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1988

Mind and Hand: Economics and Engineering at the Massachusetts Institute of Technology

Richard Adelstein, *Wesleyan University*



Available at: <https://works.bepress.com/adelstein/9/>

Breaking the Academic Mould

ECONOMISTS AND AMERICAN
HIGHER LEARNING IN THE
NINETEENTH CENTURY

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Wesleyan University Press

MIDDLETOWN, CONNECTICUT

Mind and Hand: Economics and Engineering at the Massachusetts Institute of Technology

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ON THE GREAT SEAL of the Massachusetts Institute of Technology stand a scholar and an artisan, each facing outward, on either side of the lamp of learning. The lamp in turn rests on a foundation of Science and Art, beneath which is inscribed the Institute's motto, *Mens et Manus*. For its determined founder, William Barton Rogers, the "practical usefulness" of the Institute's "happy union of science and art"¹ to the industrial and social life of the nation was the centerpiece of an educational philosophy that has guided the school to the present day. This emphasis on the practical in higher education placed Rogers squarely with those reformers who sought to supplant the traditional study of Scripture, ancient languages, and classical mathematics with a "modern" curriculum, more responsive to the commercial and cultural demands of a rapidly industrializing, secular society.

But he vigorously denied that an education centered on engineering or applied science was best achieved in departments or affiliated schools which, like the Lawrence Scientific School at Harvard or the Sheffield Scientific School at Yale, had been created specifically for this purpose at established colleges. Instead, Rogers's Institute itself was to be an experiment, combining rigorous professional training in engineering with the breadth of outlook offered by sustained exposure to the liberal arts within a single, independent technical university. Its graduates, he believed, would be uniquely qualified to grasp and apply continuing advances in scientific knowledge and to provide both the sophisticated technical

¹ I am indebted to Loretta Mannix for helpful comments on and criticisms of an earlier draft of this essay.

skills and the entrepreneurial leadership the emerging industrial age would require.

In this joining of mind and hand, Rogers captured precisely the spirit of the new age. For the promise of technology was control, not merely over stone and metal but over the economic and social affairs of human beings as well, through the purposeful application of scientific theory to practical problems in both engineering and administration. As the nineteenth century gave way to the twentieth, spectacular advances in the technologies of production, transportation, and communication transformed the nation's economic landscape and began to induce equally significant changes in political thought and the structure and functions of government. These parallel and interrelated revolutions in technology, organization, and ideology brought America to an age of concentration in which scientific rationality and conscious control over nature and man were to become pivotal cultural values. In all of this, MIT reflected the mood and aspirations of the time and, through the scholarly and professional leadership of its political economists, contributed in important and lasting ways to the development of the discipline throughout this critical period.

William Barton Rogers was born in Philadelphia on December 7, 1804, the second of four remarkable sons of Patrick Kerr and Hannah Blythe Rogers. Each of the Rogers brothers was to achieve distinction in his own right as a scientist and educator, and they collaborated with one another on a host of projects throughout their lives. In 1819 the family moved to Williamsburg, Virginia, where Patrick, trained as a physician, had been elected professor of natural philosophy and chemistry at the College of William and Mary. William entered the college that autumn, quickly completed the prescribed studies, and, by the age of twenty, had translated an important French work on the differential calculus. After pursuing independent studies in physics and mathematics and assisting his father in the laboratory in Williamsburg, he joined his brother Henry in experimenting briefly with the organization of a technical high school at the Maryland Institute in Baltimore.²

When Patrick Rogers died in 1828, young William was chosen to succeed him at William and Mary, taking on teaching responsibilities in mathematics for a short time as well. Stimulated by his brother Henry, who was to become professor of geology at Pennsylvania in 1835, William turned his energies to research in geology.

Appointed in 1835 by the state legislature to conduct a geological survey of Virginia, he won national recognition for his work and was soon named professor of natural philosophy at the University of Virginia. Here his reputation continued to grow, and in 1840 he helped found the Society of Geologists and Naturalists, which seven years later became the American Association for the Advancement of Science.

In 1844 Rogers took his turn as chairman of the faculty at Virginia, the school's chief administrative officer. It was an unhappy time for the university. The campus was racked by violent disturbances, in one of which Rogers's predecessor as chairman was killed in his doorway by riotous students. The legislature seriously considered withdrawing the state's support from the university, but Rogers stayed its hand with an eloquent recital of the significance of scientific and literary education for the cultural development of the nation.¹ Despite this success and the eventual restoration of peace on the campus, Rogers began to consider finding a more tranquil place to live and work.

Geological research and professional contacts drew him to Boston, as did his deepening relationship with Emma Savage, whom he married in 1849. Henry was now settled there as well, having resigned his post at Pennsylvania to lecture and consult in the Boston area. During their frequent visits, they discussed the ideas William had expressed in his message to the Virginia legislature and the extension of higher education into technological fields, which were not then well represented in American colleges. In 1844, Henry was invited to deliver a series of talks at the Lowell Institute, established twelve years earlier by the Lowell family to offer free lectures on scientific subjects to the public. By 1846 Henry had interested John Amory Lowell, the Institute's trustee and the dominant member of the Harvard Corporation, in the possibility of creating at the Lowell Institute a scientific and technical school such as he and William had discussed. Lowell asked Henry to submit a plan in writing, and Henry appealed to William in Charlottesville for help. The result was two letters from William, dated March 13, 1846, and called "A Plan for a Polytechnic School in Boston."

New England, with Boston at its heart, seemed the ideal place for such a venture. For decades it had been a leader in industrial development and a source of capital and enterprise for the nation's expanding economy. During the War of 1812, Francis Cabot Lowell built the first complete factory in America at Waltham

around a newly invented power loom, providing a model and spur to the growth of the region's great industrial cities over the next forty years.⁴ By 1850 Boston capital was instrumental in financing railroads and mining operations in the Middle West, and New England's industry had become the most active and diversified in the United States.

The idea of an advanced technical school that could meet the increasing demand for men trained in science and skilled in its application had been in the air for many years.⁵ Those early American engineers who had not been self-taught were primarily graduates of West Point, which had offered formal training in military engineering since 1802. Slowly, however, schools offering instruction in civil engineering as well began to emerge, and in 1835 the first American degree in civil engineering was conferred at the Rensselaer Institute in Troy, New York. By the 1840s, even these schools could not keep up with the demand for trained engineers, and the instruction they undertook was too narrow and vocational to provide the practical but liberal education that the Rogers brothers believed their "polytechnic school" could offer.

Apart from its stress on the cultural and practical value of a higher education built upon the scientific disciplines, the Rogers plan is noteworthy both for its commitment to the laboratory method of instruction, a "daring innovation" at the time,⁶ and for its provisions for serious offerings in applied science to artisans and foremen who supervised work on the shop floor. But the plan foundered when it was held that the Lowell bequest could not be used to support such an enterprise, and in the following year new schools of applied science were opened at both Harvard and Yale. Disappointed but still convinced that a scientific and technical college must be free to develop independently of a great university if its educational potential were to be fully realized, the brothers held fast to their dream. In 1853 William left his chair at Virginia to move to Boston and, after Henry's departure in 1855 to become Regius Professor at Glasgow, continued to pursue their vision alone.

When opportunity smiled, Rogers was ready. In a message to the Massachusetts legislature in 1859, Governor Banks urged that newly filled land in the Back Bay be devoted in some way to the development of public education in the commonwealth, and the idea of establishing a new educational institution on a portion of this land quickly gained favor in influential circles. Rogers, able to draw upon both the political skills sharpened in his own dealings with the Virginia legislature and the active support of impor-

tant industrial and commercial leaders who wanted a technical school in Boston, went straight to work. After two false starts, he and four associates produced the "Objects and Plan for an Institute of Technology," and on April 10, 1861, an Act to Incorporate the Massachusetts Institute of Technology, "having for its objects the advancement of the Mechanic Arts, Manufactures, Commerce, Agriculture and the applied sciences generally, together with the promotion of the practical education of the industrial classes," was signed by Banks's successor, Governor John Andrew.⁷

Now the Civil War intervened, and the problem of financing the Institute remained. In 1862 Congress passed the Morrill Act, granting federal funds to "provide Colleges for the benefit of Agriculture and the Mechanic Arts." Governor Andrew proposed that this money be used to support a grand plan to unite Harvard, the fledgling MIT and a new agricultural college at Amherst. Rogers spoke forcefully against this plan and its implied submission of the Institute to a dominant Harvard, and the governor gracefully withdrew. In the end, seven-tenths of the federal grant was used to create the agricultural college, with the remainder given to MIT. This, coupled with generous gifts from private sources, was sufficient to proceed.

