In order to trace the origins of premedical education in this country, I have reviewed the history of the premedical requirements established by Columbia University College of Physicians and Surgeons (originally known as King’s College, founded in 1767); Harvard Medical School (founded in 1783); University of Michigan Medical School (founded in 1850); Johns Hopkins School of Medicine (founded in 1893); Stanford University School of Medicine (founded in 1908); and University of California, San Francisco School of Medicine (founded in 1873). These schools represent a range of public and private universities; each has made a contribution to the evolution of premedical education.

It is in 1873, with the founding of the University of California, San Francisco (UCSF) medical school, that I begin my study of the history of premedical education. In 1873 neither Harvard nor Columbia listed any prerequisites for admission in their bulletins. Only Michigan had explicit admission requirements, described in the university’s bulletin for 1873 in the following terms:

Every candidate for admission shall exhibit to the Faculty satisfactory evidence of a good moral and intellectual character; a good English education, including a proper knowledge of the English language, and a respectable acquaintance with its literature, and with the Art of Composition; a fair knowledge of the Natural Sciences, and at least of the more elementary mathematics, including the chief elements of Algebra and Geometry, and such a knowledge of the Latin language as will enable him to read current prescriptions, and appreciate the technical language of the Natural Sciences and of Medicine.

The University of California received its original legislative charter in 1868, charged by the legislature with creating first a College of Arts and Letters, followed by a College of Medicine and other professional colleges. In 1872 the university hired as its second president Daniel Coit Gilman, at that time a professor of geog-
raphy at Yale University and secretary of Yale’s Sheffield Scientific School. As described by historian Gert Breiger, “Gilman had already been involved in the planning and beginning of the first premedical course while he was still at Yale, and he was much involved in the consideration of what constituted proper medical education while he was the President of the University of California.”

In 1872 there were two medical schools in San Francisco: the Medical College of the Pacific (later to be re-named the Cooper Medical College), originally founded in 1858 by Dr. Elias Cooper; and the Toland Medical College, founded in 1864 by Dr. Hugh Toland. Each was hospital based; neither had an affiliation with a university. Both schools were open to essentially any student able to pay the required tuition. As a result of some unfriendly competition between the two schools and some back-and-forth movement of faculty, Dr. Toland decided it would be best to affiliate his medical school with the fledgling University of California. A series of negotiations ensued, and in March 1873 the trustees of the Toland Medical College deeded their school to the University of California. The Archives of the Library of the University of California, San Francisco, contain a complete collection of the bulletins of the medical school, starting with the first bulletin published in 1875. A review of these bulletins indicates that there were no specific admissions requirements listed for the new medical school.

Building on his years at Yale, President Gilman worked to incorporate a vigorous education in the natural sciences as part of both the medical education provided at the new medical school and the expected preparation for entry into medical school. Gilman argued, “Chemistry, zoology, comparative anatomy, these should all be thoroughly learned before the student takes up medical studies.” Dr. Ronald Fishbein, former admissions dean at the Johns Hopkins School of Medicine, describes Gilman’s efforts to inculcate in the minds of the leaders of the new university and of the medical profession in California the importance of a medical education grounded in the sciences:

He spoke of “those branches of knowledge which lie at the foundation of medicine.” He pointed out that students enter medical school where “they learn for the first time that there are such sciences as physics, chemistry, and physiology, and are introduced to anatomy as a new thing.” He proposed that the educational system be adjusted to make available the elements of physical sciences to those who were preparing for the further study of medicine. He felt that these subjects should be conquered before acceptance into medical school.

However, Gilman was not successful in getting the University of California to adopt preparation in the sciences as a prerequisite for entry into the university’s med-
tical school. The leaders of the university viewed Gilman’s emphasis on a rigorous preparation in the natural sciences as somewhat unorthodox by the then-extant standards. Failing to gain support for his approach to medical and premedical education, Gilman left the University of California in 1875 to become the first president of the newly established Johns Hopkins University. Not until 1885 would UCSF establish as a specific requirement for admission “a matriculation examination . . . in the following subjects: English; Arithmetic; Geography; Elementary Chemistry.”

While Gilman may not have been fully successful in California, he nonetheless did have a substantial impact on the future of medical education. As described by Fishbein, Gilman’s effort, “was one of the first public pronouncements of a trend in scientific medical education that would eventually engulf American universities and medical schools.”

Contemporaneous with Gilman’s efforts to imbue medical education at the University of California with a scientific foundation were those of Charles W. Eliot toward that same end at Harvard. Despite considerable faculty opposition like that faced by Gilman, Eliot was to be substantially more successful over time. An 1853 graduate of Harvard, Eliot had traveled to Europe to study both the rapidly evolving field of chemistry and European systems of higher education. While in Europe, he had closely observed the German system of medical education in which, as described by Paul Starr, “the laboratory sciences of physiology, chemistry, histology, pathological anatomy, and somewhat later, bacteriology were revolutionizing medicine.”

