arate grants. But the Fountain report takes the position that, as a result of this procedure, a large sum of research support is excluded from competition and outside review. Further, it observes that while Sloan-Kettering is "widely recognized as a leading cancer research institution," it has far from a perfect batting average in obtaining approval for its grant applications at NIH. "In the last two complete fiscal years which preceded the January 1966 single grant," the subcommittee states, "Sloan-Kettering investigators applied for 34 separate grants, of which only 20 were approved by NIH's scientific review bodies. The approval rate for these applications was 59 percent in the combined fiscal year 1964 and 1965. The comparable approval rate for all NIH applicants in these same years was 58 percent."

On the issue of the scientific quality of all NIH-supported research, the report notes that, in 1956, 40 percent of NIH grant applications were placed in the topmost evaluation category, whereas in 1966 only 26 percent were judged to be at this level. NIH, of course, can reply that awards, rather than evaluations, are a significant measure of quality, since not all approved applications actually end up with NIH money. And, on the basis of awards, the quality—to the extent that it can be meaningfully measured—holds up well. Further, the 1966 program was five times the size of the earlier effort, and is at least tacitly predicated on the assumption that possibly pedestrian projects have a part to play in a vast nationwide program of biomedical research. Also, NIH can point out that in recent years it has emerged with high honors for scientific quality in a variety of outside evaluations.

But the dilemma of NIH as well as of other scientific agencies lies today more in the substance of politics than in the substance of science.

At least in the case of the HSAA program, there is the appearance—a solid appearance, it must be added—that NIH engaged in some highly questionable administrative procedures. The motives may have been good science, but the appearance is awful, and with Congress now rampaging about federal spending in general, and research expenditures in particular, this is an unfortunate time for the mainstay of biomedical research to be exposed to accusations of dubious practices.

NIH has not yet come forth with a public explanation. Its relations with Fountain and his staff are so chilly and distant that there is little communication between the congressman's office and Bethesda, outside of Fountain's demands for papers and NIH's acquiescence. The gist of the report is not drawn from any recent hearings. No hearings were held, except for two sessions in June 1965, when Fountain belabored NIH for paying overhead fees in excess of the required minimums. In fact, the hostility between Fountain and NIH is now so great that, at the time the report came off the press last month, NIH was totally unaware that it was even in the works.

—D. S. GREENBERG

Mt. Sinai: How a Hospital Builds a Medical School

New York. Since its founding in 1852 by Jewish immigrants, Mt. Sinai Hospital has moved its home twice and changed its name once. Its 22-building medical complex now fits snugly between 98th and 101st Streets on Manhattan's East Side, where 5th Avenue's fashionable apartments quickly run into the slums of Harlem. The hospital treats 150,000 patients a year, delivers 5000 babies, and is indisputably one of the nation's best. But it is not satisfied; it is beginning a medical school.

Along with 15 other new medical schools, Mt. Sinai enters the well-documented world of the doctor shortage. Yet, even with these new openings, American universities will not produce enough physicians, or, for that matter, meet the demands of college graduates who want to become physicians. Many educators have shied away from starting medical schools because they know what Sinai's founding so amply illustrates: that creating a medical school is a long, costly, and intellectually demanding business that may be the most diffcult undertaking a university can attempt.

When the first students enter Sinai next year, nearly a decade will have passed since the hospital's leaders started thinking seriously about a medical school. The Admissions Office will accept 25 first-year students, but will have to wait at least three more years—until 1971 when the school's major building is completed—before accepting the first full-size class of 100. The initial investment to create the school is estimated at $107 million, a figure that is probably conservative.

Nevertheless, in many respects, Sinai has had an easier time than many other developing medical schools. The hospital starts with impressive assets. It has a long tradition of clinical excellence and a high-quality staff, which, because Sinai continually attracts first-class interns and residents, has plenty of teaching experience. Thus, unlike most medical schools, it did not have to find, build, or improve a hospital in which to train its students. In addition, Sinai always encouraged research and an atmosphere of inquiry. "There were 78 medical schools in the country in the 1950's," says hospital director Martin Steinberg, "yet without being a medical school, we were 27th in the amount of money received from NIH. . . . This is how hard we worked on this area."

Because of these strengths, Sinai also has a widespread reputation for quality, which is an undoubted asset for recruiting a faculty and raising money. And Sinai has also had time to ponder carefully what kind of medical school it wants to build. "We are in a better position to experiment with medical education because we don't have to worry so much about patient care and research," explains Hans Popper, a

leader in establishing the school and now its dean for academic affairs.

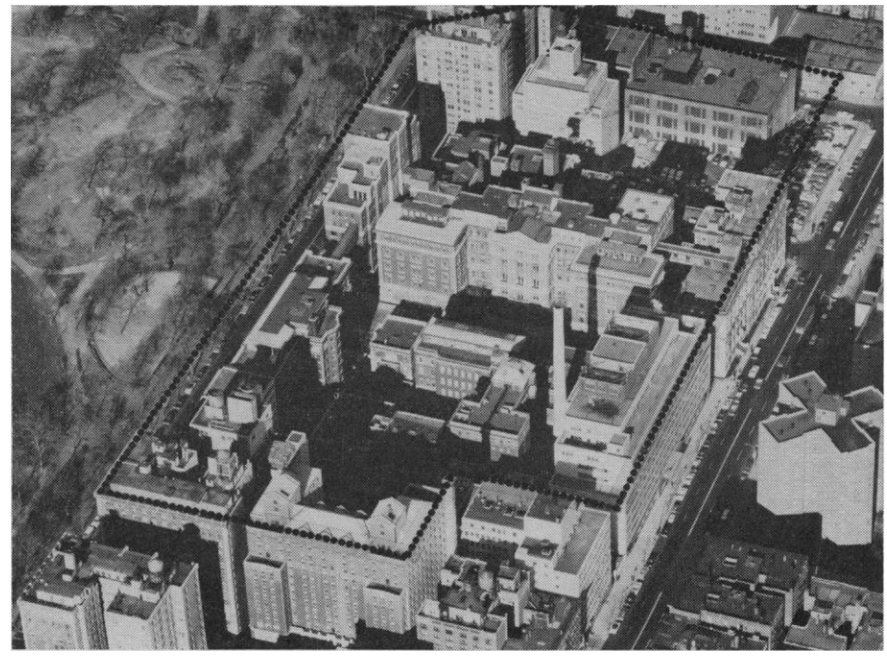
Mt. Sinai is not the only school attempting to remake medical education. But because critics of the traditional medical curriculum have yet to agree on a satisfactory replacement, curriculum development may be the most important and interesting activity at the new school.

