



VERY STUDENT at the Massachusetts Institute of Technology since instruction began on February 20, 1865, has many times seen or heard the name of William Barton Rogers, its founder. There is today, in the central lobby under the great dome of the Cambridge buildings, a bust that shows him as a typical gentleman of the old school, serious yet kindly in demeanor, looking toward the future with hope and faith. Portraits of him adorn several Institute rooms, notably the president's office and one room in Walker Memorial. On the north wall of the lobby in the present Rogers Building a bronze tablet, given by the classes of '82, '83, '84, '85, and '86, depicts his striking profile with its almost aquiline expression, and memorializes him as the founder of this great school.

Although these memorials of the great founder have been daily visible to hundreds, probably few of the busy students of the past four decades have even a casual knowledge of his early life, and still fewer know the impressive story of his family. A glimpse into his father's career, and some account of the family's aspirations and struggles through the first half of the last century will help explain the vision that culminated in the founding of M. I. T.

A hundred years ago William Barton Rogers was one of a notable group of four brothers, all of them distinguished scientists and educators. Like the three Compton brothers a century later who showed such a striking combination of scientific and administrative ability, each of the "Brothers Rogers," as they were known in their day, made his name distinguished in some branch of science and held some prominent academic post. They were in touch with the scientific work and the intellectual currents of Europe and America, and they worked together or corresponded intimately throughout their lives.

Patrick Rogers, the father of the Rogers brothers, was himself a man of outstanding character. He was born in 1776 in Tyrone County in Northern Ireland, of Irish, Scotch, and English ancestry. He was the eldest of the twelve children of Robert Rogers, a congenial, liberal Irish gentleman. Patrick's first school was a thatched, clay-walled little schoolhouse on his father's estate about forty miles from Londonderry. Later he was tutored, especially in the classics, by one of his two Presbyterian clergyman uncles. Patrick was keen of mind, thoughtful, and decisive in character. When it was time to decide on his future he rejected the career in the church that his family proposed, and instead entered a counting-house in Dublin. Shortly afterward, in May, 1798, the Irish Rebellion broke out, and Patrick contributed to Dublin newspapers some articles hostile to the government, which his friends thought almost certain to cause his arrest. Thereupon, assisted financially by a kinsman, Alexander Rogers, he fled to Londonderry and thence to America. In August, 1798, after a voyage of eighty-four days, he arrived in Philadelphia.

The refugee soon secured a position as tutor in the University of Pennsylvania, and in the winter of 1799 was admitted to study medicine at the Pennsylvania Hospital under the eminent Doctors Barton and Rush, and in the university under Doctors Shippen and Wistar, all men still well remembered in the annals of medicine. At the same time he also assiduously attended lectures in chemistry by Dr. James Woodhouse at the university and became thoroughly grounded in this science.

While still a medical student, in January, 1801, he married Hannah Blythe, of Scotch-English parentage and good family, who

had also come from Londonderry, and on February 11, 1802, James Blythe Rogers, the first of the four famous sons, was born. In May of that year Patrick received his medical degree, dedicating his graduation thesis to Dr. Barton, and at once started a medical practice, several thousand dollars in debt.

Patrick's father died in 1803, and as the eldest son, Patrick felt it necessary to go to Ireland to assist in adjusting family affairs and to obtain his share of the estate. A year later he returned to Philadelphia, bringing with him two younger brothers. After he had paid his debts from his small inheritance Dr. Rogers found himself "with neither money or an establishment" as he expressed it, and with a family to support. In his absence his practice had disappeared, and the outlook was not bright. Spurred by need, and sensing an opportunity to take advantage of the public curiosity about science, he energetically prepared a series of popular lectures on chemistry, with experimental demonstrations, probably the first to be given in this country. In 1810 he published "A Syllabus of a Course of Lectures on Natural Philosophy and Chemistry with the Application of the Latter to Several of the Arts." Eventually these lectures became well known, but they were not remunerative. For eight years after his return from Ireland, Patrick was constantly stalked by poverty and debt, and the family eked out a poor living in Philadelphia.

