I closed the previous chapter by describing the challenge issued to undergraduate colleges and universities by Jules Dienstag of Harvard. Dienstag indicated that the changes he proposed grew at least partially out of his work with a major national commission convened jointly by the AAMC and the Howard Hughes Medical Institute (HHMI) with the goal of undertaking “a joint, comprehensive assessment of the continuum of premedical and medical science education.”¹ He described one of the recommendations that would come from that panel: “Premedical requirements for rigid, 1-to-2-year, discipline-specific science courses should give way to more creative and innovative courses that span and unite disciplines, offering a glimpse of the way biologists and physicians actually navigate real-life problems.”

The AAMC/HHMI panel published its report in June 2009, urging medical schools to move to using “‘science competency’ (learner performance), rather than academic courses, as the basis for assessing the preparation of medical school applicants.” The report encourages medical schools to evaluate science competency among premedical students “against a set standard or threshold” rather than as a continuous measure of fitness to study medicine. The report also encourages undergraduate institutions “to develop more interdisciplinary and integrative courses that maintain scientific rigor, while providing a broad and strong liberal arts education.”²

In an editorial commentary published in Science magazine, the panel’s co-chairs explicitly acknowledge that there will be multiple approaches to teaching undergraduate science and therefore “multiple routes to gaining a competency.”³ They urge undergraduate educators to explore innovative alternatives to the traditional curriculum and pedagogy. Working with colleagues from Stanford University, the University of California Berkeley, and other universities, I have developed a proposal for a new way to organize the teaching of premedical knowledge that I believe is fully consistent with Dienstag’s recommendations and the recommendations of the AAMC/HHMC panel.
Note that I said “premedical knowledge,” not “premedical science.” While certain content areas within the natural sciences of chemistry, biology, and physics are necessary to gain an understanding of the functioning of the human body, knowledge from these three disciplines alone is not sufficient to ensure such an understanding in the context of medical care. The curriculum I propose goes considerably beyond instruction in these traditional premedical sciences.

The sciences of chemistry, biology, and physics have so changed and enlarged over the hundred years since the Flexner Report as to be barely recognizable to a medical scientist from that day. In 1910, instruction in biology dealt largely with the structure and function of different types of organisms. Beyond microscopic examination of the tissues, the biologist had little means of delving into the inner workings of cells and their constituent parts. Similarly, the chemist was interested principally in the identification of compounds and in the reaction between compounds. With the discovery of atomic structure and the delineation of protons, neutrons, and electrons, chemists began to understand matter in substantially greater depth, yet had little means of applying that new knowledge to the study of human life and human health. Physicists were on the verge of a new understanding of the universe through discoveries in quantum mechanics and concepts of relativity. Each science had its core elements of knowledge; each was thought to be essential to the development of medical knowledge; each had little to do with the others. In figure 9.1A below, I illustrate the relationship of these sciences as it existed at the time of the Flexner Report.

In figure 9.1A, each of the three disciplines stands alone; they are shown with no overlap. A biologist of 1910 used little chemical knowledge directly in the study of biology. Likewise, a physicist used little biology in his study of the nature of matter and space. Each discipline had a subset of knowledge within it, the principles of which every doctor must know. However the disciplines did not overlap—there was no intersecting set. In order to gain those principles of scientific knowledge necessary for the practice of medicine, principles that were embedded somewhere in the ovals representing the state of scientific knowledge at the time, each student was required to take a one-year course in each discipline. (The course in chemistry became a two-year course a few years later.)

Now let us fast-forward to the state of scientific knowledge in 2010, one hundred years after the Flexner Report. The associations among chemistry, biology, and physics are illustrated schematically in part B of figure 9.1. We notice some striking differences between the representations of premedical science in the two figures. Each of the disciplines is substantially larger in 2010 than in 1910, representing the tremendous expansion in scientific knowledge that has ensued. Perhaps more im-
Figure 9.1. The disciplines of premedical science in (A) 1910 and (B) 2010
portantly, as each of the disciplines has expanded, each has grown closer to the other such that they all now overlap. There is a subset of knowledge (referred to in the figure as the “intersecting set”) that is common either to all three disciplines or to at least two of them. All elements of knowledge in this subset are simultaneously part of more than one discipline.