The strain took its toll on Rogers. In 1864 he traveled to Europe to recuperate in his brother's company and to observe developments in scientific education there. He was impressed most by the Polytechnic Institute at Karlsruhe and returned refreshed to Boston late in 1864 to prepare to admit students that winter. Elementary courses in mathematics, physics, chemistry, drawing, and French were assembled and announced, and on February 20, 1865, Rogers exulted in his diary: "Organized the school! Fifteen students entered. May not this prove a memorable day!"⁸

When the first regular session began in October of that year, with seventy students enrolled, the faculty roster numbered ten, all with the rank of full professor. Besides Rogers, who taught physics and geology, the staff included not only such men as John D. Runkle in mathematics and Charles W. Eliot in analytical chemistry and metallurgy, but also Ferdinand Bôcher in modern languages and William P. Atkinson in English language and literature.⁹ The early presence of these humanists and the equality of rank they enjoyed make clear that from the outset Rogers's intent was to offer more than just focused professional training in engineering. He meant as well, as the first catalogue put it, "To furnish such a general education, founded upon the Mathematical, Physical, and

Natural Sciences, English and other Modern Languages, and Mental and Political Science, as shall form a fitting preparation for any of the departments of active life."¹⁰

Rogers's insistence on educating engineers rather than simply training them led him to reject the sequential model of independent exposure to the liberal arts followed by concentrated technical work, as in medicine or law. He believed instead in the integration of scientific, literary, and social studies in a single four-year program. This view came less from a desire to conserve his students' time and resources, though this was an important consideration given the modest circumstances of the typical aspiring engineer, than from Rogers's conviction that engineers must be conscious of the cultural values implicit not only in the humanities but in the forms and assumptions of technological practice itself. The ability to understand and criticize one mode of thought or discourse in light of another, the mark of an education in breadth, could be achieved only by the concurrent, interactive study of contrasting disciplines.¹¹

Still, Rogers knew that young men and women¹² would come to MIT to study science and engineering, not liberal arts. He designed for them a common program of required subjects.¹³ In the first two years, comprehensive studies in basic science and technique were leavened with substantial work in English composition and literature, French, and German. At the beginning of the third year, students were expected to select one of five (after 1873, eight) courses offered in the scientific and technological disciplines. Here too their sustained exposure to liberal studies was insured by further requirements in biological science and four broad areas of humanistic endeavor: modern languages; history, political economy, and the "science of government";¹⁴ logic, rhetoric, and the history of the English language; and mental and moral philosophy.

But Rogers also understood that there would be some students for whom the prospect of concentration in a specific technical discipline would no longer seem as attractive as it once did, and he sought to insure that there would be a course for them, too, a path to the bachelor's degree that did not entail their transfer to another school. From 1865 to 1904, there was such a course, formally identified over the years as Science and Literature, the Elective Course, or General Studies, but known popularly from 1873 on as Course IX. Concentration in Course IX did not mean a radical switch from a technical discipline to a wholly different specialization in a single area of the humanities or social sciences. Instead, it would be a

continuation of the same diversified program of liberal studies that had accompanied the student's professional education from the start, albeit in somewhat greater depth than was demanded of engineering majors. Nor would the technical disciplines be abandoned; in place of an intensive sequence in one of the engineering fields, Course IX upperclassmen were required to select, as their interests dictated, subjects in physics, chemistry, geology, zoology, and the various branches of engineering. For them, the change would thus be from a greater to a lesser degree of technical specialization. Though its focus would be widened and its cultural setting enriched and enlarged, the central emphasis on science would remain uncompromised.¹⁵ Never a large program in terms of student majors,¹⁶ Course IX was nonetheless treated throughout this period with the respect Rogers himself had exemplified, as a full partner in the educational aspirations of a technological university.

The task of making these ambitious plans a reality in the classroom fell largely to William Parsons Atkinson. Born in Boston in 1820, Atkinson graduated from Harvard in 1838 and spent the years until his appointment at MIT in preparatory education as a private tutor and, briefly, as principal of the Brookline High School. Remembered by his students as a "quiet and genial personality [who] made 'history hour' a relief from the more abstract and trying engineering studies,"¹⁷ he struggled manfully to assemble the lectures and exercises promised by Rogers's expansive vision. In addition to his subjects in English composition and literature, he developed teaching materials in history, philosophy, political economy, and business law, and in 1871 his title was changed to professor of English and history to reflect the range of his responsibilities more fully. By 1873 Atkinson had constructed an imposing program of upperclass studies, which included year-long subjects in British and American Constitutional History and the History of Commerce and Industry, and one-semester offerings in History and Literature, Political Economy, Business Law, and Political and Industrial Geography.¹⁸

A bit of the flavor of these subjects, as well as Atkinson's difficulties in teaching across so wide a spectrum by himself, is given by his report on the activities of the "English Department" in 1872:

With the fourth year's class my attention has been mainly devoted to Political Economy and the Commercial and Economical aspects of History. Adopting the smallest and least controversial manual that I could find [otherwise unidentified], I have made it the text for a series of readings and

oral lessons, designed mainly to interest the class in the investigation of the various politico-economical subjects, which have so close a connexion with their professions and future occupations in life. No subjects belonging to the English department are more important, or have proved more interesting to the students as these; but in the more technical parts of Political Economy, the subjects of Currency, Banking, &c., I have to lament my own lack of practical knowledge; and I would respectfully suggest that a brief course of non-controversial lectures on these topics, explanatory of the ordinary course of business, and given by a practical business man, would be very useful.¹⁹

Atkinson's pleas for more staff so that he might increase the effectiveness of his own teaching by narrowing its scope were answered in part by the appointment in 1871 of George H. Howison as professor of logic and the philosophy of science. In 1873 Course IX was joined as an alternative to concentration in a specific technical discipline by a new course in philosophy, and Howison was eager to begin the work of curriculum development in this area. But the Institute's trustees prevailed upon him to assist Atkinson in political economy as well, so in the spring of 1873 he taught the fourth-year class from Amasa Walker's *Science of Wealth*, "taking pains," he wrote,

to present the points in which other leading writers differ from him, and to develop with special clearness both sides of the great dispute between Protection and Free Trade. The class have shown great interest in the subject, and at the final examination . . . not a single member was conditioned, while the great majority passed at a very high grade.²⁰

In 1874, over the strong protest of Atkinson,²¹ the work in political economy, which had previously been required of all students, was made optional for all but concentrators in Course IX. Atkinson continued to plead for more staff and resources in the humanities and social studies, but by now the "spectre of poverty stalked the Institute."²² Increasingly severe financial difficulties forced the Institute not only to deny this request but to reduce the staff in several other areas and, in 1878, to withdraw the Course in Philosophy entirely.

Finances had been a serious problem for the Institute from the very beginning. Much of Rogers's time and energy during the early years was consumed in the search for funding, and in October 1868 he suffered a slight stroke while attending a faculty meeting. John D. Runkle was appointed acting president in December of that year while he recovered, but age and weariness forced Rogers

to submit his formal resignation on May 3, 1870. Yet, even before Runkle's succession to the presidency became official in October, the Institute's independence was threatened by its own financial weakness and the considerable ambitions of the new and energetic president of Harvard.

Harvard had for many years been receptive to the ideals of technical education. As early as 1847, it had committed itself to instruction in the applied sciences by establishing the Lawrence Scientific School, but it could never resolve to its own satisfaction the question of what the status of technical studies within the university should be. Successive administrations showed a continuing bias toward pure science rather than its applications, and the prevailing opinion within the university was that professional training should be appended to rather than combined with the traditional liberal arts curriculum. That the Lawrence School never prospered in such circumstances is not surprising, and proposals to merge the new MIT with Harvard were heard with regularity.²³

Rogers, as we have seen, fought tenaciously for the Institute's independence and held to the view that the proper place for engineering training was in a four-year undergraduate program, where it could effectively be combined with liberal studies to produce a sound and useful education. In 1869, however, the Harvard Corporation reached into the Institute's faculty to select Charles W. Eliot as the university's new president. Their choice was not unanimous; many members feared that the traditional Harvard curriculum was not safe in the hands of this young reformer, with his scientific background, his avowed sympathy with the new technical education, and his harsh criticism of the unresponsiveness of American colleges to the economic and technological imperatives of the time.²⁴ For his part, Eliot intended to build a university in the largest sense at Harvard, and for forty years he pursued the goal of making MIT a part of it.

There was much to commend such a merger. The Institute's coffers were all but empty, though the apparent success of its educational experiment had already begun to win it a reputation for excellence. Harvard, on the other hand, had money, but the Lawrence School had never been able to achieve the standards the university and the Lawrence family had set for it. In his courtship of the Institute, Eliot stressed not only the financial rewards of a merger with the university but, perhaps misreading the temper of his intended, the great honor MIT would enjoy in becoming a part of Harvard as well.²⁵

Despite some sentiment in favor of the association within his own faculty, Runkle, with the strong support of the recuperating Rogers, successfully resisted Eliot's advances. But the collapse of the merger plan late in 1870 left the Institute's financial difficulties unresolved. Enrollments, which had been 224 in 1870, peaked at 348 in 1872 and, in the lean years following the depression of 1873, dropped year by year to a low of 188 in 1878.²⁶ Runkle struggled to keep the Institute alive, and though suggestions that the staff be reduced and faculty salaries lowered were never taken up, the few new appointments that were possible could be made only at the lowest ranks. By 1878 Runkle's energies were exhausted, and he resigned the presidency for a two-year leave of absence in Europe. Rogers himself was called from retirement to succeed him and, at the age of seventy-four, managed to raise over \$60,000 in new funds and reverse the alarming decline of enrollments. By the time Runkle returned in 1880 to resume his professorship in mathematics, the financial emergency had been weathered and the Institute's prospects brightened once again.²⁷

Now Rogers could look forward to a hard-earned second retirement. The MIT Corporation had elected his successor in 1881, and an inaugural ceremony was planned as a part of the graduation exercises in Huntington Hall on May 30, 1882. After an emotional tribute to the greatness of his vision and leadership, the old man, visibly moved, rose to reply. "His voice," said one who was there,

was at first weak and faltering, but, as was his wont, he gathered inspiration from his theme, and for the moment his voice rang out in its full volume and in those well-remembered, most thrilling tones. Then, of a sudden, there was silence in the midst of speech; that stately figure suddenly drooped, the fire died out of the eye ever so quick to kindle at noble thoughts, and, before one of his attentive listeners had time to suspect the cause, he fell to the platform instantly dead.²⁸

Thus was the torch passed to this stunned witness, Francis Amasa Walker. At forty-one, he had already been a soldier, a public servant, a scholar, and a teacher, winning in each of these endeavors distinction enough in the eyes of his contemporaries to fill a lifetime. Now, with the enthusiastic concurrence of Rogers himself, Walker assumed leadership of the Institute as its third president. In the seventeen years of his tenure, MIT would grow from a fragile school of slender resources and great ambitions to an institution of national reputation, a leader by example in the revolutionary modernization of American higher education. By 1897 the construction

and purchase of several buildings in the Back Bay would more than double the worth of the Institute's physical capital, the number of students and teachers would quadruple, and the endowment would rise almost fifteen times in value.²⁹ Instruction was introduced and departments created in technical fields that were just then being born, and in nurturing a genuine Department of Political Economy at MIT Walker contributed greatly to building the scientific and empirical foundations he believed so essential to the development of his own discipline. But, as if to illustrate the truth of Rogers's perception that the values and assumptions of technology itself would gradually permeate the wider culture, Walker's own economic thought during this period came increasingly to encompass a kind of technological art, an informed and purposeful interference in the processes of economic life by a state committed to furthering "the public interest."