Early in this distressing period, the second son, William Barton Rogers, named in honor of the friendly Professor Barton, was born on December 7, 1804. A third son, Henry Darwin, was born August 1, 1808. Two daughters were born during this period also, but both died in infancy. Hoping for better things, the family moved to Baltimore in 1812, and there the fourth of the brilliant sons, Robert, was born on March 29, 1813.

Life in Baltimore, where the family lived for the next seven years, proved somewhat better, but continued to be a struggle with poverty. Dr. Rogers, by combining an apothecary's shop with medical practice, and by continuing his public lectures, was able to support his family and pay the debts he had incurred. He eventually acquired some distinction in the medical profession, was elected physician of the Hibernian Society in 1816, and "orator" of the Medico-Chirurgical Society in 1819. He also gained public reputation as a scientist.

Despite the difficulties, there was a happy home life. Patrick Rogers had made it a practice to give a part of each day to the scientific and practical instruction of his young sons rather than leave their education entirely to the schools of the city. Of a part of this program, William once wrote: ". . . With the exception of a short period when James and myself walked about two miles to Baltimore College [the Public High School] to receive instruction in Latin, we never spent any of our afternoon hours in school. . . . It thus happened that our education was conducted in great part at home, and by the daily personal attention of our kind and judicious father; and to this cause I may justly ascribe the thoroughness of our knowledge on all the subjects which we studied. . . ."

While this regimen undoubtedly developed in the sons an early love of science and a maturity of thought and a facility of expression far in advance of ordinary boys in their teens, it largely deprived them of the companionship of other boys and of participation in the simple sports of the period. The Rogers brothers were not athletic or sport-loving, but they enjoyed excursions into the fields and hills, and were keen observers. Music was one form of family relaxation, with Dr. Rogers and Henry playing the violin and William the flute. But for the most part the boys were steeped in serious things, and under the father's influence keen to study the unfolding sciences.

In 1819, the University of Virginia was incorporated, with Thomas Jefferson as the founder. On May 21 of that year Dr. Patrick Rogers applied to Mr. Jefferson for a professorship in natural philosophy and chemistry in the newly established university. Mr. Jefferson replied in kindly vein, stating that no funds were available for teaching, that the proposed professorship had already been assigned, and that the opening of the university was to be postponed until 1821. The ability of Patrick Rogers did not remain long unrecognized, however, for he was soon after elected Professor of Natural Philosophy and Chemistry in the ancient College of William and Mary, founded in 1693, and second in age only to Harvard among American colleges. The Rogers family moved to Williamsburg and settled in Brafferton House on the campus in the autumn of 1819.

Life at Williamsburg began auspiciously and ran smoothly. The

two elder sons, James and William, matriculated in the college. Patrick Rogers entered on his new work with zest. He loved teaching, and his lectures were brilliant and popular. He made all the apparatus required in his experiments, aided by his sons, who under his tutelage acquired unusual facility in the use of tools.

In the summer following the first year Mrs. Rogers died of the dreaded malarial fever. (At the time, the region of Williamsburg was so notorious for the prevalence of malarial fevers during the summer seasons, that it was seriously proposed to move the College of William and Mary to Richmond). The death of the mother was a stunning blow to the family. It brought the father into still closer relations with the four boys, and strengthened the intense devotion to each other that the boys showed throughout their lives.

After a second year at William and Mary, James, the eldest son, entered the Medical School at the University of Maryland, took his M.D. degree in one year, and began medical practice at the age of twenty in Baltimore. William, whose health had always been far from robust, completed his college course, and then spent the next few winters in Williamsburg, immersed in the study of physics and mathematics, and working as an assistant to his father. In 1822, at the age of seventeen, he demonstrated his remarkable rhetorical gifts at the third "Virginiad" celebrating the settlement of Jamestown in an oration that was highly praised by the press of the day. Before he was twenty he had translated an important French work on differential calculus.