For example, let us consider the structure of the DNA molecule. DNA is made up of a double helix—two connected rows of molecules wound around each other. DNA is the core element of life, constituting both the means of reproducing life and the means of regulating life. It is made up of a repetitive series of the molecules adenine, cytosine, guanine, and thymine, known as nucleotides. Without going further into the detail of the molecular structure and function of DNA, I will pose this question: If we are studying DNA, are we studying chemistry or are we studying biology? In 1910, chemistry and biology were dichotomous; in 2010, they are, to a substantial extent, continuous. The study of DNA is simultaneously the study of chemistry and the study of biology—it is part of biochemistry. It is part of the intersecting set of the two disciplines.

Let us also consider the flow dynamics of a particular fluid—human blood—in a particular set of tubular structures—human blood vessels. As I learned as part of college physics, the dynamics of the flow of a fluid through a tubular structure will depend on several factors, including the viscosity of the fluid, the diameter (or was it the radius?) of the tube, and the temperature of the surrounding environment. If we study the effects of a narrowing of the diameter of an arteriole (small artery) on the resistance encountered by the blood flowing through the arteriole and the resulting pressure exerted on the wall of the tube, are we studying physics or are we studying biology? We are studying the intersection of the two sciences, and when we add changes in fluid viscosity due to an abnormally high level of glucose in the blood, we are studying chemistry, biology, and physics simultaneously.

Shortly after 1910, when it was decided that chemistry needed to be separated into its constituent parts of inorganic chemistry and organic chemistry, it took a minimum of four years of study to learn the requisite knowledge contained within the three disciplines of premedical science: one year of physics, one year of biology, and two years of chemistry. While that requisite knowledge was certainly learned, so too was a great deal of material that had little to do with medicine. In 1965–66, I took a year-long course in organic chemistry that was required as part of my biology major in college. I can remember clearly one of my most fascinating experiences in that course. By meticulously following the instructions in the laboratory manual, I was able to get two liquids into a beaker, one on top of the other, with a distinct interface between them. If I ever so carefully reached into that interface with a pair
of tweezers, grabbed it, and slowly pulled the tweezers out of the beaker, a consistent white strand followed the tweezers. I could keep pulling and pulling, and the strand would get progressively longer until all of both liquids in the beaker had been converted into a single, very long, white strand. *I had synthesized nylon!* It was fascinating. Nylon is a polymer; DNA is a polymer. I learned the basic principles of polymerization in a few minutes of lecture and a few pages of the text. The several additional hours it took for me to make my strand of nylon were thoroughly enjoyable (at least to me—not all of my classmates had the same success). Synthesizing nylon may have been fascinating, but it had little if anything to do with medicine. I can say this definitively after more than thirty years of medical practice. The knowledge of polymer chemistry, beyond a basic understanding of the concept, is not part of the intersection of scientific sets that comprises necessary premedical knowledge.

What if, rather than teaching premedical students all about polymer chemistry as well as about all other aspects of chemistry, biology, and physics, we instead teach them only about what is in the intersection of the three disciplines, as represented in figure 9.1B? Would we be diminishing their scientific knowledge such that their chance of successfully completing the first year or two of medical school was correspondingly diminished? Quite the contrary, the data described in the earlier chapters of this book suggest that, armed with the knowledge contained within the intersecting set, they would do quite well in medical school, assuming they had also demonstrated a general academic ability and the aspects of personality, character, and motivation required for success in medicine.

### Structure and Content of the Proposed Curriculum

The time has come to develop such a course on a pilot basis and to offer it as an experimental alternative to the traditional curriculum that continues to follow the premedical paradigm described by Flexner. What should we call such a course? It is neither chemistry, nor is it biology, nor is it physics. It is a part of each but synonymous with none. Accordingly, I suggest we name the intersecting set of these three disciplines the “human life sciences.” Within this concept I include

- **Human Biology**: those aspects of biology that are integral to understanding the structure and function of the human organism
- **Chemistry**: those principles of inorganic and organic chemistry necessary to gain a full understanding of human biology
- **Physics**: those principles of physics necessary to gain a full understanding of human biology
The traditional curriculum for premedical students and for students considering a career in the biomedical sciences includes at least two years of chemistry, one year of biology, and one year of physics, each taught in a separate department. The course I propose would be offered as an alternative to this traditional curriculum. The purpose of the new course is to provide students with a firm grounding in the human life sciences in a single integrated course that uses a curricular and pedagogical structure more appropriate for those students who have traditionally encountered personal discouragement or academic difficulty in the traditional science curriculum. By developing an alternative learning environment based on recent research from social psychology and educational psychology, a goal of this proposal is to increase the diversity of students who select careers in either medicine or the biomedical sciences.