Whereas in England, and subsequently in the United States, instruction in medicine had historically been provided either on the apprenticeship model or in medical schools based in hospitals, medical education in Germany was largely the responsibility of universities. In the mid-nineteenth century when sciences such as chemistry, physics, and physiology began to expand the breadth and depth of knowledge, it was in close proximity and close cooperation with the clinical faculty. As natural science expanded in laboratories of the German university, medical science expanded accordingly.

Germany had also established a system of secondary education based on the Gymnasium, a rigorous secondary school in which the best students prepared for potential entry into the university. Those completing the Gymnasium took a series of examinations, with students passing the exams eligible to enter the university. Upon matriculating at the university, a student could select from among the available curricula, one of which was medicine. Typically, there was little if any chemistry, biology, or physics taught in the Gymnasium—students received instruction in these sciences as part of the university-based medical curriculum.

Both Eliot and Gilman proposed that medical education in the United States
should adopt the German model, but with one important difference. They agreed that medical schools should be based in universities; however, both felt that sciences such as chemistry, biology, and physics should be taught as part of the undergraduate curriculum in preparation for medical school rather than being included as part of the medical curriculum.

In 1865 Eliot returned to the United States to take a position as professor of chemistry at MIT. He was committed to the concept that medical education should be the responsibility of universities and that it should be based on an early and rigorous education in the basic sciences, especially chemistry. Four years later, when he assumed the presidency at Harvard, he turned his attention both to reforming the nature of undergraduate education there and to reforming medical education. As described by Kenneth Ludmerer, Eliot “was convinced of the importance of science to medicine and of the need to teach scientific principles with laboratories as well as with lectures.”  

In and after September, 1877, all students seeking admission to the Medical School, must present a degree in Letters or Science from a recognized college or scientific school, or pass examinations in the following subjects:

- Latin (French or German will be accepted, however, as a substitute for Latin)
- Physics.
In the Medical School Bulletin of 1877 this requirement was amended with the addition of the following: “All candidates for admission, except those who have passed an examination for admission to Harvard College, must present a degree.” In Germany and France it was the norm that all students completing the European equivalent of high school were required to pass a rigorous examination before entering the university. Once in the university, students were free to select from available courses of study, including medicine. Because most medical students at Harvard had had, at most, only a high school education, Eliot wanted to be sure that both students entering Harvard College as undergraduates and students entering the Harvard Medical School had had an adequate high school education. For the medical school this entailed as a minimum a knowledge of physics and of either Latin, French, or German. Entering students were not initially expected to have had a course in chemistry. That subject was part of the early curriculum within the medical school.

In 1880 the list of subjects to be covered by the medical school’s entrance examination was expanded to include English, Latin, physics, and “any one of the following subjects: French, German, Algebra, Plane Geometry, or Botany.” In 1893 a required examination in chemistry was added to the list, and the following statement appeared: “Candidates who present a degree in Arts, Literature, Philosophy, or Science from a recognized college or scientific school are exempt from all of the above examinations, with the exception of Chemistry.”

Concurrent with the extension in 1892 of the medical school’s required curriculum from three years to four, an explicit expectation was established that entering medical students will have had a course in chemistry. Students who had graduated from a college other than Harvard and who wanted to attend the Harvard Medical School were exempted from all entrance examinations with the exception of that in chemistry. It appears that Eliot was giving predominance to the science in which he was originally trained.

While Charles Eliot was working to strengthen the scientific grounding of medical education at Harvard, Daniel Coit Gilman was working at Johns Hopkins University to accomplish the same thing. Johns Hopkins University was founded in 1876, with Gilman selected as its first president. The university had been created by the bequest of Johns Hopkins, a leading member of the Quaker community in Baltimore. Before his death in 1873, Mr. Hopkins had explicitly stated that he wished his legacy to be used to found a university, a hospital, and a medical school. These were the tasks assigned to Gilman when he took charge of Johns Hopkins. Gilman worked hard to attain these goals, and in 1889 the hospital was opened. As described later in this chapter, the medical school would not be ready to open until 1893, and
only after a complex series of negotiations between President Gilman, the university trustees, and a group of feminists from Baltimore.

From the outset, Gilman was clear about the direction he wanted the medical school to take. The university’s curricular bulletin from 1877 described what Gilman considered to be the optimal preparation for the study of medicine: “Physics, Chemistry, and Biology, with Latin, German, French, English form the principal elements of this course.”¹² In making his recommendations, Gilman had relied heavily on advice he had received from several leading medical educators in Europe, among them Charles Huxley and Henry Acland of England and Joseph Lister of Scotland. Based on his own perspective and the advice of these noted scholars, in 1878 Gilman submitted a report to the Johns Hopkins trustees titled “On the Studies Which Should Precede a Course of Study in Medicine, Hygiene, Etc.” In his report, Gilman argued, “First, a standard of admission to medical colleges should be agreed upon, and every respectable institution should insist on a real, and not a pro forma examination to be passed by every matriculant . . . there is in our present circumstances no other method by which suitable candidates for the medical profession can be chosen, and the unsuitable eliminated.”¹³ In Gilman’s 1878 remarks we see the first explicit indication of the need to use the sciences to eliminate —to weed out—those candidates who are unsuitable for entry to medical school. Later in the report Gilman describes in some detail the “Programme of Studies preparatory to medical studies” that a student at Johns Hopkins would be expected to follow:

He will have followed for a year . . . a course of instruction in Natural Philosophy [a common way at that time to refer to the study of physics] and will have had the opportunity of working with scientific instruments in the physical laboratory during the same period.