In 1825 William and his brother Henry, who had just finished college, went to Baltimore to seek their fortunes. In the autumn of 1826 they opened a school at Windsor, Maryland, to which their brother Robert came as a student, but it was never large or prosperous enough to provide a suitable living for the two men. Fortunately, William soon managed to get a temporary appointment as a lecturer at the Maryland Institute, one of the earliest of the "institutes" common in that era that sponsored courses on scientific subjects as well as popular lectures and exhibitions. In the autumn of 1827 he was given a permanent appointment as lecturer, but an expected professorship did not materialize. At the request of the managers of the Institute, early in 1828 William drew up a plan for a school empha-

sizing in its upper years instruction in mathematics, elementary surveying, natural philosophy, chemistry, and other practical subjects, in fact, a technical high school, to be established as a part of the Maryland Institute. When the trustees accepted his proposal William and Henry abandoned the school at Windsor, and both began their careers in technical education in the new school.

For three years the Rogers brothers were all together around Baltimore, struggling to support themselves and considering the various careers open to men interested in science. Robert, at first a student in the school at Windsor, later transferred to the Maryland Institute. James, who had not been successful in medical practice, worked for a time as an industrial chemist, and then joined his brothers as a lecturer at the Maryland Institute.

In August, 1828, Patrick Rogers died of malarial fever, and on October 13 William was chosen as his successor to the chair of Natural Philosophy and Chemistry at William and Mary. For the next seven years William devoted his splendid mental energies to teaching and experimental work at Williamsburg, in which he was remarkably successful despite the climate and the competition from the new University of Virginia at Charlottesville which had opened in 1825. Later when the professorship in mathematics suddenly became vacant, he temporarily assumed this additional task, so successfully that the students petitioned the Board of Visitors to make no new appointment in the subject for the rest of the year.

As the first of the brothers to establish himself, William also assumed his father's role as head of the family. Robert returned to Williamsburg to complete his college work, and to him William gave an almost paternal protection. To the other brothers he was a constant helper, ready with substantial aid and wise counsel when it was sought.

Things did not go well without William at the Maryland Institute, and after a short time James and Henry left to seek more secure academic posts. James, after an unhappy period teaching chemistry in a struggling, second-rate medical school in Baltimore, finally received a much better appointment as professor in a medical school in Cincinnati, where in addition to medical teaching he wrote a textbook in chemistry. Henry was elected to the chair of Natural Philos-

ophy at Dickinson College in Carlisle, Pennsylvania, but found the experience disillusioning and unsatisfactory because of the narrow religious and social views that permeated the college. His scientific ability was recognized, however, and for a year he edited a journal that published reviews of scientific matters.

Although the brothers were dispersed during this period they maintained the deepest family feeling and the closest association in their general scientific interest, so that they were in a sense an organized scientific team, exchanging ideas in a stream of letters, and contributing to each other's work. Each brother had his own interests and aptitudes, but the brothers were united by an absorbing interest in chemistry and in natural philosophy, which included mechanics and electricity. They also shared a deep interest in the new science of geology, which was then receiving much attention, especially in England.

In the spring of 1831, Henry, feeling that his future at Dickinson was insecure, resigned and went to Philadelphia. During the summer he accompanied William and Robert to New York, in the hope of securing work for Robert with a Captain McNeil, who was locating some new railway lines in New England. Robert joined the surveying party as a volunteer, and found as one of his associates a Mr. E. S. Chesbrough, later one of the founders of the American Society of Civil Engineers. Some weeks later, Henry sought and obtained employment on these field surveys, and thus it came about that in the summer of 1831 again Henry and Robert were working together in New England.