We should be clear on one important aspect of this proposal, however. I began this book with a discussion of the factors that impeded the expansion of the racial and ethnic diversity of entering medical students. It is true that I expect the new course structure to be attractive to many URM students and that, given adequate social and academic support, these and other students who come from disadvantaged educational backgrounds and who take the new course will likely have more success in their premedical studies and will be more likely to persist in those studies and apply to medical school. I also expect the same to be true for many women students who, as our research has shown, interpret unsatisfactory early experiences in the chemistry classroom as a message to find a different career path. However, the new course is not focused solely on the needs of URM students or on the needs of women. It is intended to meet the needs of a wide range of students who enter college with hopes of becoming physicians but who don’t fit the mold created by the premedical paradigm.

Let us reconsider the goals and the outcomes of two programs described in chapter 7: the Humanities and Medicine Program (HMP) at the Mt. Sinai School of Medicine, and the admissions polices and procedures followed by McMaster School of Medicine. Neither is intended as a program to increase racial or ethnic diversity among medical students. Neither is intended to be more suitable or attractive to one gender over the other. Rather, both are intended to attract to the study of medicine students with certain noncognitive strengths and characteristics that are often lacking among medical students. As described earlier, HMP has the goal of providing “maximum flexibility in the undergraduate years for students to explore their interests in humanities and social sciences.” McMaster seeks as medical students those applicants who bring with them “two interwoven sets of qualities: the one, traditional academic qualities, and the other personal qualities of motivation, initiative, and social awareness.”

Figure 5.3 summarized the research findings reviewed in that chapter. In the
twenty-first century the optimal physician will bring with him or her a balance of scientific aptitude and personality strengths. Historically, the premedical paradigm has identified those most “fit to study medicine” as students with superior academic ability, with substantially less emphasis placed on their noncognitive aspects. The new curriculum I envision is targeted to those students who fall within the shaded area of figure 5.3 labeled as “Most Highly Qualified,” but who do not fit within the concept of “Most Highly Qualified” as generated by the traditional paradigm, illustrated in figure 5.2.

The new curriculum is targeted for all students with both the academic ability and the strength of personality necessary to succeed as physicians, but it will seek out especially those students with these requisite characteristics who otherwise might find themselves “weeded out” by the traditional premedical paradigm. Many of these students will be from URM groups; many will not. Many will be women; many will not. Most will be most comfortable in a learning environment such as that pioneered by McMaster and widely applied in U.S. medical schools today in which new knowledge is placed in the context of a problem of human health and well being rather than being listed on the blackboard.

In order to meet the educational needs of this group of students, I envision that the course will have the following characteristics:

1. The course will be taught by a team of faculty, staff, and graduate students representing the three principal human life sciences disciplines: biology, chemistry, and physics. This team will work collaboratively to design and present the curriculum in a way that conveys accurate scientific knowledge but does so by weaving the three disciplines together. The team will jointly design the means by which student progress will be assessed and by which students who encounter difficulty will be offered additional support.

2. The course will present information from the human life sciences in an integrated fashion, focusing on those scientific principles necessary to understand a given contextual focus. It will not be simply a compendium of traditional premedical courses in chemistry, biology, and physics. Rather, as illustrated in figure 9.1B above, it will identify and teach the knowledge content of the intersection of the knowledge sets that comprises human life sciences as I have defined them.

3. The course will adopt a context-based approach to teaching, analogous to the problem-based learning that has become a common part of the curriculum at many medical schools. For many students, including many women and URM students, problem-based curricula and other similar pedagogies have been shown to more conducive to science learning than the traditional didactic curriculum that relies more heavily on lectures and readings without a contextual framework. For exam-
ple, the pedagogy of the course might be based on the structure of the human organism, addressing in sequence:

a. The cell nucleus, including nucleic acids and the chemical basis of biological information
b. Cell structure and function
c. Organs and organ systems
d. Physiologic and homeostatic systems
e. The human organism and its association with its environment

4. The course will present information from the human life sciences in an integrated fashion, focusing on those scientific principles necessary to understand a given contextual focus. By having an integrated team of instructors, each topic encountered at the various levels of analysis can be addressed either simultaneously or sequentially by instructors with different backgrounds and training.