He will have attended for a year a course of lectures, examinations, and demonstrations in Chemistry, and will have worked in the chemical laboratory four hours daily, during a year and a half.

In Biology he will have worked for a considerable part of two years, and will have pursued a thorough course of dissection and demonstrations both in comparative and human anatomy, and in physiology.

He will have a good command of English, and will have been taught Latin, French, and German. He will read at sight ordinary books in the languages last named.

We see in Gilman’s proposed premedical curriculum the first explicit roots of the premedical curriculum faced by students today. What Gilman proposed in 1878 was
most certainly not the orthodoxy of premedical education at that time. No other medical school in the United States had come close to establishing such a rigorous premedical curriculum. Recall that in 1878 Harvard expected only a high school education, with examinations required in Latin and physics. In 1878 Columbia listed no entry requirements.

At that time there were also two young organizations working in support of Gilman’s and Eliot’s approach to strengthening medical education and its scientific foundations. In 1876, representatives of twenty-two medical schools had convened in Chicago in order “to consider all matters relating to reform in medical college work.” They agreed to establish a new organization, which they named the American Medical College Association. The assembled delegates agreed to establish a common policy regarding the minimum requirements of a medical education. Among these requirements were a minimum of three years study under the direction of a “‘regular’ graduate and licentiate and practitioner of medicine” (medical educators at that time had begun to differentiate between “regular” medical practitioners and “irregular” practitioners), and a requirement that every student shall also have “matriculated at some affiliate college or colleges, for two regular sessions,” and during those two sessions will have studied and passed an examination in a list of subjects that included chemistry and physiology. At their meeting in 1880, the delegates voted to extend to three years the minimum course of study in a medical college.

While the delegates who founded the organization and established these requirements were enthusiastic in their efforts, the general response to those efforts was less than enthusiastic. After establishing the three-year requirement, membership in the association began to dwindle. A number of medical schools were unwilling to adopt these heightened expectations. At the 1881 meeting of the association, only eighteen schools sent delegates; in 1882 the number of delegates was eleven. No further meetings of the fledgling organization were held. As described by Dean F. Smiley, in 1957 secretary of the Association of American Medical Colleges, “The Association was dead. The new organization had tried to raise standards too rapidly.”

In 1890 representatives from several medical schools in Baltimore (the Johns Hopkins medical school had not yet been established) issued a proposal to reconvene the association, and a series of preliminary meetings was held. Delegates to these meetings voted to reestablish the organization and to rename it the Association of American Medical Colleges (AAMC). By that time the general sentiment had shifted regarding the wisdom of establishing national standards of medical education, and the renamed organization was able to grow in both number of schools
represented and national influence. The new role of the association is described later in this chapter.

In 1876, the same year that the ill-fated American Medical College Association was founded, a second group of medical educators met to establish a parallel organization, the American Academy of Medicine (AAM). As described by historian Steven Peitzman, the AAM was “a society formed largely by literary minded small town doctors concerned that medical students knew no Latin or Greek . . . locally recognized well-educated physicians, many residing in small towns, not . . . giants of the profession.”16 The members of the AAM had all been to college before studying medicine. It was their purpose to “encourage young men to pursue regular courses of study in classical, scientific, and literary schools of the highest grade, before entering upon the study of medicine.” The constitution of the AAM recognized two categories of members: Fellows, and Honorary Members. To be accepted into the academy:

The Fellows shall be Alumni of respectable institutions of learning, having received therefrom—

(1) The degree of Bachelor of Arts, or Master of Arts, after a systematic course of study, preparatory and collegiate;

(2) The degree of Doctor of Medicine, after a regular course of study, not less than three years.17

The AAM had called for the same three-year course of study as had the American Medical College Association. However, the AAM was largely an association of individuals, not of medical schools, so the failure of most medical schools to adopt their standards did not dampen their enthusiasm. The AAM continued to meet regularly throughout the 1870s and 1880s. In 1891 it began to publish the Bulletin of the American Academy of Medicine. Beginning in 1893 the Bulletin began to publish the proceedings of the AAMC and for several years was its official publication. The AAM also established a close working relationship with the National Conference of State Medical Examination and Licensing Boards. The early years of the Bulletin contain many references to joint efforts between that organization, the AAM, and the AAMC to get laws passed in the various states restricting the issuance of licenses to practice medicine only to graduates of medical schools that met the standards adopted by these organizations. For several years these three organizations held their annual meetings together. The American Medical Association joined those efforts in 1905.

