characterization and elucidation of chemical structures. One of the most powerful methods is x-ray diffraction analysis, by which complex structures (including absolute stereochemistry) have been obtained, the chemist's contribution being the provision of the suitable single crystals. The chemist now has the time to enlarge his experience by directing more of his inquiry into the relationship between his isolates and the living plant.

Most of our knowledge concerning indole alkaloids, and most alkaloids, for that matter, is based on the analysis of large amounts of dried plant tissue. The number and kinds of bases may be somewhat different in the living plant. Moreover, they may well differ from one individual to another, for such genetic differences may not show up in the morphology of the plants. There is also evidence that some indole alkaloids may be modified during conventional isolation procedures. Chemical transformations may be produced by the solvents and chemicals used, as well as by the inevitable changes in *p*H (*19*). The most fundamental way to solve such problems is to study synthesis in plant tissue culture or tissue homogenates as a preliminary step toward the final enzymatic experiments in the test tube.

It is the basic nature of the indole alkaloids which makes them, and alkaloids in general, easy to isolate even when present in minute amounts. If neutral equivalents (lactams) of the indole alkaloids are of general occurrence in similarly small amounts, they are escaping detection, except when some factor facilitates their detection and isolation. A few lactams of the aspidosperma group are known (*20*) and other examples will be found if they are looked for. The predicted position for the lactam carbonyl is No. 5 in yohimbine (see Fig. 1). In our own work we have not found any lactams, but our important analytical tool has been pharmacological activity; such lactams, if present in the plants that we have looked at in detail, have no striking effects on small animals.

Perhaps the tracing out of the participation of mevalonic acid in the biosynthesis of indole alkaloids will help to put this fascinating group of compounds into proper perspective with regard to plant metabolism as well as revealing non-basic congeners.

After many years of speculation, it is now certain that the complex indole alkaloids are monoterpenoid derivatives. This discovery marks the first major step towards an understanding of the function of indole alkaloids in plants.

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Quality versus Quantity in American Medical Education

The Flexner doctrine is dead. As sickness increases, we need quantity production of high-quality physicians.

Greer Williams

Most, though not all, American health and medical authorities agree that there is a doctor shortage. After 15 years of debate, that is progress.

The American Medical Association itself has intelligently backed off from its earlier position that there is no shortage—that there are merely fewer doctors in some places than in others. Opposition to the training of more physicians has been beaten down, and the annual crop of new M.D.'s has gradually increased. A half dozen new medical schools opened in the last decade; a dozen or more are in the making. In 1963, Congress for the first time provided federal aid to education in the health professions, and in 1965 it greatly increased such aid.

Efforts to date have met about one-third of the annual need for new doctors forecast by *Physicians for a Growing America*, a study published by the Public Health Service in 1959 (*1*). This so-called Bane Report became medical liberals' bible of medical manpower needs. According to its predictions, medical schools will have to increase the present 275,000 physicians to 330,000 by 1975 simply to keep up with the population growth. Inasmuch as American medical schools are now graduating physicians at the rate of nearly 75,000 every 10 years, it would appear that Frank Bane's objective is being met (*2*).

Where, then, is the generally agreed upon doctor shortage? Many accept its existence, but few attempt to demonstrate it. For example, the latest study of medical education, *Planning for Medical Progress Through Education*, published by the Association of American Medical Colleges (*3*), also assumes

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a shortage and furthermore lays part of the blame for it on the doorsteps of medical schools that have so far declined to expand. This study, known as the Coggeshall Report, was the first of the medical manpower studies to question what the nation's leading medical schools were doing about the doctor shortage. What, for instance, are Harvard, Johns Hopkins, Pennsylvania, Washington University (St. Louis), Stanford, Vanderbilt, and Tulane doing? Historically, these and other medical schools like them have been pace-setters in American medicine. Their scientists have made discoveries and developed methods that have changed the way we are born, live, and die. Their teachers have passed this knowledge on to their graduates, who have set examples of skilled service to the sick. It is astonishing to find that, as I later show, these schools have done nothing to increase the supply of M.D. graduates. Johns Hopkins is producing fewer physicians than it did in 1920. Harvard has stood still since 1930 in the number of M.D.'s produced.