In this work they paid special attention to the geology as well as to the surface features of the regions between Boston and Providence and between Boston and Taunton. All this they reported in letters to William at Williamsburg, who was keenly interested. The region had appealed especially to Henry, who in September, 1831, wrote to William:

I often make some observations on natural history, especially the nature of the trees and rocks. Griswold has mentioned my habit to the Captain, reporting, I presume, something in praise of my geological information: the Captain requested me to-day to record a series of geological observations throughout our route, stating that such things will

be beneficial to my prospects. So much for a little science!!! I should not omit to state that, though volunteers, we receive the full recompense usually given persons who do our duty, each of us now getting \$1.25 a day. This of course will not continue after we quit the field, but for the present it more than defrays our expenditures.

Henry and Robert spent the winter in New York after their surveying season ended, and Robert returned the following spring to continue in the survey. These two seasons with surveying parties on railroad location work were the first experience of the Rogers brothers with practical engineering work. Apparently it did not attract them as a profession. Robert, at the age of twenty, wrote to William: "Engineering holds out but very few inducements, for only those who have been educated at West Point stand in the way of promotion, and can look forward to certainty of success; they alone are sure of constant occupation in the profession." The civil engineers of that and earlier days were not the product of technical schools in the now-accepted sense, since none were in existence. To be sure, West Point, founded in 1802, taught *military* engineering to men who were to become officers in the U.S. Army, and who often resigned early to use their training in more profitable civilian work. As in England, the term *civil* engineer was beginning to be used to describe men skilled in surveying, in the construction of dams, bridges, canals, and docks, or in the layout and construction of highways and railways. Aside from the Army engineers, most Americans engaged in this sort of work were ingenious and versatile self-made men, without much background in science and mathematics, other than that gained by their own efforts. In any case Robert, seeing no future for him in engineering, entered the Medical School of the University of Pennsylvania; and Henry, after a brief fling at social reform, turned to the more congenial field of geology.

In Baltimore a few years earlier, Henry Rogers had met and been strongly influenced by the brilliant but visionary Miss Frances Wright, of extremely liberal opinions, who was crusading against the accepted theological and social views of the day. Like other free-thinking utopians of the time, she was interested in educational schemes, especially the establishment of "halls of science" to make



new scientific knowledge available to the people. During the winter of 1831-32, in New York, Henry met Robert Dale Owen, the leader of this movement, and his interest was renewed. As a result he developed a desire to visit England to follow up these theories and to observe social conditions in London and elsewhere. With the reluctant consent of his family he left for England in May, 1832, intending to return in the autumn. At sea on his homeward passage a series of severe storms disabled and almost wrecked the ship, and Henry was obliged to return to London for the winter. This accident was a turning point in the lives of the Rogers brothers, for it brought them into contact with the great scientists of Europe, and launched Henry, and indirectly William, on their careers as geologists.

A Geological Society had been founded in London in 1807, and one in France in 1830. Interest in geology was also well developed in America—a society was formed in the Wyoming valley of Pennsylvania in 1832—and the Rogers brothers had all taken a deep interest in this new and important science. During his enforced stay in England, Henry found opportunity to attend many meetings of the Royal Society and to make the acquaintance and gain the friendship of many of the most eminent scientific men of the period, including Faraday; Dalton, the chemist; Tully, one of the inventors of the achromatic objective; and perhaps most important of all, Lyell. Lyell was the outstanding geologist in all Europe. Henry's already strong interest in geology was tremendously stimulated, and his knowledge greatly increased, especially through a concentrated study of fossils and all the materials available in the museums in London. So eager was his pursuit of the science that he became recognized as a leader in the subject, and before his return to America he was elected a Fellow of the Geological Society of London, the most authoritative body in this field, and the oldest of the geological societies in the world. Young Henry Rogers, about twenty-five at this time, was now assured of the course his own life would take. Geology must be his professional field. He had shared his new knowledge by letters to his brother William, and on his return to America in September, 1833, they, with Robert, spent some weeks in discussing the new developments in this branch of science.