For example, consider how the topic of the cell membrane might be taught. The cell membrane is typically composed of a combination of protein and lipid molecules. It has a dual function: to hold the contents of the cell in place, and to let selected chemical compounds move in and out of the cell. Having said that, it would be appropriate to diverge for a bit to understand more about the chemistry of lipids and proteins: how are they constructed, how are they similar, how are they different? For this we need to know fundamental principles of chemical bonds between and among molecules. However, we also need to understand the dual functions of the cell membrane of maintaining structure and selectively permitting diffusion across its boundaries. Why is diffusion across cell membranes important to cell functioning? What type of molecules might be involved in this diffusion? How does electrical charge among ions affect this diffusion?

5. The course will rely extensively on electronic teaching aids integrated with didactic and group-based learning. An example of such an electronic teaching resource that might be incorporated into the curriculum is ChemSense®, described as, “an NSF-funded project to study students’ understanding of chemistry and develop software and curriculum to help students investigate chemical systems and express their ideas in animated chemical notation.” Many of the most exciting advances in college-level instruction involve electronic resources of this type. It is my hope that additional such resources will be developed as part of this curriculum.

I hope it is evident (as I’m confident it is for anyone who has taken a traditional course in organic chemistry) that this approach to teaching and to learning differs fundamentally from the pedagogical approach common to the traditional chemistry, biology, and physics classrooms. I hope it is also evident that an approach such as I have described will be attractive to a diverse groups of students—intellectually
diverse as well as diverse in terms of gender and ethnicity—and will help many of these students succeed in their premedical studies who might otherwise have turned away from a medical career.

To complete the premedical sciences that make up the traditional paradigm requires four years of study: two years studying chemistry, one year studying biology, and one year studying physics. These year-long courses can be taken sequentially, or, for some brave souls, simultaneously. I expect that the integrated, context-based curriculum outlined above would take two years to complete. Shortening from four years to two the time required to complete the premedical curriculum will realize at least two additional benefits: (1) allowing the students to delay the start of the premedical curriculum until the sophomore or junior year, and (2) enabling students to take additional courses in the social sciences and humanities.

**Further Benefits of the Integrated, Context-Based Curriculum**

From the research presented in chapter 4, we learned that among the various MCAT sub-tests, the Verbal Ability score is the strongest predictor of a physician’s clinical skills as measured by the USMLE-III. Many students, especially students from disadvantaged educational backgrounds, enter college with weak verbal skills relative to their classmates. Many of these are the very students who, when immediately placed in a highly competitive chemistry classroom, encounter difficulty. By delaying the start of the alternative curriculum until the sophomore year (or later), all students, but especially disadvantaged students, will have the opportunity both to strengthen their verbal skills in preparation for medical school and to adapt to the academic and intellectual climate of college.

Recall the comments of Dr. Ezekiel Emanuel cited in chapter 1: “Why are calculus, organic chemistry, and physics still premed requirements? Mainly to ‘weed out’ students. Surely, it would be better to require challenging courses on topics germane to medical practice, research, or administration to assess the quality of prospective medical students, rather than irrelevant material.”

For fifteen years I taught a series of courses to undergraduates at Stanford University, a majority of whom were premedical students. One course explored American health policy; a second course examined the roots of health disparities that lie in factors such as social class, race, and ethnicity. I have heard repeatedly from students who have taken these courses and have then gone to medical school that what they learned in them was directly relevant to their medical education and their medical practice. In addition, I have seen firsthand how courses in biomedical ethics offered by other instructors at Stanford have been equally relevant and useful to stu-
dents entering medicine. Each student taking the proposed premedical curriculum would be encouraged (perhaps required) also to take courses such as these as part of their preparation for medical school. I heartily concur with Emanuel that courses such as these would be at least as “germane to medical practice, research, or administration” as much of the content of traditional science courses.