The Coggeshall Report gives us a clue as to where the difficulty lies in proving a doctor shortage when it says: "There is yet no adequate measure of 'need' for health care."

It is certainly true that the public does not express what the social scientists call its felt needs for medical services in any unified or systematic fashion. To most Americans, medical education itself is as remote from everyday life as the Ecumenical Council's deliberations on deicide. As a matter of fact, press coverage of the Council's deliberations has been a good deal better than coverage of, for instance, evidence of the growing fissure between medical science and community service, a phenomenon both alarming and painful to the medical educator, who must straddle the gap. True, the mass media become periodically excited about the doctor shortage but tend to make the mistake of thinking "a doctor is a doctor," of seeking single villains, and of superficially deciding that more doctors are all we need to cure what ails us.

All most people know or care is that they would like to have a good doctor when they need him. They are not entirely agreed even on that; some may not appreciate need until it is too late; others do not believe in doctors.

A good many have difficulty in finding the help they would like. To the sophisticated family such help may mean the services of that rarest of all medical specialists, a child psychiatrist; it is hard, short of doing violence, to get expert mental-health help of any kind without going on a waiting list.

To the lower-middle-class city dweller any medical care at all may mean going to the emergency clinic in the nearest big hospital, sitting on a bench, and waiting one's turn while house doctors and nurses of the obviously short-handed staff hustle about.

Many people know that they can't get a doctor to come to the house. Some, when they need attention, are accustomed to jumping in the car and driving 10 to 50 miles. Certain inadequacies in health care are not hard to prove. History shows that maternal and infant mortality rates almost invariably drop in the face of systematic attack, yet Negro death rates for mothers in childbirth and infants in their first year are double those for whites in some parts of the South. The average person of any class has to trust to luck in finding a doctor who is well trained and equipped to diagnose and treat his condition, or who will send him to someone who is.

One great obstacle to planning adequate health care is the sheer complexity of the problem. It is fogged over with fuzzy assumptions about need—the best possible care for everyone—and demand—what people have been educated to expect and what they can afford—and also about what would happen if money were not a barrier to medical care. There are scientific, professional, economic, and political and social issues, all thorny.

The AMA's former position had a simpleminded plausibility about it. The handiest measure of supply has been the number of doctors relative to population. The national ratio, now about 1.4 per 1000, has remained fairly constant: therefore, no overall shortage (*4*).

The trouble is that physicians tend to concentrate in large centers of population and wealth. The District of Columbia has seven times as many physicians per capita as Alabama and Mississippi. For states such as these, the number per capita is nearly 50 percent below the national average, whereas for New York, California, and Massachusetts it is as much as 50 percent above.

If the entire nation were as well supplied as these top three states, we would need over 400,000 doctors. The figure is perhaps meaningless without an analysis of what kinds of doctors (plus other members of the "health team") are needed, and where, to give Americans the comprehensive medical care they hope for and to help fight disease among people in the developing nations. But it is worth noting that the 400,000 figure is higher by nearly 50 percent than the 275,000 we have now.

The health manpower experts, in my opinion, have begged the question of shortage by failing to demonstrate conclusively that we need many more doctors. Only if we can make a compelling case for this need can we successfully press for the answer to the question, How do we get them?

Why We Need More Doctors

The issues are not nearly as plain as the objective: freedom from illness. For instance, it has not been made wholly clear that, quite aside from the population explosion, the advance of medical science itself has greatly increased the need for more specially trained physicians.