Two important results came from these discussions. Henry pre-

pared a series of public lectures on geology, splendidly illustrated by fine models of crystals skillfully prepared by his brother Robert. These lectures were given to overflowing audiences at the Franklin Institute in Philadelphia during the following months and stirred much interest in the subject. In January, 1835, Henry was elected Professor of Geology at the University of Pennsylvania, and began an illustrious career as teacher, director of surveys, and consultant.

A not less important result was the effect on William's career, for he had already given serious attention to geology and had made careful observations in Virginia. The stimulus derived from Henry's English visit intensified William's zeal in research in the field, and had as a product the notable reports on the marls and greensands of Virginia which brought him increased reputation and wide correspondence with some of the foremost men of science in the country. He and Henry published jointly one important article in *Silliman's Journal* in 1834, the first of numerous papers by the two brothers.<sup>1</sup>

One outcome of William's work was an attempt to induce the legislature of Virginia to undertake a geological survey of the state like those already instituted in Massachusetts, Maryland, and Tennessee. The proposal was favorably acted on in March, 1835, and soon thereafter William was appointed chief of the Geological Survey. By a happy coincidence, Henry began a similar survey of the state of New Jersey in May of the same year. The combination of teaching and academic research with the supervision of practical field work that his position as head of the Geological Survey demanded must have led William gradually to observe the interrelations of science with industry and productive enterprises, the field later called applied science or technology.

In August, 1835, after seven years' distinguished service at William and Mary, William Barton Rogers was elected to the chair of Natural Philosophy at the University of Virginia. The change from the malaria-ridden district of Williamsburg to the higher, cooler hill country of Charlottesville was a happy one. Moreover, the University of Virginia had unlimited advantages in its form of organization, breadth of outlook, and support by State funds, as compared with the much older, already famous, but exceedingly restricted College of William and Mary. At Charlottesville, William's health

greatly improved, and he was able to conduct geological explorations in the state, and also to take the positions in national scientific bodies to which his great ability and reputation entitled him.

William's main occupation was as a professor at the University, yet the other duty as director of the survey could not be neglected, and he needed competent assistance. His own brothers were, in fact, the men best adapted by knowledge and experience to serve in this important capacity, but none of them was immediately available. His first summer was spent in a personal reconnaissance in the field, from the notes of which he was able to prepare a profile map of the state during the arduous winter months that followed. This map with some descriptive material constituted his first report. He had help and much advice from his brother Henry, who was himself about to be engaged in a similar survey of New Jersey, and their exchanges of information and experience were mutually helpful. Henry was also practically engaged to make an extended survey of Pennsylvania on completion of his New Jersey work. Henry's immediate services were not fully available, although he found time to give some help to his brother in the Virginia work, and was even appointed as an assistant on the Virginia Survey for a brief period. But with the opening of the Pennsylvania Survey Henry could no longer hold the Virginia position and resigned. Such other field assistants as William had were not well enough trained to replace Henry; and the situation was so critical that William even thought of resigning his professorship in order to give full time to the geological survey which he had begun so enthusiastically.

It was fortunate that all the brothers, as a result of their previous close association, had developed an interest in the work in geology. Even the two who had been medically trained, James and Robert, had often been called on for chemical analyses of mineral substances and had acquired great facility in this work, Robert being especially competent. Just at this time, in 1836, when he had finished his medical course with the highest standing and looked forward to establishing himself in practice, a family conference decided that if possible he should postpone his plans and come to the assistance of William. Although this suggestion was somewhat disappointing to Robert, who had already been offered an appointment as physician

in one of the state institutions, he cheerfully responded to what seemed to be a family duty, and, much to William's satisfaction, became for some months the chief assistant on the survey. Later he went to Philadelphia to assist his brother Henry in a similar capacity on the Pennsylvania Survey. Robert's place on the Virginia work was taken by James, who had resigned from his professorship at the medical school in Cincinnati. Thus it came about that all four of the now famous Brothers Rogers had a part in this important Virginia Survey, which had become well known far beyond the boundaries of the state.