As yet I have said little regarding the role of laboratory instruction as part of the proposed curriculum. Repeatedly, throughout the discussion of the history of premedical education summarized in previous chapters, the principal justifications for requiring students to include extensive laboratory experience as part of the premedical curriculum were twofold: to acquire technical laboratory skills necessary for the practice of medicine, and to understand and appreciate the scientific method. I entered medical practice in 1974. For the first several years of my practice as a primary care physician I was capable of performing a few basic blood and urine tests in my office and of staining and examining under the microscope a few types of specimens. A few years into my practice the licensure regulations changed, and I would have had to get a new type of license to perform and charge for these tests. Accordingly, I stopped doing them, coming instead to rely on a hospital lab or private lab locally. I have not carried out a laboratory procedure in its entirety for more than 25 years. My understanding is that few of my medical colleagues, other than pathologists or certain sub-specialists, carry out laboratory procedures as a direct part of their practice. Similarly, I have queried a substantial number of former premedical students who are now medical students. Other than gross anatomy laboratory, where they learn dissection, none has indicated that direct instruction or experience in laboratory techniques or procedures was part of their medical education. It is my sense that, for most physicians, developing advanced laboratory skills and techniques is no longer a relevant part of medical education or medical practice.

Rather, the value of laboratory experience is in learning to appreciate the strengths and the limitations of the scientific method. In defending the role of organic chemistry in the premedical paradigm, Kramer argued that “the critical thinking and problem-solving skills of organic chemistry formed the foundation of my medical training.” Higgins and Reed suggest that organic chemistry and physics “contribute a great deal to providing the framework for understanding basic principles of medicine.” In defending the inclusion of these sciences, these authors seem to be defending their role in teaching the scientific method more so than their factual or technical content.9

I fully concur that we need to teach an understanding and appreciation of the scientific method to all premedical students. However, synthesizing strands of nylon in the organic chemistry lab or, as was my assignment in physics lab, calculating the
period of a pendulum, does not accomplish this task. Rather than teaching laboratory technique, the laboratory component of the curriculum I propose is focused on teaching the methodology of science, both its strengths and its weaknesses.

In teaching the scientific method, it will be crucial for students to learn the process of going from an unanswered research question to being able to describe and defend the answer to that question through the analysis of scientific data. It will be important for students to learn how the process differs for questions of social science and questions of genetics or molecular biology. Knowing how to collect data, which data to collect, and what analytic methods to apply to the data are all things that can be learned in both a seminar context and a laboratory context. A fundamental understanding of principles of statistics will be part of this learning process.

Students’ knowledge of the scientific method should also be supplemented by an appreciation of its potential weaknesses. What is the role of uncertainty in analyzing data and reporting results? How does one measure the mathematical effects of uncertainty, and how does one measure its psychological effects? These are areas in which instruction in the history and philosophy of science can play crucial roles. Finally, no instruction in research methodology can be complete without a discussion of the ethics of research. In evaluating the results of a project, does it matter how the research was funded? To whom does a scientist owe his or her duty?

As part of the new premedical curriculum, I suggest we replace the previously required four years of experience in a science laboratory with one or two years of study of the scientific method. This instruction will include actual time in a laboratory conducting experiments, and it will include time in a seminar discussing and debating some of the issues described above. I believe that after such instruction a student will be substantially better prepared for the study and practice of medicine than he or she would have been after four years spent doing sequential experiments described in the laboratory manual and overseen by the lab TA.

A question I have not addressed, yet one that is quite germane to our discussion is whether successful completion of the proposed new curriculum will prepare a student equally well to go on to medical school or to go on to graduate school in a biomedical science. I suggest that it would. It is my hope and expectation that a substantial number of students who complete the proposed curriculum will see the importance and the excitement of contributing directly to the expansion of biomedical science in ways that extend our ability to treat illness and injury. I believe that students completing this curriculum who select a research career will be fully capable of going on to take more focused and advanced courses in biochemistry or other biomedical sciences and will be fully capable, with appropriate instruction and mentoring, of initiating a program of laboratory-based scientific research.
Evaluating the Outcomes of the Proposed Curriculum

The premedical curriculum proposed by the CME in 1905 and supported by Flexner in 1910 was, by 1914, adopted as the national standard by which medical schools would be evaluated. It was adopted on the faith that it would provide the optimal preparation for medical school but with essentially no scientific evidence that it actually did so. I suggest that we not repeat this methodological error.

What I have proposed is essentially a research hypothesis:

$$H_1: A \text{ restructured premedical curriculum will bring a more diverse pool of students into medical school without a decrement in the clinical or professional quality of physicians trained in this manner.}$$

As with any research hypothesis, this one must be evaluated by well-designed research. Once completed, I believe the research will support the hypothesis. On the other hand, it may not. Thus, in parallel to the revised curriculum itself, I propose an ongoing program of research to evaluate the new curriculum.