As our death rate has dropped and life expectancy has lengthened during the last 75 years, the amount of sickness in the population appears to have gone up, not down. This disconcerting phenomenon, brought to our attention in recent health surveys (*5*), suggests that our health crusaders have been bad prophets. When they spoke of conquest of disease, they meant sickness as well as death, naturally. Indeed, some thought that, as the hygiene movement progressed, there would be less and less need for doctors.

What was overlooked is now self-evident. The more spectacular conquests have been against acute infectious diseases. These diseases, when they struck, might result in sudden death or complete recovery and subsequent immunity. In addition, great strides were made in diet; the common deficiency diseases have been controlled with proteins, vitamins, and minerals. All these diseases took their heaviest toll among children. In contrast, little has been accomplished in preventing the various colds, flus, and grippes that beset children and adults every winter. Most important, the general reduction of deaths in childhood opened the way for the chronic, degenerative diseases of later life, by letting the population grow and a larger segment

reach ages where, as the old lady told Walter C. Alvarez, "Death takes little bites of me."

Understanding of the doctor shortage turns on this point. People think of a person's dying of one thing, all at once, when in fact he commonly succumbs at the end of a fairly long life in which several things go wrong.

People learn to live with some diseases by taking their doctors' advice and giving ground on such things as tobacco, alcohol, or overeating. Stomach ulcer is a good example. Owen H. Wangensteen used to say that after a patient had had seven medical "cures" for his ulcer he should have an operation to remove the affected part of his stomach or duodenum. This is not always the end of the trouble either.

Notwithstanding the many who drop dead of a heart attack or stroke, the leading killers—diseases of the heart, blood vessels, and kidneys—usually take their time. Meanwhile, medical care is important to recovery from any given bout in the long, heroic fight of the human organism to overcome.

Cancer, with the exception of acute leukemia and a few other fast-spreading malignancies, takes little bites. A person receiving a reasonably early diagnosis of cancer may have to go back to the hospital for many x-ray treatments or for a second or third operation. In return, he gets 3, 5, or 10 more years on earth. Had he died of septicemia from an infected toe in his youth, he would have been spared much illness.

Schizophrenics can make surprisingly good recoveries with the aid of tranquilizers, psychological attention, and follow-up supervision by a psychiatrist, psychologist, nurse, or social worker. But most psychotic patients have to remain in the hospital for several months the first time, and some have to return at future times. For a patient with the most common type of major mental illness, senile psychosis, the future holds little more than a long period of disability before death occurs from some other cause.

Where heredity is a factor, as in diabetes, the amount of chronic illness in the surviving population may increase for another reason. Before the discovery of insulin, the child diabetic died before reaching maturity. He now can live into the middle years, marry, and have children. In *Mirage of Health*, Rene Dubos (*6*) touched rather starkly on the possibility of breeding a race of increasingly unhealthy people.

A national health survey made by the Public Health Service (*7*) showed that the average person is unable to carry on his usual activities because of specific illness about 20 days of the year. In the course of 70 years—the normal life expectancy—this adds up to nearly 4 years of sickness. There is no means of comparing this loss with losses in earlier times, but it is obvious that the addition since 1900 of 20 years to normal life expectancy has increased the opportunity of being sick by 40 percent. "We have, in effect, traded mortality for morbidity . . ." is the way the late Alan Gregg summed up the trend (*8*).

Where all this leaves us is unmistakable. The more medical science progresses and the more people become educated to its benefits, the more physicians, dentists, nurses, technicians, social workers, psychologists, and others on the health team will be needed to apply it. These experts have become increasingly effective in keeping the more fortunate in a fair state of comfort and competence. The maximum benefits of this kind of health care depend on availability and continuity of care, requiring large increases in trained personnel as well as even distribution and community organization.

There can be no doubt about the increasing demand when one considers that, whereas the ratio of doctors to population has remained constant, the rate at which people seek medical service has tripled in one generation.

