusetts Institute of Technology (Boston: J. Wilson and Son, 1861). A number of state documents provide greater detail about the deliberations among state leaders regarding the merger as well as relevant petitions submitted by the Massachusetts Boards of Agriculture and Trade. Those documents include “Resolve Authorizing Certain Expenditures by the Committee on an Agricultural College,” Acts and Resolves Passed by the General Court of Massachusetts in the Year 1863 (Boston: Secretary of the Commonwealth, 1863), 560; “Senate No. 108,” Documents Printed by Order of the Senate of the Commonwealth of Massachusetts during the Session of the General Court, A.D. 1863 (Boston: n.p., 1863), 4–5; “Senate No. 108,” Documents Printed by Order of the Senate of the Commonwealth of Massachusetts during the Session of the General Court, A.D. 1863 (Boston: n.p., 1863), 18; “Senate No. 108,” Documents Printed by Order of the Senate of the Commonwealth of Massachusetts during the Session of the General Court, A.D. 1863 (Boston: n.p., 1863), 10.


33. “An Act in Addition to the Act to Incorporate the Massachusetts Institute of Tech-
nology,” Acts and Resolves Passed by the General Court of Massachusetts in the Year 1863 (Boston: Secretary of the Commonwealth, 1865), 496–97.

34. “Governor’s Address,” Acts and Resolves Passed by the General Court of Massachusetts in the Year 1863 (Boston: Secretary of the Commonwealth, 1865), 727–28; Public Documents of Massachusetts: Being the Annual Reports of Various Public Offices and Institutions for the Year 1864, vol. 1: Public Document Number 4, Annual Report of the Massachusetts Board of Agriculture (Boston: William White, 1865), 44.


36. Scope and Plan of the School of Industrial Science, Massachusetts Institute of Technology (Boston: J. Wilson and Son, 1864), 3; Silas, “Massachusetts Institute of Technology,” 294–95.

37. Silas, “Massachusetts Institute of Technology,” 295–96; Scope and Plan; see also First Annual Catalogue of the Officers and Students and Programme of the Course of Instruction of the School of the Massachusetts Institute of Technology, 1865–6 (Boston: J. Wilson and Son, 1865). The Institute did not receive permission from the state to grant degrees until 1868.

38. Silas, “Massachusetts Institute of Technology,” 295–96. See the MIT Catalogue for 1865–66: “A high value is set upon the educational effect of laboratory practice, in the belief that such practice trains the senses to observe with accuracy, and the judgment to rely with confidence on the proof of actual experiment” (27).


41. WBR to HDR, June 15, 1863, LL, 2:166; WBR to HDR, January 19, 1864, LL, 2:186. While working on the plan for the Institute, Rogers also received help from a colleague in Paris who helped make comparisons between the idea of MIT and schools in Europe. (W. G. Preston to WBR, March 26, 1864, WBRP-MITA).

42. LL, 2:185. Rogers took pride in finding that “some eminent scientific friends abroad including one of the directors of the Conservatoire des Arts et Metiers, and the ablest mathematical engineer of G. Britain expressed a very high appreciation of the scheme as set forth in the [Scope and Plan] pamphlet” (WBR to [?], January 1, 1865, WBRP-MITA).

43. WBR to HDR, LL, 2, April 13, 1864, LL, 2:191–92; Thomas Webb to WBR, June 7, 1864, LL, 2:192; WBR to HDR, July 23, 1864, LL, 2:199; WBR to RER, August 26, 1864, LL, 2:205.

44. Prescott, Boston Tech, 46–49.

45. LL, 2:224; Prescott, Boston Tech, 51.


47. WBR to CWE, June 6, 1865, LL, 2:238–39; WBR to CWE, July 17, 1865, LL, 2:240–42; CWE to his mother, August 2, 1865, reprinted in James, President of Harvard, 1:155–56.


MIT Press, 1984), has also called attention to this contrast between the exterior and interior of what came to be known as the Rogers Building. Turner interprets the contrast as reflecting an “ambivalence about whether grandeur or stark utilitarianism was the proper image for a technical school” (164). Rather than the result of “ambivalence,” the building presents a reflection of Rogers’s useful arts educational plan.

50. LL, 2:281.

Chapter Eight • Reception of the Idea


3. “Technical Education,” Scientific American, April 18, 1868, 249. Religion, by this point, would not have entered significantly into the debate. See Jon H. Roberts and James Turner, The Sacred and the Secular University (Princeton: Princeton University Press, 2000), who have argued that during this period ‘most scientists, Christian and otherwise, no longer judged the effectiveness of their efforts by whether they enable human beings to ‘satisfy the aspirations of Reason to understand the wisdom of the Creator in his work.’ In fact, religious concerns became essentially extrinsic to the culture of science” (31).

4. While scholarship by Paul Mattingly and David Potts has complicated the traditional view of the Yale Report of 1828, the use of the report and allusions to it in the postbellum period are the focus of this analysis. Noah Porter, The American College and the American Public (New Haven, Conn.: C. C. Chatfield, 1870), 42, 92, 46–48, 93, 154–55.

5. Porter, American College, 271. Porter was not simple-mindedly opposed to the introduction of modern studies in the curriculum. For studies that suggest that he and the circle of New Haven scholars appreciated German ideals of research and inquiry, see Louise L. Stevenson, Scholarly Means to Evangelical Ends: The New Haven Scholars and the Transformation of Higher Learning in America, 1830–1890 (Baltimore: Johns Hopkins University Press, 1986); George M. Marsden, The Soul of the American University: From Protestant Establishment to Established Non-Belief (New York: Oxford University Press, 1994).