The second son of Amasa Walker, Francis was born on June 2, 1840, just as his father was abandoning a successful career in manufacturing to devote the remainder of his life to public service and scholarship. The family soon settled near Amherst, Massachusetts, where Amasa embarked on the teaching and writing that would establish him as a leading American economist of his day. Young Francis entered Amherst College at fifteen. Despite a serious eye malady that kept him back a full year, he excelled both in his studies and at boxing, an activity well suited to the quickness of his hands and temper. Upon his graduation with honors in 1860, he joined the law firm of Devens and Hoar in Worcester and drilled with a local rifle company during the critical winter of 1861. When war erupted that spring, his older brother enlisted immediately, but Amasa forbade Francis to join him until he reached the age of majority. Volunteering that August as a sergeant major, Francis began four years of military service distinguished by bravery and pluck. Quickly promoted to staff officer, he saw action in Virginia, sustaining heavy wounds at Chancellorsville and falling into enemy hands near Petersburg in the summer of 1864. A daring attempt at escape was unsuccessful, and Walker languished in the Libby Prison at Richmond until he was exchanged and sent home late that year. In March, not yet twenty-five, he was breveted brigadier general for gallantry and meritorious service.³⁰

With his recovery complete and the war over, Walker took a teaching position at Williston Seminary in Easthampton and assisted his father by lecturing from time to time at Amherst. Like John Stuart Mill, he also contributed to his father's scholarly work,

helping Amasa prepare his treatise *The Science of Wealth*, published in 1866. Though decidedly in the classical English tradition against which Francis was later to react, the elder Walker's ideas made a strong and lasting impression on his son's thinking. Both insisted on a scientific approach to political economy based on the confrontation of theory with empirical evidence and labored to free the subject from what they saw as the limiting and distorting effects of treating it as a branch of theology or moral philosophy. Both maintained a lifelong interest in monetary problems, and Francis significantly extended and developed Amasa's insightful distinction of entrepreneurship from capital as a factor of production. Early in 1868, however, Francis left the academy, briefly writing editorials for Samuel Bowles's *Springfield Republican*. Declining an offer to return to Amherst as a part-time lecturer, he immersed himself instead in Washington politics to gain experience for a career in journalism.³¹

In 1869 Walker was deputized by David A. Wells, then special commissioner of the revenue, to reorganize the Treasury's Bureau of Statistics, and his work there led to an appointment in 1870 as superintendent of the Ninth Census. Walker saw the job of collecting statistical data as a serious scientific endeavor; as early as 1868, he had written that the latest election returns from Melbourne or the ordinary police blotters of American cities held more "interest to the student of political science than all the speculations of all the philosophers."³² With the support in Congress of his friend James A. Garfield, Walker sought unsuccessfully to professionalize the operations of the census by basing the selection of enumerators on ability rather than patronage. Still, he was able to gather data with unprecedented thoroughness, winning the admiration of statisticians around the world with his imaginative presentation of the results in the exhaustive *Statistical Atlas* of 1874 and his candid assessment of the survey's errors and shortcomings.³³ The huge mass of facts and figures that now filled his head, moreover, fueled his growing impatience with the dry, lifeless abstractions of English orthodoxy. When the empirical methods of German historicism promised to put this mountain of information to productive scientific use, Walker would be prepared to recognize the advantages of the new approach and treat the young economists who argued for it with sympathy and respect.

As the work of the census continued through 1871, Walker's thoughts turned increasingly to his own future. After negotiations for an editorial post with the *New York Times* came to naught, he

accepted President Grant's appointment to the scandal-ridden commissionership of Indian Affairs so that he might finish his census work despite the expiration of its funding. By Christmas of 1872, discouraged by the corruption and inefficiency he had seen in Washington, Walker was preparing to return to Massachusetts and a position with his brother-in-law's manufacturing concern when a new opportunity appeared unexpectedly. The census had engaged him in a cordial and fruitful collaboration with Daniel Coit Gilman of the Sheffield Scientific School at Yale, and when Gilman left Yale in 1872 to become president of the University of California, Walker was asked to join the Sheffield faculty as its first professor of political economy and history.³⁴

Walker's seven years at Yale were busy and productive. Though somewhat shy as a public speaker, teaching appealed to him, and the deep and genuine concern he showed for the welfare of his students made the erect, soldierly professor with the full moustache and glossy silk hat a well-loved figure on the campus.³⁵ His fascination with data and their analysis never waned; he inaugurated one of America's first courses in statistics at the Yale Graduate School and maintained his ties to the census by serving from New Haven as its unsalaried superintendent until 1874. The impact on Walker's thinking of this continuous exposure to "the flesh and blood of actual, vital Political Economy," to "man and societies as they are,"³⁶ was profound. More sensitive than they to the vast complexities of the American economy, he showed correspondingly less of the dogmatic assurance of many of his academic contemporaries.³⁷ Nor did Walker abandon his interest in politics and practical affairs. He served on both the local and the state boards of education, went to Paris in 1878 as the American delegate to the International Monetary Conference to argue for universal bimetallism, and, at Garfield's urging, directed the census once more in 1880.³⁸

But the most lasting and significant product of Walker's Yale years was his scholarship, embodied primarily in *The Wages Question* (1876) and a book that was to become a leading college economics text in the United States for twenty years, *Political Economy* (1883). In these works, Walker developed a theory of entrepreneurial profits closely analogous to the Ricardian theory of rent and challenged the reigning wage-fund doctrine by asserting a relationship between wages and the productivity of labor. He developed this latter insight into a general (and controversial) theory of distribution that linked the returns to capital, labor, and

entrepreneurship to the contribution each makes to the value of current production.³⁹ Walker's analysis lacks the precision of John Bates Clark's later articulation of the marginal productivity theorems, prompting one not unsympathetic historian to observe that Walker's theory "amount[s] simply to the statement that each factor in turn gets what is left over when the others have been paid."⁴⁰ Yet the very interrelatedness of allocational outcomes in this sense anticipates the style of contemporary general equilibrium theory and, accordingly, Walker continually drew attention to conditions of perfect competition as the guarantor of a "harmonious and beneficent"⁴¹ economic order. Where real conditions diverge from the ideal of perfect competition, he maintained, government, clumsy though it might be, could properly legislate as required to establish or restore competitive conditions.⁴²

Yet, despite the corrective role for government implied by the centrality of competitive conditions, Walker remained faithful throughout this period to the doctrine of laissez-faire. Influenced perhaps by the incompetence and venality he had seen in Grant's Washington, his views at this moment, expressed in two letters written in 1879, are worth quoting at length:

The social and industrial relations of every community, even the most primitive, are a web finer and more intricate than gossamer; and when the clumsy foot of the law, as of a ruminating or meditative ox, is brought down upon it, rending and crushing what all the art of all the legislators in the world cannot restore, I say "brutal." . . .

That is why I am a free-trader—not because I doubt that capital and labor make mistakes, when left to themselves . . . nor because I doubt that it would be possible for a central authority, directed by superior intelligence, so to order them as to produce appreciably larger results; but because I know of what sort of stuff legislators and committees are composed—what sort of bargaining and dickering goes on . . . what sort of compromises are made . . . what sort of influences prevail. . . .