How We Can Get More Doctors

The American voluntary medical care system, so-called, centers around the private physician and his interests rather than the community and its needs. Evidence of this is the fact that the doctor shortage is greatest in the less attractive specialties, positions, and locations. There is no shortage in the lucrative surgical specialties, but there is a shortage in preventive medicine. From 10 to 25 percent of the openings for doctors in state and local health services remain vacant year after year; neither the medical profession nor the public does a thing about filling them. Medicare administrative posts go begging at $15,000 a year. State, county, and city hospitals are chronically—in New York City, acutely—short-staffed. Under a free enterprise system, perhaps not a great deal can be done until medical manpower moves from its traditional economy of scarcity to an economy of abundance.

Curiously enough, the health crusaders' early hope that they would put doctors out of business suited the aspirations of both medical politicians and medical educators. The AMA once made policy on the economic assumption that if the number of doctors — and therefore, presumably, the amount of competition—increased, medical incomes would suffer. The professors, in contrast, cared less about money than intellest; they sought to restrict physician training to the Chosen Few (many may feel called to medicine but few will be chosen).

The position of leading medical schools did not become an issue until Lowell T. Coggeshall, vice president of the University of Chicago and former dean of its Medical School, made his report in 1965 (*3*). The report attracted considerable attention and some signs of support among medical deans and their faculties. This was the first time a medical educator of Coggeshall's standing had publicly accepted a share of the blame for the doctor shortage.

In the 26 years from 1940 to 1965, the annual production of doctors of medicine rose from 5097 to 7409, or by 45 percent. About half of this increase resulted from the building of 19 new medical schools. The remainder was due to the expansion of some of the 66 older schools.

The more prestigious older schools have relied on the newer and the lesser ones to meet the national manpower problem. Indeed, medical schools as a whole are laggards compared to the rest of the university. From 1940 to 1962, American colleges accelerated their annual production of graduates with bachelor's or first professional degrees by 123 percent. They stepped up production of master's degrees by 216 percent and of doctor's degrees (including Ph.D's and D.Sc.'s) by 250 percent.

It is only fair to note that the basic science departments of medical schools trained about one-third of the Ph.D's. It is also fair to note that, in their primary responsibility of training physicians, medical schools have not been as responsive to public demand as the liberal arts or other graduate schools in the general field of higher education.

Coggeshall naturally appreciates the plight of his fellow deans. They head medical schools but hardly run them.

The medical faculty or university president is more apt to run the dean, who is perpetually caught between these forces as well as between the pressures of government and organized medicine. He presides over a never-ending battle—over career appointments, teaching-hospital facilities, curriculum content, space utilization, building programs, and disbursement of millions of dollars for research that leaves the school with much the same operating deficit it had before. At the end of the day a dean is not eager to pull the faculty-room roof down on his head by proposing to expand the size of his student body by 50 percent.

But this is what Coggeshall proposed. To get a new medical school off the ground and into production takes about 10 years. He suggests that it would be easier to expand existing schools. The entire anticipated deficit of 3500 graduates per year could be met by an average increase of 40 per school. Coggeshall himself did not specify which medical schools he was putting on the spot.

I analyzed the year-by-year record, for 1940 through 1964, of 66 4-year schools (see Table 1). Forty-six schools have stepped up their M.D. production in this 25-year period. Twenty-three of these are state schools and 23 are private schools. Three schools have increased the size of the graduating class by 100 to 200 percent; two of these (Howard and Women's) are private schools and one is a state school (Georgia). Another 13 have boosted the number of graduates by 50 to 100 percent. These include three private and ten state medical schools; among the 13 are Michigan, one of the largest medical schools, and Yale, one of the smaller ones.

Sixteen schools—11 private and five state—have shown increases of 25 to 50 percent; this group includes the universities of Chicago and California. Another 14, seven private and seven public, are producing 10 to 25 percent more graduates; this group includes Columbia and Western Reserve.

Twelve (Table 1, columns 5 and 6) have shown little growth or have shrunk in size. Here the division is 15 private and five state medical schools. Nine of the historically great private medical schools are in this static group—Harvard, Johns Hopkins, Pennsylvania, Stanford, Washington (St. Louis), New York University, Northwestern, Vanderbilt, and Tulane.

