William Barton Rogers and the Idea of MIT

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Although he’d retired from his duties, Rogers gave no indication that he planned to stay away from MIT for very long. Within weeks of handing the presidency to Francis A. Walker, he accepted an invitation to deliver the Institute’s May 1882 graduation speech. On that fateful day Rogers, in a very literal sense, gave his life to MIT. According to the physicians who rushed to the podium when he fell, “Life was extinct before his body fairly touched the floor.” When news of his death reached his friends and colleagues, their responses came pouring in. Letters from former students, fellow researchers, educational leaders, politicians, philanthropists, and many others expressed their sympathy and loss to Emma. They warmly shared similar views of the man—the way he inspired his students to love science and the “sense of obligation” they felt toward him; his ability to touch others with “wonderful power of illustration and expression”; his personal dedication to “all that concerns the progress of science”; the “combined feelings of affection and respect” for him as a person and a scholar. “How few of us are left,” despaired Asa Gray, “after the mortality of this fatal year.”

The year was “fatal” because Darwin had also died just a few weeks earlier. Their nearly simultaneous deaths were momentous to Gray’s generation—they signaled the end of an era in science.

In terms of scientific research Rogers was, of course, no Darwin. He had contributed no grand theory of evolution, field-changing insight in geology, or revolutionary idea for natural philosophers. Rogers was, rather, a middling scientist among his peers, a determined, creative scholar with a penchant for understanding how different kinds and levels of scientific knowledge could inform one another. His determination led him to publish over one hundred works examining vexing geological and natural philosophical problems. His efforts, as with the Virginia Geological Survey, generated a great wealth of data. This Baconian enterprise laid the foundation for his more creative scientific work developing theories about mountain chain formation. More important, however, is what Gray undoubtedly had in mind when
he thought of that fatal year. Darwins of any era rely on the labors of scientists like Rogers for their own work. Before going public with *Origin*, Darwin turned to places like Gray’s Botanic Gardens at Harvard, that great repository of plant specimens from all over the world, for supporting data. Without the data-collecting work of Rogers, Gray, and like-minded researchers, grand theories amounted to little. Thus, Darwin stood in part on the shoulders of middling scientists, and Asa Gray understood this as well as anyone.

Rogers’s death robbed Gray of a close colleague who shared in defending Darwin’s theory, in collecting data necessary for theorizing, and in attempting to keep scientific institutions out of the hands of the exclusive, sometimes secretive Lazza-roni. They had taken on these struggles together. They had lived to see science mature and loosen itself from the hold of the past, represented by figures such as Agassiz. With Rogers, Darwin, Agassiz, Joseph Henry, A. D. Bache, Benjamin Peirce, and many others gone, that chapter in American science was drawing to a close.

Throughout his long scientific career Rogers followed many goals and interests, but if there was one legacy he hoped to leave through his research, it was advancing the interdependence of theoretical and practical questions in science. For most of his life the scientific community had been divided. Advocates of basic science, like Agassiz, had little interest in the work of practical scientists such as Jacob Bigelow. Rogers’s articles, books, and presentations stood out in his day as work conducted by someone who defied boundaries and restrictions others sought to maintain. All branches of scientific inquiry, he believed, needed thorough, sustained investigation. As if in a nod to this view, the American Association for the Advancement of Science (AAAS), a few months before Rogers gave his final speech, changed its organizational structure. The AAAS divided the physical sciences division in two, one section for theory (i.e., physics) and the other for practice (i.e., engineering). They carved out a space for specialists in each area.

Were it not for Rogers and his passion for and approach to scientific research, there would be no MIT today. The conclusions he reached while collecting specimens in the field or experimenting with materials in the laboratory inspired Rogers’s ideas about higher education reform. He wanted an institution that would train the next generation of scientists who took seriously the interplay between different levels and forms of scientific investigation. MIT’s mission, he made clear, stood for the commingling of theory and practice. Rogers believed that the European emphasis on theory, on the one hand, had a greater role to play in the American science. On the other hand, he argued that America’s fervor over technology provided better, more accurate tools with which to improve scientific theories. The Institute he envisioned brought the two traditions together in a laboratory-centered system of
higher learning. At the commencement of 1882 Rogers told students that their education had equipped them for “practical industries” as well as for research in “the laboratory or in the field.” The “thoroughness” and “accuracy” of student work at the Institute reflected the useful arts ideal.\textsuperscript{2}

Not all scholars shared this vision. A younger generation of scientists who advocated either pure or applied science was critical of Rogers. The Johns Hopkins University physicist Henry A. Rowland complained of “professors who degrade their chairs by the pursuit of applied science instead of pure science.” Faculty who squander their “energy and ability in the commercial applications” of science, he warned, represented a “disgrace both to him and his college.” Citing the lack of pure studies, when compared with Europe, Rowland employed nationalistic arguments in calling for a refocusing of priorities in American science. Other researchers, such as engineer Robert H. Thurston, argued for an emphasis on practice over theory. Through his work at the Stevens Institute of Technology and Cornell University, Thurston defended utilitarian studies, particularly in such areas as mechanical engineering, and dismissed the need for theoretical or abstract studies. In these programs he discouraged his students from abstract mathematics and related coursework for fear it would distract them from applied science.\textsuperscript{3}