The early volumes of the Bulletin of the AAM contain a series of very interesting papers, addressing the issue of what type of preliminary education should be ex-
pected of medical students. One of the first was by David Starr Jordan, an 1875 graduate of Indiana Medical College and president of the University of Indiana. Shortly after giving his address to the annual meeting of the AAM in 1891, Jordan took a new job as the first president of a newly established university in California, the Le- land Stanford Junior University. In 1908 Jordan was to preside over the founding of the Stanford School of Medicine.

In his paper to the AAM titled “The General Education of the Physician,” Jordan supports the basic precepts of the AAM, saying: “The Bachelor’s Degree as generally understood is an index of general culture, the gauge of that degree of training which fairly prepares a bright young man to enter upon professional work.”18 Jordan notes, though, that by requiring a bachelor’s degree before beginning the study of medicine, the student “is not through college and ready to begin his professional studies much before the age of twenty-two.” He acknowledges that many medical schools consider this lengthy preparatory period to be unreasonable, with many students unable to begin the practice of medicine much before the age of twenty-six or twenty-seven. “Is the standard of the Bachelor’s degree too high for the best results in professional work?” Jordan asks. “In other words is the physician who has waited to secure his Bachelor’s degree thereby handicapped in his professional life? . . . I cannot think so, and I am sure that no such view could be sustained by statistics.”19 He goes on to argue that the undergraduate premedical course should include the study of chemistry, physics, physiology, and a reading knowledge of German and French. Jordan cites the premedical curriculum that had been established by Johns Hopkins University as consistent with these expectations. That curriculum was to become a prerequisite to admission when the Johns Hopkins Medical School opened two years later in 1893.

In his 1892 presidential address to the AAM, Dr. P. S. Conner argued that chemistry should be taught, not as part of the medical course, but as an undergraduate subject that is preparatory to medical education: “Chemistry in the didactic medical course is a non-essential of the first order, and the hours devoted to it [in medical school] are simply wasted. . . . No one should be permitted to enter on the study of medicine who has not at least an ordinary school-boy acquaintance with the elements and their compounds. . . . If . . . the undergraduate would have an extended, more thorough course in organic and animal Chemistry, by all means give him the opportunity.”20

A paper presented to the annual meeting of the AAM in 1892 described the premedical course at the University of Pennsylvania,21 which approached chemistry and physics as well as Latin, Greek, French, and German as subjects to be taken as an undergraduate before beginning the study of medicine. Dr. Helen Warner from
Detroit then rose to speak in response to the paper describing Pennsylvania’s curriculum. “Chemical training,” she commented, “while it is more useful in one sense, at least more directly productive, is less educative to the whole man than the more general literary training. So it is that a man may be a wise and intelligent physician, or a very skillful surgeon, and have never learned to express himself clearly and to the point, or to write good plain English without rhetorical effusion.”

Dr. Warner’s comments about the disjunction between knowledge of chemistry and verbal ability presage arguments and research results that would only appear more than a hundred years later. As it turns out, and as we will see in chapter 4, when the Standardized Patient Examination was added to the series of tests required for medical licensure in the United States, a student’s verbal ability was found to be a better predictor of clinical skills than was knowledge of chemistry.

In 1893 Victor C. Vaughan addressed the AAM. A practicing physician with a special interest in toxicological chemistry, Vaughan had become dean of the University of Michigan Medical School in 1891. The previous year, Michigan had lengthened its required medical school course from three years to four and had established the requirement that those not having a high school diploma must pass a series of examinations that included physics, biology, and Latin.

While supporting the need for a broad undergraduate education as preparatory for the study of medicine, Vaughan is clear on the need to include an in-depth study of science as part of the premedical curriculum.

He who would practice the profession in the best light of today must make himself familiar with the sciences which contribute to medicine and with the best methods of applying the facts thus ascertained. . . . The medical man must be familiar with physics in its various branches . . . ; with chemistry, both inorganic and organic; with botany, microscopy, hygiene, bacteriology, physiology. . . . Lacking knowledge in any one of these sciences, the medical man is constantly limited and crippled in his work.

Vaughan went on to state that the study of these sciences must include extensive work in the science laboratory. In an earlier paper, Vaughan had suggested that medical students should spend at least four hours per day in the laboratory as part of their study of chemistry, biology, and physics.

With the addresses given by Conner in 1892 and Vaughan in 1893, we are beginning to see an important shift in the dominant approach to premedical education. There was a growing consensus that chemistry, physics, and biology should be part of undergraduate premedical education. In addition, we begin to see the argument that the study of chemistry should be extended to include both inorganic chemistry
and organic chemistry. What was unorthodox when Gilman had proposed it in 1873 and again in 1878 was becoming mainstream in 1892.

In 1893 Harvard began to require entering medical students to pass examinations in English, Latin, physics, and chemistry, although students could have taken these courses either in high school or in college. By that time the University of California, San Francisco, had a similar requirement, requiring entrance examinations in English, arithmetic, geography, physics, and chemistry. Michigan would accept either a high school diploma or examinations in these subjects in lieu of a diploma.