From this tabulation it is impossible to relate quality of graduates to (i) size of school or (ii) public or private ownership. The first point had already been demonstrated in the long acceptance of Johns Hopkins and Harvard medical graduates as equals even though Harvard has produced twice as many doctors as Johns Hopkins. The second point is supported by the experience of the University of Michigan; it increased the size of its entering medical-school class from 150 to 200 in 1951 without loss of standing.

There *is* such a thing as mediocrity and also inferiority in medicine, but they must result from something besides size, for which there is no standard. In 1965 the number of medical graduates per nationally accredited school ranged all the way from 41 to 174.

To affirm Coggeshall's tenet that there is no logical relationship between the size of a medical school and the quality of its product—he points out that no objective study ever has shown one—the medical faculties will have to give up their cherished keep-it-small dogma. How many M.D. students can a school accommodate? Their axiom has been "around 100 per class"; one arrives at the ideal size for a graduating class by subtracting dropouts and washouts (these run about 12 percent).

The Flexner Concept of Excellence

The outsider may not automatically catch fire at the implications, but Coggeshall has upset a half-century-old doctrine of quality in American medical education that dates back to 1910 and Abraham Flexner's *Medical Education in the United States and Canada* (*9*). Before that, in 1904, the AMA had created its Council on Medical Education, because of its own concern for the poor quality of medical training then available. In that year American production of physicians reached its all-time peak in proportion to population; some 155 schools, most of them mere doctor-owned, profit-making, would-be institutions of higher education, graduated 5747 M.D.'s.

As a model of what he thought higher education in medicine ought to be, Flexner took the Johns Hopkins Medical School, established in 1893. It was a true university medical center, a department of the university, seated in a university-owned hospital and centered around a full-time faculty in the basic, or laboratory, sciences, with the clinical professors functioning as a closed staff.

This is the ivory-tower conception of scientific education in medicine, a setting in which scholars investigate the

Table 1. Trends in the production of M.D.'s by older American medical schools, 1940 through 1964.*

+ 100–200%	+ 50–100%	+ 25–50%	+ 10–25%	Little change	Decrease
		Private medical schools			
Howard Woman's	Albany N.Y. Medical College Yale	Boston Georgetown George Washington Duke Emory Marquette Meharry Pittsburgh Rochester Chicago Southern California	Baylor Columbia Cornell Creighton Jefferson Tufts Western Reserve	Harvard Johns Hopkins Louisville Loma Linda N.Y.U. Pennsylvania St. Louis Stanford Temple Tulane	Hahnemann Loyola Northwestern Vanderbilt Washington (St. Louis)
		State medical schools			
Georgia	Colorado Iowa State Michigan Oklahoma Ohio State South Carolina State Univ. N.Y., Brooklyn State Univ. N.Y., Syracuse Tennessee Wisconsin	Indiana Texas (Galveston) California (San Francisco) Vermont Wayne State	Arkansas Kansas Louisiana Oregon Richmond State Univ. Buffalo, N.Y. Virginia	Cincinnati Illinois Maryland Minnesota Nebraska	

* The trends are based on a comparison of data for the period 1940–1944 with data for the period 1960–1964, to smooth out fluctuations in single years.

diseases of their patients and render their greatest service through the discovery and imparting of knowledge helpful to humanity. Direct service to sick human beings was so uninteresting to Flexner, an educator, that he barely took notice of patients in his writing, although they flocked to the great clinicians of Johns Hopkins Hospital in larger numbers than it could accommodate.

Advanced training, beyond the doctoral degree, became the predominant interest at Johns Hopkins, with the professors devoting almost unlimited time to interns, residents, and fellows who showed promise in teaching and research. Medical students were necessary, but their quality must be high and their number rigidly restricted. Johns Hopkins' fidelity to this view may be seen from the fact that in 1920 it graduated 93 doctors and in 1965, 82.