Life at the university, although it had begun so auspiciously, became more complicated and at times burdensome to William as the years passed. A main source of distress was a long series of outbreaks by disorderly and undisciplined students. Violence was not uncommon. Riots, in one of which the Chairman of the Faculty was killed in his own dooryard, continued sporadically over several years, greatly injured the morale and the reputation of the university, and made life in Charlottesville unhappy for professors and citizens. William was deeply disturbed by them.

To make matters worse, even the survey, to which he gave so much care, began to be opposed in the legislature in 1839, and was under fire in 1841 on grounds of delay and expense. It was only by long and patient work and a brilliant defense of the value of the survey that Rogers eventually managed to get an appropriation from the legislature. But if there was criticism at home, there was praise and a growing reputation outside Virginia.

During these strenuous years William maintained his deep interest in science, especially geology, and somehow, in spite of frequent illness, he found time to do original work of much importance, such as the discovery of infusorial earth in Virginia. His reputation as a scientist grew steadily in America and abroad. He became one of the earliest members of the National Institution for the Promotion of Science, founded in 1840, and of the Society of Geologists and Naturalists, a more exclusive group also established in 1840, which became in 1847 the American Association for the Advancement of Science. In collaboration with his brother Henry, he presented an outstanding paper before the Philosophical Society of Philadelphia

in December, 1841. The following year they joined in the presentation of an extremely important contribution "On the Structure of the Appalachian Chain as Exemplifying the Laws which have Regulated the Elevation of Great Mountain Chains Generally." This epoch-making paper was read before the meeting of the Association of American Geologists and Naturalists at the third annual meeting in Boston in 1842. Nathan Appleton, a leading merchant and promoter of New England industries, himself an amateur geologist, financed the publication of the proceedings. Charles Lyell, the great English geologist, was a participant in the conference, and was so impressed by this contribution of the Rogers brothers that he induced them to send a long abstract of it to the British Association.

To be honored by the leading geologists of the English-speaking world at these brilliant meetings at the Boston Society of Natural History must have given the Rogers brothers intense satisfaction. On this, his first visit to Boston, William was also undoubtedly impressed with the intellectual activity and industrial development of the Boston area. Rich in historic buildings and libraries, deeply interested in the budding sciences, distinctly in its commercial glory, and with its leading business men exceedingly active with new and great industrial development in textile and other lines of manufacturing in New England, Boston was a city of commanding interest. He returned to the city several times over the next decade, and with each visit the conviction grew that Boston was an ideal location for an institution devoted to the new kind of technical education that he and his brothers had been turning over in their minds since 1828.

In the wake of these triumphs there were disturbing and discordant notes. On his return to Charlottesville, William found that the criticism of the survey had not ceased, but funds were eventually voted for its completion. A more distressing attack on the university itself soon followed. In December, 1844, the legislative Committee on Schools and Colleges was instructed to investigate "the past history and present condition and influences of the University of Virginia, with a view of forming their opinion upon the question of repealing the Act of Assembly granting an annuity of \$15,000 to that Institution." This came as a great blow to William Barton Rogers, who had just been elected Chairman of the Faculty, the chief administra-

tive officer of the university, and to Robert, who had been elected Professor of Chemistry and Materia Medica in the university in 1842.

It devolved on the Chairman of the Faculty to prepare a memorial to the legislature in defense of the university. The document that Rogers prepared was unquestionably the ablest discussion of the function of the American college and its methods of instruction that had been prepared up to that time, and for breadth of view and thoughtful elaboration of the significance of scientific and literary education in the general culture of the country it is still notable reading a hundred years afterward.<sup>2</sup>

How deeply this long and carefully prepared memorial may have affected the legislature is not clear, but it was apparently successful. If so, its effect must have been considerably neutralized by a fresh outburst of student riots, which had to be suppressed by the civil authorities. Peace was eventually restored, and seventy of the ring-leaders were dismissed from the university, but by then these unhappy events had so disturbed Professor Rogers that he began to consider finding a more tranquil place to live and work.