For these reasons, I would rather trust the sense of individual interest, imperfect as it is often found to be, than submit industry to the discussions of any Legislature that ever was assembled.⁴³

Productive though it was, Walker's time at Yale must have been frustrating as well. His relations with the "cantankerous" William Graham Sumner, never close, deteriorated over time as the differences in their views became sharper, and Walker's lack of a Yale pedigree and association with the slightly *déclassé* Sheffield School consigned him to the periphery of campus life.⁴⁴ He regretfully declined Gilman's offer of a professorship at Johns Hopkins in 1876 to

redeem the obligation he felt to those colleagues at Yale who had taken on his classes while he had been on leave. But he did deliver a series of lectures on monetary questions at Johns Hopkins in 1877 which brought him into closer contact with the German historicism newly transplanted in Baltimore by Herbert Baxter Adams and alerted him to the quality of the students at Gilman's new university. When Rogers sought him out in June 1880 to offer the presidency of MIT, Walker's responsibilities to the census and the possibility of a cabinet post in the new Garfield administration caused him to hesitate, but he accepted at last in the spring of 1881. Delayed and saddened by the subsequent murder of his old friend the president, he set out in November of that year for yet another career, this time in Boston.⁴⁵

A "doer" all his life, Walker was stimulated by the challenge of building a young institution as vibrantly committed to the "New Education" as he was.⁴⁶ He stood foursquare with Rogers in his belief in the soundness and utility of a liberal education rooted in science and technology and saw in it a way not only to provide the nation with young people trained to meet the demands of modern life but to extend the moral and developmental advantages of higher education to a broader class of students as well. Classical studies, he argued in his *President's Report for 1883*, would only rarely provide the spark needed to engage the labors of the young in scholarly work, but rigorous, practical training in science would generate enthusiasm for study in all the disciplines and spare students the boredom and idleness that pervaded traditional colleges. "I believe it to be equally true," he went on, "that the faculties of clear perception, of careful discrimination, and of just generalization are developed by the study of natural history, of chemistry, of physics, as they can be through no other educational means."⁴⁷

A proper history of the Institute's impressive growth in size and stature in the years before 1900 and the role played in it by Walker's leadership has yet to be written. The new president worked hard to improve the school's precarious financial health, cajoling substantial support from both private benefactors and the state and steadfastly preserving the Institute's independence in the face of continuing overtures from Eliot's Harvard. He moved immediately to broaden the curriculum and, despite his own lack of experience at the frontiers of technology, made a series of brilliant appointments in the scientific and technical disciplines, including Silas Holman in physics, George F. Swain in civil engineering, and William T. Sedgwick, a graduate of the Sheffield School at Yale, in

biology, which established the school's eminence in these fields for decades to come. Yet, when the Institute moved to its present site in Cambridge in 1916, the building chosen to bear Walker's name housed neither classrooms nor research laboratories. Instead, the Walker Memorial has to this day been a comfortable place for students to eat and a home to dozens of extracurricular organizations and activities.

From the beginning of his presidency Walker strove to promote the physical and emotional well-being of his charges. When he arrived in 1881, the Institute maintained no housing for its students, and the single dining facility was a small lunchroom hidden in a corner of the shed used for military drill. Students came with seriousness of purpose and well-defined career objectives, largely from families of limited means and no traditional college loyalties, and their full class schedules and the time spent in travel left them very little opportunity for diversion or organized recreation. Under Walker's guidance, a true campus life began to emerge. Constantly accessible to students and their parents, a good part of his working day was spent in conversation with lonely or discouraged young people. He cheerfully supported a host of budding student organizations in mustering a wholesome spirit of community and slowly cultivated a strong loyalty to the Institute in its growing body of alumni. Here, even more than at Yale, Walker inspired the respect and love of hundreds of students to whom he was both teacher and mentor.⁴⁸

For Walker himself, the chance to create at MIT a Department of Political Economy where none had existed before must have been irresistible, and he plunged instantly into this particular labor of love. As if in answer to Atkinson's prayers, the catalogue for 1881-82 announced: "The instruction in Political Economy and International Law is given by the President,"⁴⁹ enabling a grateful Atkinson to return to teaching in English and history, the fields he knew best. By 1883 Walker had stiffened the requirement in liberal studies for concentrators in all disciplines; in addition to substantial work in English literature and modern languages, all science and engineering majors now took a sequence that included three subjects in history and one, taught by Walker from his own text, in political economy. In 1882 the Course in Science and Literature was reorganized and renamed the Course in General Studies, though it continued to be known informally as Course IX. Built as before on a demanding base of science and mathematics, Course IX now encompassed extended work in history, political economy,

public law, geography, and statistics. In its emphasis on the inter-relatedness and empirical foundations of all these studies, moreover, it began to reflect the influence of the German historicism to which Walker himself was increasingly drawn. Until 1886 Walker and Atkinson between them taught nine subjects in General Studies each year, and in these years every regular student at the Institute was exposed to the president's energy and commitment to his field in the introductory lectures in political economy. And for Walker, whose admiration for the "captains of industry" and the activity of entrepreneurship was strong and deeply rooted, the presidency of MIT offered a unique opportunity to reach and influence the development of dozens of young entrepreneurs-to-be.⁵⁰

But Walker's purpose from the outset had been to build a teaching department around the Course in General Studies whose excellence and commitment to scholarship would equal that of the Institute's scientists and engineers. As the everyday burdens of administration left him less and less time for the classroom, Walker's thoughts turned to the question of new appointments in history and political economy. Given his own growing dissatisfaction with English classicism and his long-standing, cordial relationship with Gilman and his colleagues at Johns Hopkins, the search would prove to be an easy one.

In September 1885 the American Economic Association (AEA) was born in Saratoga Springs, New York, and Walker, who himself had felt "the need of such moral support from fellow workers in political economy as might come from formal association and concerted action,"⁵¹ agreed to serve as its first president. The initiator of this venture was Richard T. Ely, a vigorous and provocative young scholar who had returned from graduate work at Heidelberg in 1880 and joined the faculty at Johns Hopkins the following year. Along with his older colleague Herbert Baxter Adams, the founder in 1884 of the American Historical Association, Ely had drunk deeply of German historicism. Greatly impressed by the empiricism of the historical school and the active role for the state in economic affairs that its doctrines implied, Ely hoped to create an association of progressive economists who, like him, repudiated *laissez-faire* as a scientific doctrine and sought ways not only to explain the economic order but to improve its ability to produce wealth and distribute it justly as well.⁵² "They were concerned," as Joseph Dorfman has aptly put it, "not only with analysis, but—in an incipient way of course—with social engineering."⁵³

In this, Ely's views were at one with those of the German economists who had formed the Verein für Sozialpolitik in 1872. Rejecting the rigid formalism of English theory and its emphasis on natural rights and immutable laws of nature, the Verein economists were strongly influenced by the success of the inductive, experimental method in the natural sciences and committed to a political philosophy that reified the organic state and asserted its plenary authority over the individual.⁵⁴ They attached great importance to the gathering of statistical data by government agencies and its application to what they called the "Science of Finance," the study of the "wants of the state and the means by which they are supplied."⁵⁵ When John Kells Ingram of Trinity College, Dublin, offered a sympathetic summary of their views to the British Association for the Advancement of Science in 1878, he might just as easily have been quoting from the statement of principles adopted by the AEA at its founding seven years later. The Verein, he said,

seeks to understand present economic phenomena through the study of their historical development, and to ascertain them as accurately as possible through statistical investigations. It uses the knowledge of the nature of man's intellect and will for the rational explanation of economic facts, but does not construct those facts themselves out of one-sided assumptions respecting the nature of men.

It . . . recognizes the right of the state to positive intervention in the economic relations of the community, for the support of the weak and the strengthening of public spirit. As the Political Economy of the last century applied itself chiefly to the liberation of the economic forces from antiquated and useless restrictions, so the new school specially meets the acknowledged need of new social arrangements, the need of social reform in opposition to social revolution on the one hand and to rigid *laissez-faire* on the other.⁵⁶

But in the 1880s such young men as those gathered around Ely at Saratoga Springs could not successfully challenge the abstract, deductive orthodoxy alone. Their attempts to bring empirical substance to economic theory through historical and statistical research and to create an active role for the state in economic policy needed a champion from the older generation of established economists. They found him in Walker. Though he opposed the association's original (and short-lived) statement of activist principles on the tactical ground that it would divide economists rather than unite them and never subscribed to policies of state intervention quite so radical as Ely's, Walker nonetheless saw great merit in the approach of the historical school⁵⁷ and threw the weight of his con-

siderable prestige behind the efforts of its young American adherents.⁵⁸ He had always been deeply concerned to establish his discipline as a positive science rather than a prescriptive art or a form of moral discourse. The economist's business, he told his students, was simply "to trace economic effects to their causes, leaving it to the philosopher . . . the moralist or the statesman, to teach how men and nations should act in view of the economic principles so established."⁵⁹ Though his respect for classical doctrine remained strong, Walker came increasingly to fault its sterile deductivism and often stubborn normative predisposition to *laissez-faire*. Classical writers, he argued in 1879, had been led to "avoid some of the most fruitful sources of economic discovery, to employ less and less the historic and inductive methods, and to resort more and more to the *a priori* and deductive, and especially to effect a simplicity in classification of which the subject matter is not susceptible."⁶⁰

At Sumner's Yale, such an appeal to experience and empirical procedure could be made, if at all, only apologetically.⁶¹ But at MIT, the banner of inductivism flew proudly over disciplines whose magnificent achievements were there for all to see, and Walker's confidence in the value of methods of physical science and engineering to the study of economic problems grew accordingly. In his *President's Report for 1883*, as we have seen, he had commended the study of physics to all educated men and women as a model of clear thinking and discriminating perception. By 1890, in a letter to Alfred Marshall, his claims regarding the place of physics in the education of the economist had become substantially bolder:

But the physicist . . . has a truly enormous advantage in studying the phenomena of industrial society, in watching the propagation of economic shocks, in tracing the lines of fracture from commercial or financial disasters, in appreciating and estimating the degree and direction of industrial forces making for good and of industrial disturbances making for harm.