A great reform followed the Flexner report. By 1920 the number of schools was down to 83, with 3047 graduates. The Rockefellers, Eastmans, Rosenwalds, and other philanthropists provided upward of $500 million to develop university medical centers that followed the Hopkins pattern and accepted the doctrine of the Chosen Few.

Harvard University, where President Charles Eliot during the pre-Flexner era had rebuilt the older Harvard Medical School along university lines, pursued much the same pattern of scholarly eliteness as Johns Hopkins, but in a much larger and looser organization. A large number of independent hospitals were allied with the School but had their own tradition of community service. Harvard graduated 96 doctors of medicine in 1920, and, through the vigorous leadership of then dean David Edsall, worked the total up to 135 by 1930. There it stuck. The figure was 133 in 1965.

Other private medical schools operating in the same pattern include the University of Chicago, Western Reserve, Pennsylvania, Columbia, Yale, and Rochester; state university medical schools of similar reputation include Michigan, Minnesota, and California (San Francisco). The dominant interest in these great medical centers is research.

There is a strong undercurrent of opinion, not too vocal and certainly not popular, that public and professional interest in research is making medical schools and their teaching hospitals lopsided institutions, inclined to regard ordinary students and ordinary patients as little more than necessary evils.

This view holds that the focusing of federal aid on medical research, while good for science, has hurt medical schools and their hospitals both as teaching institutions and as community service organizations. Not long ago my onetime family doctor in Washington, a professor of medicine, urged me to do an article entitled, "Research is ruining medical care." He is not anti-intellectual. He does some research himself. He simply maintains, as he was taught at Harvard a generation ago, that care of patients should come first. He tries to teach his students this, but when they look around the medical center they wonder if the old professor is really with it.

Expansion of a Medical School

Expanding a medical school takes no wizardry—only determination and money. The presence of a student imposes certain requirements. Medical education begins with the structure of the human body. First-year gross anatomy must find a place for the student at the dissecting table, four students to a cadaver. Two hundred students require twice as many tables and cadavers as 100 do. The same is true of laboratory bench space in physiology, biochemistry, microbiology, pharmacology, and pathology.

About the least an expanding medical school can get away with is a new basic sciences building, plus salaries for additional staffing in these areas. There is a shortage of qualified physicians willing to take full-time faculty positions, but the growth rate in the number of Ph.D. professors of basic science has been good. The real problem is to drag the young professor away from research to assume a heavier teaching load.

From the basic sciences of the first 2 years, the medical student moves on to two clinical years, to a large extent spent in the university hospital or in affiliated teaching hospitals and their clinics and laboratories. Ultimately, the limit to the number of students that can be taught is determined by the number of patients the university medical center serves, the big object of student training being to work with patients under the supervision of professors and residents. In the many departments of a hospital complex, an additional 50 students would disappear like hot dogs at a baseball game. If the medical school is skimpy on patient services, then there is the more expensive problem of constructing and developing hospitals and clinics and expanding their clinical staffs. The result, however, is doubly worthwhile, for it also means more medical service for the surrounding area.

William N. Hubbard, Jr., dean of the medical-school colossus at the University of Michigan, agrees that quality control becomes more difficult when there are more students. Any number can listen to a lecture, but American medical education is built around the professor and the approach of small-group teaching. This is maintained at Michigan by dividing the class of 200 into the same small groups but having more of them. (The group may be anything from one teacher and one student to one teacher and six or eight students.) This, of course, required the addition of facilities, equipment, and teachers.

The critical stress in moving from smallness to bigness is not a matter of quality, Hubbard suggests, but of overcoming the role conflict between the scholar, who gives primacy to the intellect and pursuit of truth, and the medical practitioner, who puts the Hippocratic ideal of humanitarian service first. The trick is in persuading the professor to see himself less as the solitary master and hero figure and more as a corporate manager who must lean more on the members of his team for actual performance in service, teaching, and research.