The situation in 1893 at Columbia, however, is instructive. For the first time, the following statement appeared in the bulletin of the medical school: “To all persons who matriculate with the intention of becoming candidates for the degree of doctor of medicine at any school in the State of New York, the following provisions of law are now applicable, viz.: Laws of New York, 1893, Chapter 661, ¶ 145 (in part).” In 1893 a law had been passed in New York, delegating to the Regents of the University of the State of New York the task of giving those students who wished to enter medical school anywhere in the state a “medical-student certificate.” Without this certificate, a student could not enter the medical school at Columbia. According to an earlier law passed in 1889, in order to obtain that certificate a student must have completed “a full year’s course of study in any college or university under the supervision of the Regents” and passed an examination in “arithmetic, grammar, geography, orthography, American history, English composition, and the elements of natural philosophy.”

For more than a decade, organizations such as the AAM and the National Conference of State Medical Examination and Licensing Boards had been advocating for laws defining standards both for medical education and for premedical education. They were successful in getting such a law approved in New York, and Columbia began following their requirements. The new standards of premedical education had been elevated from a growing consensus to a matter of law, at least in New York.

The Founding of the Johns Hopkins School of Medicine, 1893

As described above, Daniel Coit Gilman, president of Johns Hopkins University, had addressed the trustees of the university in 1878 regarding his views on the standards of premedical education. Under this “Programme of Studies,” a premedical student “must study here for three years or more and pass numerous examinations. A large part of his time will be passed in the laboratories of Physics, Chemistry, and Physiology.” In discussing what undergraduate degree these students would re-
ceive from Hopkins after they had completed this course of studies, Gilman re-
marked to the trustees, “One gentleman has playfully suggested that if we were not 
fettered by traditional initials [such as B.A., B.S.], the degree of F.S.M., ‘fit to study 
medicine,’ would tell the tale exactly.” Gilman again seems to be suggesting that 
it is at the undergraduate level that students should be sorted into those who are fit 
to study medicine and those who are not.

Gilman was successful in establishing a formal premedical curriculum at Johns 
Hopkins. Referred to as the “Chemical-Biological course,” this was what we recog-
nize today as an undergraduate major. As described in the first Johns Hopkins Med-
ical School catalogue issued in 1894, this course “is planned for the professional ed-
ucation of those students who have been especially fitted to receive its instructions 
by a course of preliminary training in the liberal arts, and especially in those 
branches of science, like physics, chemistry, and biology, which underlie the med-
ical sciences.” When the medical school first opened in 1893, only those students 
who had completed this course at Hopkins or an equivalent course at another col-
lege or university were eligible for admission. By requiring both a bachelor’s degree 
and a rigorous course of university-level sciences, Johns Hopkins established a stan-
dard of premedical education that in 1893 was unique in the United States. How-
ever, the story of how Gilman and Hopkins came to this requirement is somewhat 
more complex and involves others who were working to define new standards of 
higher education.

In September 1885, Bryn Mawr College was first opened as a Quaker college for 
women. Its first dean was M. Carey Thomas, a 28-year-old scholar of languages, the 
first woman ever to be awarded a Ph.D. summa cum laude from the University of 
Zurich. Born and raised in Baltimore, Thomas had a series of relatives and family 
who served as trustees of both Bryn Mawr College and Johns Hopkins University. 
As an indication of the close link between the two schools, Daniel Coit Gilman was 
one of the speakers at the inaugural ceremonies for Bryn Mawr. Gilman had previ-
ously consulted with Thomas in the planning for Bryn Mawr, encouraging her to 
strengthen the college’s offering in the sciences. Thomas had overcome a series of obstacles to attaining her doctorate, not the 
least of which were the explicit rules prohibiting women from enrolling at many 
American universities. After graduating from Cornell, she had been permitted to 
begin graduate studies at Johns Hopkins but had been limited to individual con-
sultations with her graduate advisor. At that time women were not allowed to at-
tend the doctoral seminars that were the core of doctoral education at Hopkins. She 
was forced to travel to Europe to complete her doctoral work, again encountering 
gender bias that delayed her completing her degree. It was only when she transferred
to the University of Zurich that she was successful in completing and defending her thesis.

While in Europe, Thomas became thoroughly versed in the German system of higher education. Never a medical student herself, she nonetheless had ample opportunity to observe the German system of medical education that Gilman at Hopkins, Eliot at Harvard, and Vaughan at Michigan were using as the basis of their own reforms. It was her hope that Bryn Mawr would develop both a world-class undergraduate college for women and a program of graduate education equal to that of Europe.