27. [Charles G. Leland], “Polytechnic Institutes,” *Continental Monthly* (July 1862): 83–84, 86, 89; *Objects and Plan of an Institute of Technology* (Boston: J. Wilson, 1861).
32. WBR to William P. Atkinson, June 8, 1865, WBRP-MITA; Albert J. Wright to WBR, October 9, 1865, WBRP-MITA; A. H. Russell to Emma Savage, May 28, 1881, WBRP-MITA; A Hyatt to WBR, October 3, 1878, WBRP-MITA.
33. Students to the MIT Corporation, January 2, 1880, WBRP-MITA; WBR notes on student interviews, January 2 and 5, 1880, WBRP-MITA.

36. Thomas T. Bouve to WBR, April 5, 1876, box 5, folder 72, WBRP-MITA.
39. Marian Hovey to WBR, December 13, 1878, WBRP-MITA.
40. Kneeland to WBR, February 19, 1876, WBRP-MITA.
41. WBR to Committee (notes), September 27, 1879, WBRP-MITA; Institute professor William P. Atkinson, Edward’s brother, promoted coeducation and the interest of women at the Institute and hired female assistants; see, for example, William P. Atkinson to WBR, May 23, 1879, WBRP-MITA; William P. Atkinson to WBR, September 24, 1879, WBRP-MITA.
42. Edward Atkinson to WBR, October 17, 1879, box 6, folder 94, WBRP-MITA; WBR to Prof. Ordway, October 24, 1879, WBRP-MITA.
43. *First Annual Catalogue of the Officers and Students, and Programme of the Course of In-
struction of the School of the Massachusetts Institute of Technology, 1865–6 (Boston: J. Wilson and Son, 1865), 10, 17, 20.

44. JDR to Emma Savage and WBR, July 5, 1876, WBRP-MITA.


46. JDR to WBR, July 5 and 24, 1876, *LL*, 2:335–36; *LL*, 2:337–38; JDR to Emma Savage and WBR, July 5, 1876, WBRP-MITA. Runkle’s published descriptions of the Russian system include *The Russian System of Shop-work Instruction for Engineers and Machinists* (Boston: A. A. Kingman, 1876); “The Russian System of Shop-work Instruction,” *President’s Report for the Year Ending Sept.* 30, 1876 (Boston: A. A. Kingman, 1876), 124–47.


52. JDR to WBR, December 23, 1869, WBRP-MITA; JDR to WBR, January 27, 1870, WBRP-MITA; WBR to JDR, February 1, 1870, *LL*, 2:293.


56. JDR to WBR and Emma Savage, June 22, 1870, WBRP-MITA; JDR to WBR, August 6, 1870, WBRP-MITA; Prescott, Boston Tech, 78–81. The idea of merger was also discussed in Edward Atkinson to WBR, July 28, 1870, WBRP-MITA; JDR to WBR, August 1, 1870, WBRP-MITA; JDR to WBR, August 2, 1870, WBRP-MITA; A. S. Wheeler to William Endicott, August 6, 1870, WBRP-MITA; Henry B. Rogers to WBR, July 20, 1870, WBRP-MITA; WBR to R. C. Greenlief, July 26, 1870, WBRP-MITA; JDR to WBR, July 27, 1870, WBRP-MITA.

57. JDR to WBR, September 9, 1870, folder 65, box 5, WBRP-MITA; see also Prescott, Boston Tech, 85–87; “Invitation to the Government of the Institute of Technology,” Annual Reports of the President and Treasurer of Harvard College, 1869–1870 (Cambridge: Cambridge University Press, 1871), 68; “Memorandum of an Agreement between Harvard College and the Mass. Inst. of Technology to Effect a Union of Their Several Schools of Applied Science,” folder 1486, box 140, Records of President CWE, Harvard University Archives; correspondence on the merger proposal faded after JDR to WBR, September 5, 1870, WBRP-MITA; JDR to WBR, September 22, 1870, WBRP-MITA.


61. Simon Newcomb, Reminiscences of an Astronomer (Boston: Houghton, Mifflin, 1903), 250–51; Cochrane, National Academy of Sciences, 100–133.


66. *LL*, 2:350–51; E. R. Mudge to WBR, June 18, 1878, WBRP-MITA.


**Chapter Nine • This Fatal Year**


5. JDR to Emma Savage, June 12, 1869, WBRP-MITA; Louis Agassiz to Benjamin Peirce, October 26, 1868, Benjamin Peirce Papers, Houghton Library, Harvard University, Cambridge; John LeConte to WBR, October 16, 1876, WBRP-MITA. In 1864 an effort to establish an “Institute of Technology” in New York borrowed Rogers’s *Objects and Plan* wholesale. Rogers wrote a letter to the editor of the New York *Evening Post* to call attention to the similarities and to suggest that MIT “will rejoice to welcome a sister Institute in New York, and cannot but be gratified at the reproduction in your city in such unchanged form of an educational plan in many respects new, and which we feel proud to have originated” (*New York Evening Post*, April 6, 1864). See also “A Proposed Institute of Technology,” *New York Evening Post*, April 1, 1864. MIT’s influence on laboratory work at Harvard is discussed in Lawrence.