The test of successful expansion of a medical school is preservation of an environment that will attract candidates of apparent high quality. One index is the number of applicants the admissions committee has to turn down, although the ratio may be arbitrarily affected by other factors. At the University of Michigan, the ratio is five applicants to one candidate accepted; nationally, it is a little more than one to one.

What this meant, over all, for the medical school classes of 1964–65 was that 19,168 applied and 9043 were accepted; 10,125 who wanted to go to an American medical school were turned down.

Had there been room for the rejected, would they have been qualified

to study medicine? Medical students are selected on the basis of their college grades, their Medical College Aptitude Test score, and a personal interview. The amount of selectivity exercised is entirely relative to the size of the pool of applicants and the number of first-year student places available. Most medical-school admitting officers feel that they are seeing and turning down qualified candidates. Association of American Medical Colleges officials are of the opinion that perhaps a third of the rejected, or some 3300, would make good medical students.

The view that a candidate, to be acceptable, must have been an A student in college is another elite-group fallacy. No one has proved that a college graduate with a B or even C average doesn't make as good a practicing physician as one with a Phi Beta Kappa key. It is true that professors like the stimulus of brilliant students.

The academic snobbery of relating high quality to small numbers notwithstanding, many medical educators have demonstrated that they aren't afraid of going big if they can get their hands on enough hard cash. The average annual expenditure of American medical schools is $8 million. However, the medical schools have gradually lost hard-money control over their operation, inasmuch as 59 percent of the money now comes from sponsored programs, mostly federal and largely for specific research, and only 41 percent comes from regular income.

Nevertheless, it is possible to expand an existing medical school at a lower per-student cost than to build a new university medical center, estimated to cost upward of $500,000 per first-year student, or $50 million for a school with a class of 100 (student body of 400). This price tag includes clinical and research facilities equal to about $280,000 per entering student. An existing school of this size can be expanded by 50 percent for $10 to $20 million, plus something on the order of $2500 to $5000 per student per year in operating costs. These figures give a rough idea of the kind of costs that must be shared by government and private sources. The federal share is now available.

The Harvard medical professors take understandable pride in the leadership that their school exerts, as do medical professors at Johns Hopkins and other top medical schools that, in turning down as many as nine of every ten student applicants, take the easy way out of a primary social responsibility. These same professors sometimes sit around the table during planning and development meetings and frankly agonize—and I have agonized with them —over whether their institution is maintaining its leadership. There is no sure way of telling, of course, until leadership is lost. But would it be impertinent to toss in the question, "Is this any way to influence medicine, to exert leadership, to serve humanity—by turning the qualified away?"

Whatever the case, the question tests the capacity for leadership of those institutions that have enjoyed national roles. The ultimate measurement seems simple enough, in quality and quantity: Will a Johns Hopkins or a Harvard with a medical student body of a size fixed 40 or 50 years ago be worth as much to a society of 200 million as it was to one of 100 million?

The Flexner concept of excellence has served American medical education well. But have we not learned enough about large-group organization and management in the 55 years since publication of his report to produce excellence in larger numbers? Perhaps it is time to say farewell to Flexner and move ahead.

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5. See "A Health Study in Kit Carson County, Colorado," *U.S. Public Health Serv. Publ. No. 844* (1962); B. S. Sanders, *Amer. J. Public Health* **54**, 1063 (1964).
6. R. Dubos, *Mirage of Health* (Harper, New York, 1959), p. 138.
7. "Disability Days, United States, July 1957–June 1958," *U.S. Public Health Serv. Publ. No. 584-B10* (1958).
8. A. Gregg, in W. V. Houston *et al., The Scientists Look at Our World* (Univ. of Pennsylvania Press, Philadelphia, 1952), pp. 83–108.
9. A. Flexner, *Medical Education in the United States and Canada* (New York, 1910).