Thomas had developed an extremely close circle of women friends in Baltimore, many of whom were also the daughters of trustees of either Bryn Mawr or Johns Hopkins. One friend in particular was to play a major role in the opening of the Johns Hopkins medical school—Mary Garrett, the daughter of John Work Garrett, president of the Baltimore and Ohio Railroad and one of the richest and most influential men in Baltimore. Like Leland Stanford and his Central Pacific Railroad, John Garrett used his influence and wealth to support the establishment and expansion of institutions of higher education. As described by historian Helen Lefkowitz Horowitz, Mary Garrett and Carey Thomas had a relationship that was both emotionally close and physically intimate. Garrett, who had inherited substantial personal wealth from her parents, used that wealth to further Thomas’s career at Bryn Mawr. In 1893 Garrett had pledged a substantial donation to the college on the condition that they name Thomas as president, a step to which the trustees eventually acceded.28

Daniel Coit Gilman had been working for several years to carry out the wishes of Johns Hopkins, the original benefactor of the university that bore his name. After successfully opening the university itself, Gilman next worked with the trustees to found a hospital, a step he helped to complete in 1889. He then turned his attention to the opening of a medical school.

Shortly before the hospital was opened, Mary Garrett approached Gilman with a proposition: she would commit to raising $100,000 in support of the new medical school if the Hopkins trustees would agree to admit women on an equal footing with men once the school opened. Garrett had seen the difficulties Carey Thomas had faced in her own graduate work at Johns Hopkins. She would use her money and her influence to open medical education at Hopkins to women. She founded the Women’s Medical School Fund, calling on wealthy and influential women she knew throughout the United States to contribute to it. By 1890 she had raised the money, and the Hopkins trustees agreed to her request. From its very first day, the Johns Hopkins Medical School would be open to women as well as to men.
Hesitant to overcommit the university’s endowment, however, the trustees established the policy that the medical school would only open once a new endowment of $500,000 could be raised. Garrett’s gift would count toward that amount, but Gilman still needed to raise an additional $400,000. By the end of 1892, Gilman had made little progress in raising this amount. This gave Thomas and Garrett an opportunity to have even more influence in setting the direction for the new medical school.

Thomas, based on her experiences in Germany and Switzerland, wanted the medical school at Johns Hopkins to be founded and operated on the principles common to the German model of medical education. After a series of letters and conversations between Thomas and Garrett, on December 24, 1892, the Hopkins trustees were presented with a letter from Mary Garrett containing a new offer. She would commit to fully funding the required endowment, including a gift of more than $300,000 from her own funds, thereby enabling the opening of the medical school. She would do so, however, if and only if the Hopkins trustees agreed to the following conditions:

1. The new medical school would include a minimum four year course for the medical students;
2. The school would accept only those students who had completed the requirements for a Bachelor’s Degree, either at Johns Hopkins or at another approved college or university;
3. To be eligible for admission to the medical school, students were required to complete as part of their undergraduate education a course of study equivalent to the prescribed premedical course at Johns Hopkins, which included:
   a. One year of physics, with three hours per week of laboratory instruction;
   b. One year of chemistry, with five hours per week of laboratory instruction;
   c. One year of biology, with five hours per week of laboratory instruction;
4. All students would have a good reading knowledge of French and German.

In addition, Garrett insisted that if at any time in the future the Johns Hopkins Medical School violated these conditions by changing either the length of the medical school curriculum or the premedical admission requirements, the entire endowment would be transferred to Bryn Mawr College. She described the reasoning behind her proposal in the following terms: “These stipulations and, in particular, those relating to the standard of admission, instruction and graduation in the medical school, I make not because of any misgiving in regard to the policy likely to be pursued by the present board of trustees, but because of the obvious possibility that the policy might be altered by succeeding trustees.”
Gilman was in an interesting bind. For twenty years he had argued for extending and strengthening the scientific foundation of both the medical school curriculum and the premedical curriculum. Now he had a major donor insisting that Johns Hopkins establish the most stringent premedical requirements of any school in the country and commit to maintaining those requirements in perpetuity. The requirements suggested by Thomas to Garrett and required by Garrett as a condition of her funding the endowment of the medical school contain essentially the same requirements medical students face today. A reading knowledge of German and French is no longer required; however, the requirement that a student complete courses in physics, chemistry, and biology is still at the core of premedical requirements in the United States today.

On January 3, 1893, ten days after the trustees had received Garrett’s proposal, Gilman spoke to the Hopkins trustees at a meeting called to discuss the Garrett offer. He cautioned the trustees: “These conditions, we must remember, are prescribed not for a year or a term of years but for all time.” Gilman was extremely reluctant to lock the trustees into requiring a specific premedical curriculum because, as he saw it, “changes which no one can foresee will in time be required by the progress of knowledge and the improvement of educational methods.” In addition, Gilman was concerned that “it is not easy to foresee by what test our medical faculty can ascertain whether other kindred courses of undergraduate study are equivalent to those that are here prescribed [i.e., the established premedical curriculum at Johns Hopkins].”

As we will see in the following chapter, Gilman was justified in his concern. Over time the chemistry requirement would need to be lengthened from one year to two years to encompass the burgeoning field of organic chemistry. In addition, as English became the predominant language of the medical literature, a reading knowledge of German and French became less and less relevant to medical education and medical practice. Toward the end of the twentieth century this requirement would be dropped at Johns Hopkins (a move that required the consent of the Bryn Mawr trustees, since it was a technical violation of the original Garrett grant).