I have been much impressed by this thought as I read your work. It seems to me that only a man who had profoundly studied the mechanics of heat, light and sound could exhibit so much insight into the nature of economic forces and so much at once of capacity and of restraint in judging and even estimating their effects upon human society.⁶²

If the analogy of economics to classical physics was a powerful influence on Walker's economic epistemology during these years, it is hardly surprising that his views on economic policy too came increasingly to reflect the ambition of technology so brilliantly real-

ized at MIT, the subjugation of nature by man's purposeful application of physical science. Walker's attachment to *laissez-faire* had never been one of principle; indeed, as we have noted, he had no doubt that a central authority guided by a "superior intelligence" *could* intervene to achieve the purpose of increasing production by drawing upon the principles of a well-developed, disinterested social science. His objection was rather that real lawmakers were too venal or, at best, simply too clumsy or ignorant to fashion legislation sufficiently responsive to the complexities of economic life to improve upon the results of free dealings between labor and capital. But now the undeniable successes of technology in the physical world offered the promise of something better, a neutral and effective economic engineering derived from the new social science inspired by Newton and Maxwell. Accordingly, Walker became more receptive to carefully crafted legislation designed to achieve specific, limited public purposes.

To be sure, Walker retained to the end of his life a firm belief in free competition as the cornerstone of a healthy and just economic order and a corresponding skepticism regarding the efficacy of state intervention.⁶³ But he came more and more to recognize that the realities of industrial life were often a far cry from the ideal of perfect competition, and in these cases he believed that only supervision or regulation of business by the state offered the hope of correcting the imperfections. He could, for example, distinguish the effects on competition of older, looser forms of business organization from those of the large corporations and trusts of his own day. Partnerships and small firms, he wrote in 1887,

are always subject to dissolution, by reason of antagonisms developed, suspicions aroused, separate interests appearing; and the expectation of such dissolution attaches to them from their formation. The cohesion excited, as between the particles of the economic mass which the theory of competition assumes to be absolutely free from affiliation and attractions, is certain to be shifting and transitory. The corporation, on the other hand, implies the imposition of a common rule upon a mass of capital which would otherwise be in many hands, subject to the impulses of individual owners. But it is because the hand into which these masses of capital are gathered is a *dead hand* that the deepest injury is wrought to competition. . . . [H]ow deeply the industrial corporation violates the principle of competition, and how absurd it is to claim for it the protection of *laissez-faire*.⁶⁴

Thus, Walker favored both a vigorous antitrust policy and the formation of trade unions in particular industries to address the threat

to competition represented by the imbalance of economic power in the industrial combines.⁶⁵ Toward this latter end, he supported much social legislation as well: acts regulating wages, hours, and working conditions, the provision of free primary education for all, and the regulation of banking to safeguard the savings of working men and women.⁶⁶

The faith of the AEA's young founders in the efficacy and moral value of purposeful state intervention informed by impartial social theory and administrative science was itself an influential component of a larger shift in the terms and assumptions of American political discourse during this period. As the nineteenth century drew to a close, the Progressive ideal of conscious managerial control over social outcomes in the interest of the public at large and the refinement of bureaucratic techniques for securing it exerted a growing influence on the nation's political thought and practice.⁶⁷ Led by such intellectuals as Ely, Lester Ward, and Herbert Croly, American Progressives began to conceive of society itself as a concrete, living entity. Its purposes and interests were understood to be entirely its own, distinct from and superior to those of its human constituents. The active agent of this reified society in the world of affairs was the state, and it, they held, must be given pervasive powers to direct individual behavior and manipulate social outcomes in the interest of "society."⁶⁸ Politics, as Woodrow Wilson suggested, could now be separated from administration; whereas the former concerned itself with the often vexing problems of identifying and articulating the common good, the latter could draw upon the neutral theories of management science to devise ways to bring it about.

Though Walker never traveled as far down the ideological path toward public management of economic processes as did Ely and his disciples, the strong and timely encouragement he offered those who did makes him an important transitional figure in the history of American economics. Moved both by the teachings of the German historicists and by the confident assurance of technological mastery over nature that pervaded the institute he represented to the world, Walker firmly rejected the complacent quietism of *laissez-faire*. Instead, he came increasingly to see law and administrative regulation as tools of the state, "social technologies" made possible by the growth of scientific knowledge and designed to enable the outcomes of complex social processes to be manipulated in the public interest. In this affirmation of the engineer's aspiration in the realm of human affairs, he helped lead his discipline into

the twentieth century and lay the foundations for the political economy of hierarchical organization and allocation by plan in both the public and private sectors that has come to characterize our own time.

But just as the reification of society in both its German and its American variants carried the seeds of a virulent, often racist nationalism, which would burst forth in the Great War, Walker's cautious attraction to the imperatives of the public interest had its darker side as well. The new ideology did indeed allow the separation of politics from administration, but now, as it sought to identify and articulate the common good, Progressive politics necessarily became collectivist, and sometimes xenophobic. On questions of race and immigration in particular, Walker's ideas exerted a considerable influence on Progressive opinion. From his quarter-century of immersion in demographic statistics, Walker had by 1896 distilled what he called the "displacement principle," the notion that immigration does not add to the total population because it induces a compensating decline in the birth rate of the native population.⁶⁹ He drew the necessary conclusions for policy with stark candor:

The entrance into our political, social, and industrial life of such vast masses of peasantry, degraded below our utmost conceptions, is a matter which no intelligent patriot can look upon without the greatest apprehension and alarm. These people have no history behind them which is of a nature to give encouragement. They have none of the inherited instincts and tendencies which made it comparatively easy to deal with the immigration of the olden time. They are beaten men from beaten races; representing the worst failures in the struggle for existence. . . .

The present situation is most menacing to our peace and political safety. In all the social and industrial disorders of this country since 1877, the foreign elements have proved themselves the ready tool of demagogues in defying the law, in destroying property, and in working violence. . . . The problems which so sternly confront us today are serious enough, without being complicated and aggravated by the addition of some millions of Hungarians, Bohemians, Poles, south Italians, and Russian Jews.⁷⁰

In the last twelve years of his life, Walker's partial conversion to the politics of state intervention in the interests of "society" was given strong impetus by the intellectual presence and energetic teaching of the staunch Germanist Davis Rich Dewey. The elder brother of the generally like-minded philosopher John Dewey, Davis was born in Burlington, Vermont, on April 7, 1858. After his graduation with honors from the University of Vermont in 1879, he

spent four years as a teacher of Latin and Greek and principal of various academies in Vermont and Hyde Park, near Chicago. In 1883 Dewey began graduate work in history, politics, and economics at Johns Hopkins, traveling two years later with his mentor Ely to Saratoga Springs to sign the original statement of principles of the AEA. Dewey's deep attachments both to the association and to German historicism lasted until the end of his life in 1942. His *Financial History of the United States*, first published in 1903 and dedicated to his beloved teachers at Johns Hopkins,⁷¹ is a model of the integrative methods Dewey first learned at Hopkins and remained in print for over thirty years in twelve editions. Equally loyal to the association, he became its president in 1909 and served continuously as editor of the *American Economic Review* from its founding in 1911 to his retirement in 1940.

When Walker determined to make a new appointment in General Studies for the academic year 1886–87, his thoughts turned naturally to the committed young man he had met at Saratoga Springs. For Dewey too, the prospect of working at the very citadel of inductive science with so eminent and sympathetic a figure as Walker must have been an exciting one, and he eagerly accepted the invitation to join the Institute's faculty as instructor in history and political science in 1886. The years that followed saw Walker's gradual withdrawal from teaching and, under Dewey's increasingly confident leadership, a remarkable development in the scope and depth of the Institute's offerings in economics and the related historical and political studies that both Walker and Dewey saw as essential to them.

Indifferent to abstract theorizing divorced from empirical reality, Dewey insisted that the application of economic knowledge to the practical problems of government and business administration was the central calling of the academic economist.⁷² From the beginning of his long service at the institute, he brought this point of view into the classroom. By 1888 Dewey, now assistant professor of economics and statistics,⁷³ was teaching ten (!) different subjects each year, ranging from introductions to political economy, statistics, commercial geography, and industrial history to practical studies in governmental administration, commercial practice, railroad management, and national taxation and budgets to advanced work in such areas as socialism and the history of economic theory.⁷⁴ Nor were the related disciplines ignored. As William Atkinson, who had taught every one of the Institute's regular stu-

dents since 1865, prepared to retire, his position in history was filled (and Dewey partially relieved) first by Charles H. Levermore, another of Ely's students at Johns Hopkins, who served from 1888 until he was called to head what is now Adelphi University in 1893, and then by Charles F. A. Currier.

The program assembled in General Studies by these men is distinguished by both the breadth of its offerings and the clear influence of Dewey's commitment to the interdisciplinary, empirical approach of German historicism. By the early 1890s, all students were required to take (in addition to subjects in English and modern languages) modern political history in the first year, American history in the second, and political economy and industrial history in the third. Students in Course IX not only pursued greater depth in all these studies but availed themselves as well of elective sequences in a wide range of fields, including political theory and public law, sociology, and anthropology. Course IX majors seeking a concentration in economics and other interested students were offered a rich menu of advanced subjects falling into five general areas. Finance and Taxation included a class in financial history taught by Dewey that made extensive use of primary sources and government documents, a subject in the history and theory of taxation using Bastable's *Public Finance*, and a class in banking that, reflecting Walker's strong interest in the subject, included detailed treatment of the question of bimetallism. Two subjects in the area of Commercial and Industrial History were offered, as well as introductory and advanced work in statistics. A single subject in Socialism (later retitled Theories and Methods of Social Reform) considered "the economic systems proposed, particularly during the present century, to change the existing distribution of wealth [in addition to] systems of cooperation, profit-sharing, and governmental control of industries," and the concentration concluded with an integrative subject in the History of Economic Theory.⁷⁵

Yet the Institute was far from a passive receptor and propagator of the Gospel according to Johns Hopkins. We have already noted the dramatic impact of Walker's close exposure to classical physics and its practitioners on his methodological thinking. But the culture of science and technology that permeated the Institute made an equally deep impression on Dewey and pushed him on to intellectual territory still uncharted by the Germanists themselves. By 1891 they had both to come to see the natural and social sciences as parts of a single whole, a unified science of nature and man that

implicitly extended the promise of control through technology from the world of objects to the world of men and women. The catalogue for 1891-92 expressed it this way:

The curriculum [in Course IX] has been arranged in the belief that the origin, growth and laws of political and industrial society can best be approached through the methods used in natural science. The general requirement of the Institute in chemistry and physics is substantially preserved in this course. From the study of biology, including botany and zoology as a basis, the student is prepared to proceed to the study of man in society, and to consider the history and significance of social institutions, such as the family, the state, and the church. Physical science, biology, anthropology, social science, and history, political and industrial history, and international law thus present, throughout the course, a definite progressive relationship. . . .