Rogers believed MIT could bridge this divide through laboratory instruction, and in many ways it did. While the Institute alienated some scholars of the late nineteenth century, others gravitated toward MIT’s catholic approach. It offered a vision of laboratory work that became one more piece of a broader applied studies movement encouraged by the federal land-grant legislation and by the emergence of the modern university. After a brief tenure at MIT, Charles W. Eliot took the laboratory ideal to Harvard, where his leadership helped shape a truly national university. At the start of his presidency in Cambridge, Eliot reminisced about Rogers’s “example,” confessing, “I received from [his] School much more than I ever gave.” Once installed in Harvard’s bully pulpit, Eliot preached the gospel of the laboratory. “The old-fashioned method of teaching science by means of illustrated books and demonstrative lecture,” he assured college leaders, “has been superseded . . . by the laboratory method, in which each pupil . . . works with his own hands, and is taught by his own senses.” The spark of reform leaped to the desk of Princeton’s president John McCosh, who wrote in 1877 that “there is a growing feeling that scientists cannot be trained by mere lectures.” During his administration McCosh led a drive to provide students with laboratory instruction beyond the lecture demonstration. Similar ambitions came alive at Amherst, where facilities for laboratories began to appear. In November 1876 a student observed that “Professor [Elihu] Root had introduced a novelty to the department of physics. Lab work is to be performed in connection
with study. For this purpose the room in Walker Hall, known heretofore as the Alumni Room, is to be used.” Yale had long before tolerated laboratories at its Sheffield School, but undergraduates at the college complained, through most of the nineteenth century, that “instruction was given, in large measure, by lectures, and these were not accompanied by strict requirements of personal investigations on the students’ part.” When the university revolution came to New Haven, faculty began transplanting the practices of the scientific school to the college proper.4

MIT’s presence on the collegiate landscape prompted questions about the need for change. The Institute’s John Runkle observed that other schools were following MIT in “moving in the matter [of laboratory instruction]”: “I heard privately that [Harvard’s] Prof. Gibbs intends to attempt something of the kind soon.” Agassiz, Gibbs’s colleague, decried “the imminent danger in which our University is of losing its prestige if rigorous steps are not taken to strengthen it in the direction demanded by the wants of the nation.” Similar pressures appeared on the West Coast. John LeConte, of the University of California, Berkeley, asked Rogers about MIT’s laboratory method, for, he explained, “your experiences [are] valuable to us”: “Any document having reference to the programme of organization; to the internal arrangements of the laboratory; to its practical working, etc. would be acceptable. In short, anything which would assist me in the organization of such a department in the most efficient manner. Perhaps, more recent experience may enable you to add some valuable suggestions. I hardly think we shall be able to accomplish anything before 2 years from this time; but I wish to have my plans matured before hand.” LeConte’s inquiry, and those of others, reveals a spirit of curiosity and enthusiasm for change that was shared by many members of the scientific community. Thus, by means of its “example” the idea of MIT became part of the broader discourse in American higher education.5

Rogers’s death not only marked the end of a scientific era but also highlighted the beginning of a new educational outlook. MIT popularized a model of laboratory instruction that was absorbed elsewhere (although controversy never wandered far from this model, as evidenced in the later Atlantic Monthly debates over MIT between Francis A. Walker and Harvard’s Nathanial Southgate Shaler).6 Walker’s interpretation of the MIT ideal, as originally defined by Rogers, remained largely unchanged throughout the closing years of the century. For the most part the institution continued to focus on the needs of the pure and applied science community. Except for minor changes to the Institute’s governance and curriculum, such as the introduction of a physical education program, it was the original idea of MIT that Walker promoted to philanthropists and to the state legislature. During his tenure this approach persuaded Massachusetts legislators to grant the Institute $300,000
for expanding its facilities and establishing scholarships for qualified state residents who were unable to pay for tuition. Such developments enhanced competition for students, resources, and prestige, prompting Harvard officials to renew their call to merge with MIT in the 1890s and then again in the 1910s. While the takeover plans proved unsuccessful, the ideas behind both institutions established factions in higher learning that continued to be the subject of public interest into the twentieth century. 

William Barton Rogers left behind ideas about higher education that college leaders would continue to debate, and his wife, Emma, helped secure his legacy through her interest in his research and in the Massachusetts Institute of Technology. Following his death, and after fielding “frequent requests . . . by geologists and others” for pieces of his work, she decided to collect and republish her husband’s research. In 1884, two years after his funeral, Emma finished editing a volume of approximately eight hundred pages of Rogers’s publications, reports, and maps. The compilation included his early work on marl, his annual reports on the Virginia survey, and an assortment of papers that described or generalized about geological formations in the South. Emma also made thoughtful contributions to MIT’s department of geology. She donated books, photographs, and funds for periodicals and microscopes to the department’s library, and, when she passed away, in 1911, she left a substantial portion of the Rogers estate to MIT.

In the end Rogers’s career and ideas intersected with the principal values defined by the useful arts. He remained convinced that, whether it was in science, professionalization, or higher learning, theory or practice alone would not do. Throughout his career he advocated the view that both had to coexist and flourish before substantive gains could be derived from science and for society. Although his epitaph at Cambridge’s Mount Auburn Cemetery reads simply, “William Barton Rogers, 1804–1882,” the MIT motto, mens et manus (mind and hand), records the work of a lifetime.