Gilman and Garrett had a series of discussions in which Gilman suggested that the premedical requirement be described as “a long course of preliminary training in the liberal arts and especially in those branches of science like Physics, Chemistry, and Biology which underlie the medical sciences.” Garrett and Gilman agreed to include a statement in their legal agreement that the conditions laid down by Garrett “shall not be construed as restricting the liberty of the University to make such changes in the requirements for admission to the Medical School of the Johns Hopkins University . . . as shall not lower the standard of admission specified in this
clause.” To monitor and enforce this agreement and the conditions it established, the trustees agreed to publish the terms of the agreement yearly in the university’s bulletin and to establish a Women’s Committee of the Medical School, “to whom the women studying in the Medical School may apply for advice concerning lodging and other practical matters.” Included on this committee were Mary Garrett and M. Carey Thomas.

Garrett and the trustees came to a final agreement on February 20, 1893, two days before the university’s previously scheduled celebration of its Commemoration Day. At the commemoration ceremony, Gilman gave a speech announcing the opening of the Johns Hopkins Medical School, with the first students enrolling in the fall of that year. In that speech Gilman traced the history of the efforts to establish the medical school from the founding of the university in 1876. He described the evolution of the premedical requirements he had worked to establish at Hopkins:

In Baltimore, a distinct course of studies (in which physics, chemistry, and biology, with the modern languages, were dominant) intended to be preparation for the subsequent study of medicine, was arranged and offered to students . . . as early as 1878. . . . [I]t has remained upon our register, with hardly any changes, awaiting the time to come when the organization of a medical school and the enlistment of additional teachers should give both the impulse and the opportunity to prune and graft our promising vines, so that in the future they may bear more fruit than leaves.

In grafting a vine from one rootstock to another so that it may flourish and grow, a gardener selects the healthiest shoots, trimming and discarding those with less promise. After his unsuccessful attempt at the University of California, Gilman was finally successful (with the help of M. Carey Thomas and Mary Garrett) in establishing the premedical curriculum he believed in and in using students’ performance in that curriculum to identify those who are “Fit to Study Medicine,” pruning and discarding those who are not.

Growing Support for the Standardization of Premedical Education, 1893–1905

The years following the opening of the Johns Hopkins Medical School saw a rapid coalescing of both interests and organizations in support of the models established at Johns Hopkins for both medical education and premedical education. At the annual meeting of the Association of American Medical Colleges in 1894, a resolution was passed requiring member schools to extend their medical curriculum to a min-
imum of fours years. In 1901 the AAMC published its list of the premedical requirements that member schools were expected to require. These included examinations in English, math, physics, and Latin. (In 1901 the AAMC required an examination in physics but not chemistry, while in that same year Harvard, with chemist Charles Eliot at the helm, required a bachelor’s degree and an examination in chemistry but not in physics.)

The year 1901 saw another important change that was to have profound effects on the course of medical education and premedical education. The American Medical Association (AMA), first established in 1847, underwent a fundamental reorganization, with centralization of its authority under a House of Delegates, a board of trustees, and executive officers. As described by Morris Fishbein, who from 1924 until 1950 was editor of the Journal of the American Medical Association, as a result of this reorganization, “the basic structure of the Association was placed on a firm footing.” One of the first actions of the new president of the organization was to appoint a Committee on Medical Education “to survey the problem of medical education in this country and make recommendations concerning the role which the American Medical Association should play in the improvement of medical education.”

Chaired by Arthur Dean Bevan of Rush Medical College in Chicago, the committee reported back to the House of Delegates in 1903 with a list of recommended policies, which included:

That it is desirable that a uniform and elevated standard of requirements for the degree M.D. should be adopted by all the medical schools in the United States;

That it is desirable that young men before being received as students of medicine should have acquired a suitable preliminary education.

A year later, Bevan reported back with a more strident commentary and a specific recommendation for future action:

In absence of national governmental control efforts to make uniform and elevated the standard of medical education can be made most effective through the agency of the organized medical profession of the entire country, and such a body we now have in the reorganized American Medical Association.

The problem of using to the best purpose the weight and influence of the American Medical Association toward elevating medical education is a very large one and one which must be carefully worked out. This can best be done by a permanent committee or council specially created for this purpose.
In response to Bevan’s report, the House of Delegates voted to create a Council on Medical Education (CME) with the charge “to act as the agent of the American Medical Association (under instruction from the House of Delegates) in its efforts to elevate medical education.” The delegates appointed Bevan as chair of the CME and named four additional members, one of whom was Victor C. Vaughan of Michigan. As dean of the medical school at Michigan, Vaughan had served in 1902–1903 as president of the AAMC. In his address to that organization at the end of his term, Vaughan had stated clearly his position and the position supported by the AAMC regarding the standard of premedical education that should be applied: “At present the average graduate of the average . . . high school has an inadequate preparation in the modern languages and in the natural sciences. I mean by this that in these branches he is not, in my opinion, prepared for the study of medicine, and he should be required to pursue these subjects in some well-equipped academy, college, or university before he enters the medical school.”