As part of this research, I expect several early outcomes:

a. The racial and ethnic diversity of self-declared premedical students electing the new curriculum will be greater than the comparable diversity of students electing the traditional curriculum.

b. Women premedical students will elect the new curriculum more often than the traditional curriculum.

c. Students electing the new curriculum will have a greater range of noncognitive strengths than those electing the traditional curriculum.

A second level of analysis will come after students have completed the curriculum, leading to the testing of the following additional hypothesis:

d. Those students shown in previous research to be more likely to lose interest in continuing in premedical studies (i.e., women, URM students, and students from disadvantaged educational backgrounds) will be more likely to maintain their interest in a medical career and to apply to medical school when compared to comparable students who elect the traditional premedical curriculum.

A third level of analysis will come after graduates of the curriculum have entered and completed at least the first two years of medical school. With the realization that there may be changes soon in the way grades are assigned in medical school and licensure examinations are administered, the next hypothesis may need to be adjusted in light of these changes.
e. Students who complete the new curriculum and enter medical school will perform at least as well as students who took the traditional premedical curriculum, using medical school grades and the results of USMLE-I as measures of performance.

The final comparisons between students taking the new curriculum and those taking the traditional curriculum can only come several years in the future, after both groups of students have completed medical school and entered into residency training and medical practice.

f. Students who complete the new curriculum and complete medical school will demonstrate a level of clinical and professional quality that is at least as high as students from the traditional curriculum, using USMLE-II, USMLE-III, standardized patient performance, and residency evaluations as measures of quality.

g. Students who complete the new curriculum and who enter medical practice will be more likely to elect practice in a primary care specialty than those completing the traditional curriculum.

Of course it will take at least a decade to begin to test these final hypotheses. However, given that the traditional premedical paradigm has been in place for more than one hundred years and still has not been fully supported with scientific evidence, a decade does not seem an overly long time to decide whether a shift in that paradigm such as I propose will attain the goals and outcomes set for it. However, as with many clinical trials, it will be important to set important mid-point evaluations that will enable us to gauge the progress being made toward the goal. If it turns out that, after only a few years, there is no support for hypotheses (a) through (d), it would seem to make little sense to continue the experiment. Thus, I propose to set in place a program of rigorous analysis of the new curriculum from the outset.

The first cohorts of premedical students who take the proposed curriculum as an alternative to the traditional premedical curriculum will face a potential disadvantage in gaining admission to medical school because they will not have taken the specific science courses required for admission by more than 90 percent of U.S. medical schools. In addition, because they have studied only a subset of physics and chemistry, they may not be fully prepared to take the Physical Sciences portion of the MCAT. Accordingly, before initially offering the curriculum on a pilot basis, it will be important to be in contact with the admissions offices of a range of medical schools and with the Association of American Medical Colleges to seek their sup-
port for this pilot project and their collaboration in completing the outcomes research that is a crucial part of it.

Since what I propose is a research project, it is incumbent on any participating institution to make any student who elects the new curriculum fully aware that, while there may be substantial benefits to participating in the new curriculum, there may also be risks. Accordingly, the proposal must be thoroughly reviewed by the university’s Human Subjects Protection panel and must use written informed consent procedures with every student who elects to enroll. Only in this way will it be possible to fulfill our ethical obligation as researchers to, above all else, protect the well-being of our research subjects—in this case, our students.

Closing Thoughts

In the years following the publication of the Flexner Report in 1910, Abraham Flexner was widely perceived as having set in motion a series of revolutionary changes in both medical education and premedical education. As we have learned from our review of the years preceding and following the issuance of his report, Flexner actually added relatively little in the way of new knowledge or new perspectives to a process of scientific revolution that was already well on its way to completion.

Given the importance of the historical role commonly assigned to the Flexner Report, its centennial year of 2010 will undoubtedly see a spate of commentary and analysis. I hope the review I have presented here will contribute both to this discussion and to the evolutionary changes in premedical education that I believe are already well underway. The premedical paradigm supported by Flexner served us well for much of the twentieth century. I hope and expect that the new, evolving model of premedical education will serve us well in the twenty-first.