Much in need of rest following the arduous year as Chairman of the Faculty, in the summer of 1845 William visited his brother Henry in Philadelphia, and then joined him in a journey through the White Mountains, a visit to Boston, and later a trip to the shores of Lake Superior, where Henry had been commissioned by Boston men to explore the region for copper ores.

On their travels in New Hampshire, the Rogers brothers met the family of Mr. James Savage of Boston, a man of ample means and notable character, who was the first treasurer of the Provident Institution for Savings, one of the two oldest savings banks in the United States, and later the author of *The Genealogical Dictionary of the First Settlers of New England*. The Savages quickly became friendly with William and Henry, and through their hospitality in Boston made it possible for them to meet many influential people. The eldest daughter, Miss Emma Savage, a vivacious and charming young lady, was most kind to the serious-minded professor from Virginia twenty years her senior, and later became his wife.

During this summer William and Henry had time to discuss the

ideas William had expressed in his memorial to the Virginia legislature, and to consider more carefully the extension of education into technological fields which were not then receiving attention in American colleges. In Boston during this summer, and also in the following two summers when William also spent his holidays in New England, they acquired new friends, widened their professional associations, and strengthened their conviction that the time was ripe and that Boston was the place for a new venture in technical education. The industrial development of New England and the energy of Boston capitalists in finding new outlets for their enterprise had created a need for well trained engineers. Various schemes for technical education to meet this demand were in the air at the time, and by 1847 both Harvard and Yale had established scientific schools.

William's experience in New England reinforced the educational principles he had conceived in his earlier thinking, and on his return to Charlottesville in the fall of 1845 he gave these matters serious consideration, stimulated by letters from Henry. Henry had resigned from the University of Pennsylvania and had already made a name for himself in Boston by courses of lectures in 1843 and 1844, had now settled there, and was a candidate for the vacant Rumford Professorship at Harvard. Early in 1846, as an alternative to the Harvard professorship, he conceived the plan of setting up a technical school such as he and William had discussed, to be attached to the Lowell Institute in Boston, and appealed to William to help him draw up a plan to submit to Mr. John A. Lowell, trustee of the Lowell Institute.

The result was two handwritten letters from William dated March 13, 1846, and called "A Plan for a Polytechnic School in Boston." Under the provisions of the Lowell will, Mr. Lowell could not accept this proposal, but it was the embryo of the Massachusetts Institute of Technology. The story of the long struggle to make this plan a reality will be told in the next chapter.

During the months immediately following the transmission of the letters with the now-famous plan, William found himself somewhat discontented at Charlottesville. Constant thought as to how the plan could be transformed into reality absorbed much of his working hours and his energy, but teaching and research, lectures and corre-

spondence also demanded his attention. His interests were manifold, and his opinions much in demand. In the summer of 1846 he made a geological survey of parts of New England. The next year he helped to promote the establishment of the National Bureau of Hydrography at Washington that had been urged by Lt. Matthew Fontaine Maury.

After spending the summer of 1847 in Boston, William began to think seriously of resigning from the university, and of joining his brother Henry, who was then a free-lance lecturer and geological expert in Boston. On March 14, 1848, he sent a letter to the rector of the Board of Visitors announcing his intention to resign at the end of the spring session. When it became known, this decision created such a furore that he felt impelled to withdraw his resignation, out of loyalty to his colleagues and to the university.

Through his brother Henry, who had again gone abroad for a few months, he was kept in close contact with the rapid development of the sciences in Europe, especially in the British Isles, and was gratified to know how extensively and appreciatively the work of the Rogers brothers was recognized. In August, 1848, Hampden-Sydney College in Virginia conferred on him the degree of LL.D., and the spring of 1849 brought an invitation to give a course of lectures at the Smithsonian Institution in Washington.