At the time Vaughan made these remarks, the State of Michigan had passed a law that mandated defined premedical requirements for entry into any medical school in Michigan, much as New York had done earlier. The Michigan medical school itself required two years of college, with courses in physics, biology, and chemistry and a reading knowledge of either German or French. Thus, the appointment of Vaughan to the Council on Medical Education and his appointment as chair of the CME’s Committee on Requirements for Admission to Medical Schools were a clear indication of the direction the CME intended to take regarding premedical education.

Coincident with the creation of the CME in 1904, George H. Simmons, recently appointed as secretary of the AMA and editor of the Journal of the American Medical Association, published a speech he had given earlier that year. In it Simmons argued, “It is essential to fix a minimum below which no medical college should be allowed to admit students.” He went on to refer to the opening of the Johns Hopkins Medical School, citing “the startling announcement that the requirements for admission would be, not only a bachelor’s degree in art, but also a year’s work in biology, physics, and chemistry and a reading knowledge of French and German.” Simmons suggested that “it is too Utopian to imagine that the minimum requirement for entrance to the professional school shall be the full college course.” Instead, he proposed that the minimum entrance requirement be set at two years of college, which would provide “a general knowledge of biology, of chemistry, of physics, of electricity, of light and sound. These are necessary—absolutely so.” However, he went on to qualify his recommendation with the following statement: “I refer to a thorough mastery of the fundamentals, not the mere acquisition of such chemical facts as
may seem from time to time, with the progress of our science, to be directly applicable to its practice and teachings” (emphasis added).43

Following the charge given to it, the CME organized a national conference on medical education, held in Chicago in April 1905. In his introductory remarks to this conference, Dr. Lewis McMurtry, president of the American Medical Association, described the purpose of the meeting as “bringing together the various examining and licensing powers of the states and territories, to secure a mutual interchange of ideas and counsel.”44 In addition to delegates from several of the state licensing boards, the AAMC was also represented at the meeting.

Arthur Bevan, chair of the CME, summarized for the conference the view of the five-member council:

What would be regarded as a perfectly satisfactory state of affairs for medical education, we might say ideal state of affairs, from our perspective viewpoint? Such medical education must be equal to that required by England and Germany. It would comprise:

1. A preliminary education such as would enable the student to enter our standard universities . . .
2. Five years of medical work, the first year to include physics, chemistry, and biology. This year either to be taken in a medical school or in a college of liberal arts.45

Two of the delegates to the conference—Prof. Richard D. Harlan of Lake Forest College and Dr. J. M. Dodson from the AAMC—suggested that adding introductory courses in chemistry, physics, and biology to the medical school curriculum would make that curriculum too crowded. Instead they suggested, as described by Dr. Dodson, “eliminating [from the medical school curriculum] such subjects as chemistry, physics, and general biology, which can be taught to better advantage in colleges of liberal arts.”46 There appeared to be general consensus at the conference that the teaching of these basic sciences was best left to the undergraduate institutions rather than being added to the curriculum of the medical schools.

Victor C. Vaughan then reported on the activities of the CME’s Committee on Requirements for Admission to Medical Schools, of which he was chair. Speaking to the requirement of a reading knowledge of German and French (the standard set by Johns Hopkins in 1893), Vaughan reported, “We would not say that a reading knowledge of German and French should be required for admission to all our medical schools, but it certainly should be recommended and those schools which can require it should do so.” Vaughan then summarized the admission requirements recommended by his committee, which included “the fundamental facts of physics,
chemistry, and general biology” supplemented by laboratory instruction in these subjects. During his comments, Vaughan also urged “the enactment of laws taking the decision on preliminary requirements out of the hands of the medical faculties and placing it on official boards.” George Simmons, secretary of the AMA, concurred with Vaughan’s suggestion and urged the AMA to establish a close working relationship with the state licensing boards throughout the country. In reporting to the AMA’s House of Delegates on the CME’s inaugural conference, Arthur Bevan described as the “ideal standard” the four-year course of medical education the delegates to the conference had identified, preceded by a year studying physics, chemistry, and biology. He recommended to the delegates that they adopt this model as AMA policy and work “to secure the general adoption of these requirements by state boards and medical schools.” The House of Delegates enthusiastically agreed, approving the CME’s recommendation.

The AMA had aligned itself with the AAMC and with the leaders of the most prestigious medical schools in the country. A new standard of medical education was adopted, involving two years of instruction in laboratory sciences followed by two years of instruction in clinical practice. This four-year medical school curriculum would be preceded by one or two years in the study of physics, chemistry, and biology in a college or university. Discussing these new standards, Morris Fishbein stated, “In the light of present-day [1947] requirements, they seem modest. In 1905, they represented a marked advance.”

What was unorthodox when Gilman proposed it in 1878 had become the new orthodoxy in 1905. Thus it was that when Martin Arrowsmith had been a premedical student in 1904, “The purpose of life was chemistry and physics and the prospect of biology next year.”