The instruction in Social Science and History has been arranged so as to connect the instruction in Biology with that in History. These two departments present an unbroken sequence of related studies extending through three successive years of the Course IX curriculum. This series rests upon the fundamental knowledge of living forms and of prehistoric man that is presented in general Biology, Zoology, and Anthropology. In the classes in Social Science and History the student passes to the consideration of rudimentary social organisms, or primitive political and religious conceptions, and of ethnological questions [and thence to modern politics and international law].⁷⁶

Walker's pride in the accomplishments of the faculty and students in General Studies shines through his *President's Reports* for these years. He and Dewey sought to attract the best minds possible for the program and often found them; between 1892 and 1895, a lively and popular course of lectures in business law was given on Saturday mornings by the Boston attorney Louis D. Brandeis. But no appointment could have made them prouder than that of William Z. Ripley, first as instructor in political science in 1893 and then as assistant professor of sociology and economics in 1895. For Ripley, like many of the most illustrious faculty members in the technical disciplines, then and now, was one of the Institute's own. He had graduated in 1890 with a degree in civil engineering but had stayed on for another year to study economics and history with Dewey and Levermore. In 1891 he became a fellow in the School of Political Science at Columbia, receiving his Ph.D. in 1893 and returning to the Institute to teach and begin the research in transportation economics that would later bring him renown.⁷⁷ In so hospitable an institutional climate as this, General Studies grew

and prospered, and by Walker's death in 1897, Dewey, Ripley, and the geographer William Niles taught a full fourteen subjects each year in economics and statistics, Ripley and Currier offered four in political science and sociology, and Currier alone taught seven in history.⁷⁸

But the strong commitment to political economy and its related disciplines that marked Walker's presidency would soon be withdrawn, if only briefly. A three-year interregnum under James Mason Crafts of the Chemistry Department followed Walker's death in 1897, and both it and the short, unhappy administration of Henry Smith Pritchett that succeeded it were dominated by the vexed and recurring question of merger with Harvard. Crafts had managed to repel Eliot in 1898,⁷⁹ yet when the issue arose once more in 1904, Harvard at last found in Pritchett a leader of the Institute who responded to the proposal with enthusiasm.

But the faculty would not follow Pritchett's lead in this great controversy. Aloof and self-assured, he had alienated many by his cavalier treatment of personnel matters, and now the faculty felt that the president had been less than frank with them regarding his own position on the merger and the various considerations that had been raised in support of it. A decision on a technical point by the Supreme Judicial Court of Massachusetts quashed the merger plan once again in September 1905, but the residue of bitterness and hostility was not easily dispelled.⁸⁰ Writing about the president to his colleague Robert H. Richards in October of that year, the normally calm and balanced Dewey found himself "so influenced by resentment and discouragement that I do not feel great confidence in my own judgment."⁸¹

The roots of Dewey's feelings ran far deeper than the merger plan alone. At Pritchett's insistence, the Course in General Studies was abolished in 1904 and replaced with a program in General Science, which sharply reduced the breadth of social and humanistic studies in Course IX and refocused its curriculum on elective subjects in natural science and engineering. The Course in General Science was explicitly directed to prospective "businessmen" and high school teachers of science⁸² and reflected Pritchett's own deep skepticism about the value of what he called "culture studies" at a technological institution:

The very earnestness which pervades a technical school, the spirit which prompts the student to bend himself to the task before him, tends to place a light value on any studies which do not lead to visible results. It

is difficult to convince him that such subjects have for him a value comparable with the more direct utilitarian subjects; and to study them in this atmosphere and with this spirit is to achieve a very much smaller result than would be possible in a different atmosphere with a different spirit.

As a matter of fact, we men in the college of technology need to recognize that it is not the study of Literature, nor of Economics, nor of History, nor of any other subject, that *per se* brings culture and a broad sympathy with men. Chemistry, Physics, and Mechanics may be taught in such a way as to develop great humanistic interests as effectively as any of the so-called culture studies. . . . If we desire to increase in our colleges of technology a spirit of true culture and to bring about a larger common interest, the effective way to do this is to bring into our colleges teachers [of science and engineering] who are themselves exponents of this culture and of this wide human interest.⁸¹

The impact of this change on Dewey's department was immediate and devastating. Though the introductory subject in political economy was still required of all third-year students, its scope was reduced to include only the most practical and descriptive elements of the subject, and Dewey complained in 1903 that "in no way can it be regarded as comprehensive."⁸² Perhaps reading the handwriting on the wall, Ripley resigned in 1902 to accept a chair at Harvard and was replaced the following year by Carroll W. Doten. By 1906 the roster of offerings in economics beyond the introductory subject had been reduced to six and reoriented toward the practical, with Dewey teaching Banking and Finance, Organization of Industry, and Economics of Corporations and Doten offering Railroad Economics, Labor Problems, and Economic History.⁸³

Dewey held the decimated program together with hard work and the establishment of popular tutorials and personal conferences attached to the introductory subject,⁸⁴ and the skies over Course IX soon brightened once again. Pritchett was gone by 1908, replaced the following year by the physicist and lawyer Richard Cockburn Maclaurin. Born in Scotland and raised in New Zealand, Maclaurin's legal training at Cambridge and the breadth of his educational vision made him far more sympathetic to the ideals of General Studies than Pritchett had been, and though his attention in the years before 1916 was primarily devoted to the Institute's planned relocation in Cambridge, he gave Dewey and Doten the encouragement they needed to carry on.

At the request of the Department of Electrical Engineering, Dewey had for many years offered its majors a required subject in the Economics of Corporations, which considered "the nature of

corporations and their legal development, accounting, valuation of bonds, holding companies, lighting companies, street railway franchises, and the taxation of corporations."⁸⁵ Now, with the explicit support of Maclaurin,⁸⁶ he expanded this core into an entire Course in Engineering Administration, established in 1914 and known to the present day as Course XV. Specifically designed for those "who expect to enter positions concerned with the management or administration of manufacturing, construction and transportation enterprises which demand a knowledge of scientific and engineering principles,"⁸⁷ the new Course encompassed separate options for civil, chemical, and mechanical or electrical engineers. Though its emphasis was most decidedly in the building of practical business skills,⁸⁸ it nonetheless provided a necessary haven for economic studies at the Institute in a period of great stress and uncertainty for them. The school that had produced Alfred P. Sloan and Gerard Swope⁸⁹ thus turned itself to the explicit training of managers and administrators, an undertaking it has proudly sustained ever since. In this way, Dewey managed to save economics at the Institute by casting it in its most obviously "useful" and worldly form, as business administration. At MIT, this was not only sufficient, it was precisely the point.

71. Fetter to Jordan, December 20, 1900, Fetter Manuscripts.
72. Fetter to Jordan, January 29, 1901, Fetter Manuscripts.
73. Jordan to Fetter, February 5, 1901, Fetter Manuscripts.
74. "Dr. Fetter Will Leave Stanford," *San Francisco Chronicle*, March 10, 1901.
75. It is interesting to note that Jordan makes no mention of the "Ross incident" in his autobiography, *The Days of a Man*.
76. Furner, *Advocacy and Objectivity*, p. 254.
77. Cross studied at Wisconsin under both Ely and Commons. Ira Cross, "Portrait of an Economics Professor," Oral History, Bancroft Library, Berkeley, p. 13.
78. Young to Jordan, April 14, 1906, Presidential Papers, Stanford University Archives, Green Library, Stanford University.
79. For details of Veblen's circumstances at this time, see Chapter 10, herein.
80. Veblen to Jordan, April 9, 1906, Presidential Papers.
81. Veblen to Jordan, April 16, 1906, Presidential Papers.
82. Joseph Dorfman, *Thorstein Veblen and His America* (New York: Viking Press, 1966), p. 268; Fourth Annual Report of the President of the University, 1907, p. 34.
83. Dorfman, *Veblen*, p. 269.
84. Cross was one of Veblen's teaching assistants, and Duffus was a housekeeper for him. Cross, "Portrait"; R. L. Duffus, *The Innocents at Cedro* (New York: Macmillan, 1944).
85. Cross, "Portrait," p. 20.
86. Dorfman, *Veblen*, p. 254, and correspondence between Jordan and Mrs. Veblen in 1909, Stanford University Archives.
87. Jordan to Henry P. Judson, October 6, 1909, Presidents' Papers, University of Chicago Archives.
88. Veblen subsequently found academic employment at the University of Missouri and at the New School for Social Research in New York.
89. Young later taught at Cornell and at Harvard and became the first American to hold a professorial chair in Britain when he went to the London School of Economics in 1927.
90. Charles P. Blitch, "Allyn A. Young: A Curious Case of Professional Neglect," *History of Political Economy* 15 (Spring 1983), p. 4.
91. Cross, "Portrait," p. 14.
92. Cookingham, "Economists and Social Reform."