In June, 1849, he married Miss Emma Savage of Boston, whose family had been especially friendly since the days of the memorable visit to the White Mountains several years before. Immediately after their marriage, Dr. and Mrs. Rogers embarked for England on the Cunard steamship *Europa*. It was William's first visit to foreign countries, although he knew many European scientists, and a wonderful summer was before them. With improving health, and with the many contacts he had with the leading scientists of the day, some of whom, like Lyell, he had already met in America, it was a triumphant period, culminating in the great meeting of the British Association at Birmingham, where he was not only welcomed warmly, but specially invited to be a guest speaker. At the great banquet of the Association, in response to a toast to his brother, he made an eloquent speech which was reported by a listener as the outstanding event of this occasion.

In the autumn he returned with his bride to Charlottesville and



spent the next four years busily and happily in teaching, in lecturing, and in fruitful research both in geology and physics. Then, in 1853, in his fiftieth year, having the insistent desire to be in close contact with his brother and friends in Boston, and the ever-present ambition to forward his plans for a new school, he finally resigned his professorship. A break of this kind could not be made without many and intense regrets. It took courage and faith to leave his many friends, the scene of his greatest scientific achievement, the sure if small income, and the facilities for scientific work built up by his own efforts, for an uncertain future in Boston. But the desire to press on to the fulfillment of his great educational plan in association with his brother Henry was strong, and he made the break.

In June, 1853, William and Emma Rogers moved to Boston, and for many years made their home in the Savage residence in Temple Place, opposite the present location of the Provident Institution for Savings. A plaque placed by the Institute now marks the place where this house stood in the days when Temple Place was wholly a residential street. Years later, with the filling in and settlement of the Back Bay lands, they moved to Berkeley Street, and later to 117 Marlborough Street.

Since the final report of the Geological Survey of Virginia had never been published, a visit to Richmond to secure an appropriation for this purpose took Dr. and Mrs. Rogers back to Virginia early in January 1854, and resulted in another disappointment, which involved him in financial loss, and demonstrated the not unusual ingratitude of governments for outstanding public service. But he was not disheartened and turned his energies into other channels. He revamped the constitution of the American Association for the Advancement of Science, which was now becoming an important body. In August 1855, he addressed the Lyceum of Natural History of Williams College. The address was a notable exposition of the interdependence of the sciences that still makes good reading nearly a hundred years after its delivery.<sup>3</sup> Then followed lectures before large audiences in Boston under the auspices of the Mercantile Library Association, an imposing series of scientific papers, and, in the spring of 1857, a course of lectures at the Lowell Institute on the elementary laws of physics.

Believing that an ocean voyage would be beneficial, in the summer of 1857 Dr. Rogers again visited England, and had the pleasure of accompanying his brother Henry to many scientific meetings and on historic and scientific excursions. These opportunities were naturally most gratifying, especially as they came at the time Henry received the announcement of his appointment to a professorship at the University of Glasgow. Thereafter the brothers visited Ireland together, and when Henry had to return to England, William continued his travels alone. On his return to England he had a peculiar and serious accident on a railway train. A stone thrown into the car struck him on the cheek and fractured both jaws. After only a fortnight's inactivity, however, he went to Edinburgh for a fortnight and then to London, where he made many contacts with noted men of science. In mid-December he returned to Boston and soon became engaged in physical experiments resulting in a series of articles of note, and in preparation of a new course of lectures at the Lowell Institute.

Of the four brothers who had shared the struggles of early life, who had constantly supported each other in their efforts to follow the scientific life, each had attained eminence in his own field. James had become Professor of Chemistry at the University of Pennsylvania, but had died in 1852, and Robert, after a brilliant career at the University of Virginia, was prevailed upon to succeed him. Henry, always most closely associated with William, had achieved great prominence as a geologist and lecturer in Boston and also in Europe. In 1857 he became Regius Professor of Natural History and Geology at the University of Glasgow, but before leaving America had aided greatly in the promotion of the "Polytechnic School" that the brothers hoped to establish in Boston. Of the four able sons of Patrick, the far-seeing refugee, each played a notable part in the development of science and education in America.