CHAPTER 12 MASSACHUSETTS INSTITUTE OF TECHNOLOGY

1. William Barton Rogers, "A Plan for a Polytechnic School in Boston" (1846), reprinted in Samuel C. Prescott, *When M.I.T. Was "Boston Tech": 1861–1916* (Cambridge, Mass.: Technology Press, 1954), pp. 335, 336.
2. Prescott, *When MIT Was Boston Tech*, pp. 7–8.

3. *Ibid.*, pp. 15–16.
4. *Ibid.*, p. 22.
5. James Phinney Munroe, *A Life of Francis Amasa Walker* (New York: Holt, 1923), p. 211.
6. *Ibid.*, p. 213.
7. Prescott, *When MIT Was Boston Tech*, pp. 27–32.
8. *Ibid.*, pp. 32–45. See also Munroe, *Life of Walker*, pp. 211–13.
9. Prescott, *When MIT Was Boston Tech*, pp. 50–51.
10. *Catalogue of the Massachusetts Institute of Technology, 1865–66*, p. 2.
11. "Course XXI: A History," in Travis R. Merritt, ed., *Course XXI Survey and Register, 1958–1983*, (Cambridge, Mass.: Humanities Undergraduate Office, MIT, 1984), pp. 10–11.
12. Although the Institute's early planning documents made no reference to the training of women, Eliot had from the outset welcomed several to his evening classes in chemical practice. Early in 1867, one of these students sought permission to attend regular day classes in chemistry, and her letter was sent by the Committee on Instruction to Rogers with the query, "Can there be any objection to ladies entering as special students except possibly want of room in the laboratory?" There being none, the president promptly announced a plan for special instruction in afternoon and evening classes for students unable to attend day classes and made clear that when it was organized the faculty would gladly receive both men and women as students. The first woman admitted was the estimable Ellen H. Swallow, a graduate of Vassar, who became a special student in chemistry in 1871. Within two years, she had completed all the requirements for the institute's S.B. degree and became the school's first woman graduate in 1873. Three years later, Swallow (now Mrs. Robert H. Richards) was appointed director of the new Women's Laboratory at MIT, an institutional home for more than a hundred special students in chemistry, mineralogy, and natural history, some of whom later received the regular bachelor's degree. The laboratory's success was such that it was abolished in 1883 in favor of the regular admission of qualified women to all of the Institute's instructional programs on the same basis as men. For her part, Ellen Richards taught chemistry at the Institute continuously from 1873 until her death in 1911. Prescott, *When MIT Was Boston Tech*, pp. 53–55, 99.
13. The Institute's own rather idiosyncratic system of classification will be used throughout the remainder of this essay: the term "subject" refers to a single, semester-long course in a specific area, and the proper noun "Course" is reserved for a major program or field of concentration in a particular discipline. Thus, for example, students enrolled in the Course in Physics would be expected to take individual subjects in mechanics and calculus.
14. *Catalogue, 1865–66*, p. 3.
15. "Course XXI: A History," pp. 8–9, 11.
16. By 1876 nine of the Institute's 170 graduates to date had taken their degrees in Course IX. *President's Report for the Year Ending September 30, 1876, Massachusetts Institute of Technology*, p. vi.

17. H. C. Spaulding, "William Parsons Atkinson: A Student's Tribute," *Technique* (the MIT student yearbook), 1892, p. 78.
18. *Catalogue*, 1873–74.
19. *President's Report for 1872*, pp. 82–83.
20. *President's Report for 1873*, p. 9. Howison's own commitment to a scientific rather than normative conception of political economy is suggested by the first of the questions he composed for that year's examination in the subject: "Show how the action of the three elements—Desire, Labor, and Wealth—renders the realm of Political Economy an ever expanding one, and how it is that they render Political Economy a *positive science*" (*ibid.*: italics in original).
21. Political economy, he wrote in 1877, "is another of those studies, some knowledge of which is a necessary foundation to all profitable reading of History, and it seems almost an absurdity that in a practical school like ours some attention to this, one of the most important of all practical subjects, should not be required of all students." *President's Report for 1877*, p. 38.
22. Prescott, *When MIT Was Boston Tech*, p. 101.
23. *Ibid.*, pp. 69–70.
24. *Ibid.*, p. 72.
25. *Ibid.*, p. 79.
26. *Ibid.*, p. 90.
27. *Ibid.*, pp. 101–2.
28. Munroe, *Life of Walker*, pp. 225–26.
29. *Ibid.*, p. 382.
30. Prescott, *When MIT Was Boston Tech*, pp. 108–11.
31. Bernard Newton, *The Economics of Francis Amasa Walker: American Economics in Transition* (New York: Augustus Kelley, 1968), pp. 2, 5–7; Munroe, *Life of Walker*, pp. 101–9.
32. Newton, *Economics of Walker*, p. 20.
33. *Ibid.*, pp. 137–41; Joseph Dorfman, *The Economic Mind in American Civilization* 3: 102. (New York: Viking Press, 1949).
34. Munroe, *Life of Walker*, p. 140; see also Chapter 6, herein.
35. Munroe, *Life of Walker*, p. 150.
36. Quoted in Newton, *Economics of Walker*, p. 23.
37. Dorfman, *Economic Mind*, p. 102.
38. Prescott, *When MIT Was Boston Tech*, pp. 112–13.
39. Newton, *Economics of Walker*, p. 45; Dorfman, *Economic Mind*, p. 108.
40. T. W. Hutchison, *A Review of Economic Doctrines, 1870–1929* (Oxford: Clarendon Press, 1953), p. 320.
41. Francis A. Walker, *Political Economy*, 2nd ed. (New York: Holt, 1884), p. 228.
42. Newton, *Economics of Walker*, p. 154.
43. Munroe, *Life of Walker*, pp. 146–47.
44. See Chapter 6, herein.
45. Munroe, *Life of Walker*, pp. 205–9, 216–18.

46. By 1894 Walker could proudly write: "It has been stated that not less than one hundred colleges and universities in the United States are to-day offering a technical instruction. There is now not a state in the Union without an institution in which more or less of a course in engineering is laid out. Some of these are classical institutions of long standing and high repute, which are as rapidly as possible transforming themselves to meet the wants of the age. If, indeed, 'imitation is the sincerest form of flattery,' those who originated the earlier schools of science and technology have reason to pray that their heads may not be turned, as one classical college after another throws overboard studies and exercises which thirty years ago were declared to be absolutely essential to mental discipline and culture, without which no one could become a thoroughly educated and cultivated man, to make room for studies and exercises which, even down to recent days, have been stigmatized as interested, mercenary, and of a base flavor. Certainly [those who] supported President Rogers and Dr. Jacob Bigelow in the demand for an educational system better adapted to the wants of modern life than the mediaeval and monastic culture then alone offered to the aspiring student, have reason to rejoice that the battle of the New Education is won." *President's Report for 1894*, p. 7.
47. *President's Report for 1883*, pp. 21–24.
48. Prescott, *When MIT Was Boston Tech*, pp. 113–50; Munroe, *Life of Walker*, pp. 218–49.
49. *Catalogue*, 1881–82, p. 7.
50. On Walker's attitudes toward entrepreneurship, see Newton, *Economics of Walker*, pp. 32–37, 163–64. As individuals operating successfully in the practical world of commerce and industry, the Institute's graduates participated directly and effectively in the organizational revolution of their day. True to Rogers's vision, the vast majority of them held engineering positions that brought them into close contact with the managerial side of their enterprises, and a sizable proportion of these became entrepreneurs or business administrators themselves, including Alfred P. Sloan, Gerard Swope, and Roger Babson. Inclined by their training to think in terms of clearly defined objectives and sensitive to material and economic constraints, they turned their analytic powers not just to designing bridges or machines but, where the occasion arose, to designing and constructing the companies that would build them, too. For them, as for many other thoughtful but practically oriented minds of the period, the appropriate metaphor for the corporation was mechanical, a machine whose operation reflects the purposes of its human designer and whose parts are constrained to move in concert at the behest of a single will. It is thus hardly surprising that the nascent science of industrial management looked for inspiration and prestige to the discipline of engineering and that its proponents drew the analogies that followed from this conception of administrative theory; if the task of the engineer was to manipulate objects according to the laws of physical science so as to further the interests of men, the task of the manager was to manipulate men

- according to the laws of social science so as to further the interests of the firm. On the relationship between management science and engineering during this period, cf. Robert B. Reich, *The Next American Frontier* (New York: Times Books, 1983), pp. 47–82.
51. Walker to Richard T. Ely, April 30, 1884, quoted in A. W. Coats, "The First Two Decades of the American Economic Association," *American Economic Review* 50 (September 1960): 558.
 52. *Ibid.*, pp. 555–63.
 53. Joseph Dorfman, "The Role of the German Historical School in American Economic Thought," *American Economic Review* 45, Papers and Proceedings (May 1955): 17.
 54. *Ibid.*, p. 19.
 55. *Ibid.*, p. 23.
 56. *Ibid.*, p. 21.
 57. Dorfman, *Economic Mind*, p. 107.
 58. Thus, wrote Ely in 1910, referring to Walker's unanimous election to the presidency of the AEA in 1885, "He was not selected because we necessarily agreed with his views, but because we looked upon him as a champion and emancipator"; quoted in Newton, *Economics of Walker*, p. 13.
 59. Walker, *Political Economy*, p. 16.
 60. Quoted in Newton, *Economics of Walker*, p. 19.
 61. In an 1893 article for the *Atlantic Monthly*, Walker clearly had in mind the inferior position occupied at Yale by the Sheffield School when he wrote that "young men do not greatly care to go to schools where they are not respected equally with the best; where all the praise and all the prizes go to others; where the stained fingers and rough clothes of the laboratory mark them as belonging to a class less distinguished than students of classics or philosophy"; quoted in Munroe, *Life of Walker*, p. 231.
 62. *Ibid.*, p. 343.
 63. "Now, this [competition] may appear a very unamiable thing; yet, rightly viewed, perfect competition would be seen to be the order of the economic universe, as truly as gravity is the order of the physical universe, and to be not less harmonious and beneficent in its operation." Walker, *Political Economy*, p. 228. But "[g]overnment will never accomplish more than a part of the good it intends; and it will always, by its intervention, do a mischief which it does not intend." Francis A. Walker, "Socialism," *Scribner's Magazine* 1 (January 1887): 116, quoted in Munroe, *Life of Walker*, p. 225.
 64. Walker, *Political Economy*, pp. 255–56; italics in original. To those who argued that the trusts were a natural and praiseworthy product of evolution, Walker remarked caustically that he supposed that the modern train robber was merely the normal evolution of the old-fashioned highwayman. "Some evolution," he went on, "is worthy of only condemnation. Some evolutionists ought to be hanged" (p. 256).
 65. *Ibid.*, pp. 258–59.

66. Newton, *Economics of Walker*, p. 150.
67. Cf. Robert H. Wiebe, *The Search for Order, 1877–1920* (New York: Hill and Wang, 1967), pp. 133–63 ("A Revolution in Values").
68. Frank Tariello, Jr., *The Reconstruction of American Political Ideology, 1865–1917* (Charlottesville: University of Virginia Press, 1982). See also Wiebe, *Search for Order*, pp. 140–48.
69. Newton, *Economics of Walker*, pp. 143–50.
70. Francis A. Walker, "Restriction of Immigration," *Atlantic Monthly* 77 (June 1896): 822–29; quoted in Munroe, *Life of Walker*, pp. 301–2. The following year, he was even more explicit: "We must strain out of the blood of the race more of the taint inherited from a bad and vicious pool before we can eliminate poverty, much less pauperism, from our social life. The scientific treatment which is applied to physical disease must be extended to mental and moral disease, and a wholesome surgery and cautery must be enforced by the whole power of the State for the good of all." Francis A. Walker, "The Causes of Poverty," *Century Magazine* 55 (December 1897): 210–16; quoted in Munroe, *Life of Walker*, pp. 304–5.
71. The book's dedication was "To the Seminary of the Department of History, Politics, and Economics at Johns Hopkins University, of which the author was a member from 1883 to 1886. Under the guidance of Adams, Ely, and Jameson, we read and learned. The first has gone, leaving affectionate memories and organized activities of permanent usefulness; the others are still doing their work in a spirit of broad-minded sympathy and fine scholarship." Davis R. Dewey, *Financial History of the United States*, 12th ed. (New York: Longmans, Green, 1934), p.v. In 1904 the book was awarded the John Marshall Prize by Johns Hopkins University.
72. Biographical Sketch of Davis Rich Dewey, MIT Archives, Collection MC70, p. 5.
73. Dewey was promoted to associate professor in 1889 and to professor in 1892. Like Walker before him, Dewey was also active in the American Statistical Association, serving as its secretary from 1886 to 1906 and helping to edit its journal as well. *Ibid.*, p. 3.
74. *Catalogue, 1888–89*, pp. 54–55.
75. *Catalogue, 1891–92*, pp. 70–73.
76. *Ibid.*, pp. 46, 71. Dewey had become chairman of the Department of General Studies upon Atkinson's retirement in 1889.
77. *President's Report for 1895*, p. 27; Edwin R. A. Seligman, "Economics in the United States: An Historical Sketch," in *Essays in Economics* (New York: Macmillan, 1925), p. 155.
78. *Catalogue, 1897–98*.
79. Prescott, *When MIT Was Boston Tech*, pp. 164–66.
80. *Ibid.*, pp. 193–203.
81. Dewey to Richards, October 3, 1905, MIT Archives, Collection M70, box 4, folder 43.
82. *Catalogue, 1907–8*, p. 60.

83. *President's Report for 1907*, pp. 20–21.
84. *President's Report for 1903*, p. 27.
85. *Catalogue*, 1906–7.
86. *President's Report for 1908*.
87. *Catalogue*, 1906–7. Dewey also taught a required subject in *Vital and Sanitary Statistics* for biology majors.
88. *President's Report for 1914*, pp. 17–18.
89. *Catalogue*, 1914–15, p. 128.
90. Thus, among other things, students considered “the organization of the executive force, departmental functions, factory efficiency, standardization of goods, stock keeping, routing of orders, management of labor, efficiency methods, marketing of goods, publicity and advertising, credit department, insurance, and business ethics.” *Ibid.*
91. Cf. n. 50, above.

CHAPTER 13 UNIVERSITY OF WISCONSIN

1. As quoted in Laurence R. Veysey, *The Emergence of the American University* (Chicago: University of Chicago Press, 1965), p. 104.
2. As quoted in Merle Curti and Vernon Carstensen, *The University of Wisconsin: A History, 1848–1925* (Madison: University of Wisconsin Press, 1949), 1:6.
3. *Ibid.*, pp. 24–25.
4. Three colleges in the state predated the University of Wisconsin: Carroll, founded in 1840 by the United Presbyterian Church; Beloit, founded in 1846 by Congregational and Presbyterian interests; and Lawrence, begun in 1847 as a nonsectarian establishment. A fourth, Ripon, began in 1850 as a private, nonsectarian college. By 1856 Lawrence had half again as many students as the University of Wisconsin, even when the large number of “preparatory” students were counted among the enrollees in the latter. *Ibid.*, p. 185.
5. *Ibid.*, p. 73.
6. The first chancellor—John H. Lathrop, who served from 1848 to 1858—also held the title of Professor of Ethics, Civil Polity, and Political Economy. Presidents Paul A. Chadbourne (1867–70), John H. Twombly (1871–74), and John Bascom (1874–87) held concurrently the chair of Mental and Moral Philosophy. *General Catalogue of the Officers and Graduates of the University of Wisconsin, 1849–1902*.
7. As quoted in Curti and Carstensen, *University of Wisconsin*, 1:97–98.
8. *Ibid.*, pp. 117, 374.
9. In its first quarter-century, friction between the Board of Regents and the university’s senior administrators was endemic. In the eyes of much of the wider public, the situation at the University of Wisconsin was unstable. That reputation no doubt contributed to the decision of Daniel Coit Gilman—later president of the University of California and of the Johns Hopkins Uni-

- versity—to decline an invitation to serve as Wisconsin’s president in 1867 and to a similar decision on the part of J. Lewis Diman, professor of history and political economy at Brown, in 1871.
10. Curti and Carstensen, *University of Wisconsin*, 1:217.
11. John Bascom, *Political Economy Designed as a Text-Book for Colleges* (Andover, Mass.: Draper, 1859).
12. John Bascom, *Ethics; or, Science of Duty* (New York: Putnam, 1880), pp. 296–97.
13. *Ibid.*, p. 311.
14. Joseph Dorfman, *The Economic Mind in American Civilization* (New York: Viking Press, 1949), 3:178–79.
15. Bascom to Richard T. Ely, as quoted in Curti and Carstensen, *University of Wisconsin*, 1:289.
16. Bascom, *Sociology* (New York: Putnam, 1898), pp. 67, 69, 146.
17. Bascom, Baccalaureate Address, 1887, as quoted in Curti and Carstensen, *University of Wisconsin*, 1:287.
18. Charles R. Van Hise, *Memorial Service in Honor of John Bascom*, as quoted in *ibid.*, pp. 280–81.
19. In the mid-1880s, the University of Michigan enrolled nearly 1,200 students, and the University of Iowa catered to 479. Wisconsin’s enrollment at that time was 387. Curti and Carstensen, *University of Wisconsin*, p. 326.
20. The subject matter of extension courses (of six lectures each) then included American history, English literature, Scandinavian literature, economics, antiquities of India and Iran, bacteriology, physiology of plants, electricity, and landscape geology. *Ibid.*, p. 725.
21. *Ibid.*, p. 345.
22. *Ibid.*, p. 631.
23. Ray Allen Billington, *Frederick Jackson Turner: Historian, Scholar, Teacher* (New York: Oxford University Press, 1973), pp. 80, 88.
24. For background on Ely’s circumstances at this time, see Chapters 8 and 10, herein.
25. Turner to Ely, November 25, 1891, Ely Papers, Wisconsin State Historical Society, Madison.
26. Billington, *Frederick Jackson Turner*, pp. 90–91.
27. Chamberlin described Ely as follows: “He is one of the foremost economists in the country. . . . Probably no one among the younger generation of economists is more widely or favorably known. His employment would direct attention to the development of the University in a most pointed and effective way, and would aid greatly in giving it recognition as a leading institution.” Chamberlin to Regent Clark et al., March 5, 1892, as quoted in Curti and Carstensen, *University of Wisconsin*, 1:619.
28. Ely to Albert Shaw, January 25, 1892, as quoted in Richard T. Ely, *Ground under Our Feet* (New York: Macmillan, 1938), pp. 180–81.
29. *Catalogue*, 1892–93.
30. See Benjamin G. Rader, *The Academic Mind and Reform: The Influence*