For those who want change, the period before the medical school actually begins is unique and inviting. "This is an optimal time," Popper has written, "because the vested interests of the faculty are not yet established and the opportunity for change diminishes as the school is organized." But this blessing is not without drawbacks. The absence of some crucial faculty members (who either have not been recruited or have not begun working full time at Sinai) has hampered curriculum planning; and as new men are consulted, changes may have to be made.

Attacks on the traditional curriculum come from both students and faculty. Taught along strict departmental lines (anatomy, biology, pathology, and so forth) and allowing little time for electives, the standard curriculum has been pictured as stifling, too time-consuming, and unresponsive to emerging patterns in medicine—the spiraling increase of knowledge, the growing use of technology in clinical treatment, and the rising demand for medical services. The inescapable conclusion of almost all reformers is that the old curriculum should be abbreviated and more new subjects should be added.

As a result, Mt. Sinai is doing three things: (i) it is reducing the standard curriculum (now called the "core") and changing the way it is taught; (ii) it is leaving far more time for electives; and (iii) it is introducing a new course, "Introduction to Comprehensive Medicine and Care of the Patient," that will bring students into contact with patients early in their first year.

In principle, the proposed curriculum seeks to strike a balance between opposing forces. By allowing more elective time, students will have the opportunity to specialize earlier (though some of Mt. Sinai's planners hope that students will use elective time to "experiment"). At the same time, the early bedside experience is aimed at broadening the physician by introducing him immediately to patients and by emphasizing the economic, ethical and social problems of medicine.



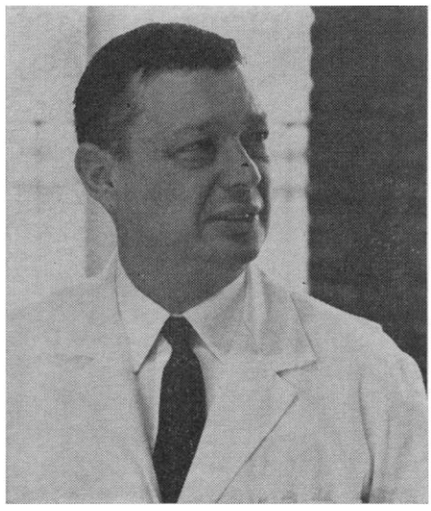
Mt. Sinai Hospital's 22-building medical complex. The home for the new medical school will be located at the center of the complex after some of the present buildings are demolished.

Although some basic science material undoubtedly will have to be trimmed to fit the new "core" curriculum, Sinai physicians want to make the basic sciences seem more relevant, both by bringing the student into the wards earlier (where Sinai optimistically hopes to relate basic science concepts to the patient) and by instituting daily basic science seminars in the third and fourth years, when the student spends most of his time in the hospital. Moreover, instead of teaching the "core" along standard departmental lines, most of the required courses will be "integrated" —that is, students will concentrate on a particular organ (or a particular disease phenomenon), learning, for example, what each department has to say about the heart.

Planning such a curriculum involves many difficulties. In the first 2 years, the fundamental decision involves how much "core" should be given and how much "free curriculum" (electives). "Everyone wants to teach more of his own stuff," Popper says, and Sinai's faculty members, like their colleagues at other schools that are revising to allow more electives, will surely vie to see that their teaching time is not reduced too much. Although this difficulty certainly reflects personal and departmental prerogatives, the question is also substantive: How much *should* certain areas be reduced? For example, initial plans called for a first trimester to be taught along traditional "bloc" (departmental) lines to give the students an introduction to the basic sciences before launching him into organ-oriented, disease-oriented studies ("We are going to teach him a dictionary of the basic sciences," explains Popper); now, after studying this plan again, it has been decided that the students were being asked to learn too much too quickly, and a second trimester of "bloc" time will probably be given.

Sinai plans to "integrate" not only the first 2 years (something which has been accomplished elsewhere), but also the third and fourth years of clinical studies. This change will mean that a student will no longer rotate between wards, spending a stretch of time in a surgical ward, followed by another long stretch in a pediatrics ward, for example, but will study the medical, surgical, pediatric, and even psychiatric problems of a particular organ (or illness) at the same time.

Again, the principle is more easily stated than put into practice. Certain areas of medicine, for example, seem to demand treatment under the old system. And Sinai also seems intent to reduce attention in some areas which can be better learned, it believes, during internship or residency; two frequently cited examples are dermatology and delivery-room obstetrics. This



George James

Hans Popper

change may produce claims from neglected specialists that they are being deprived of their chance to recruit new doctors.

In addition to the traditional emphasis on clinical and laboratory disciplines Sinai will attempt to upgrade "community medicine" (a catchall encompassing, among other things, nutrition, some aspects of preventive medicine, and the distribution of medical care). This field will be treated as a major speciality that would develop its own experts, and students will be able to devote much of their elective time to studying it. With the appointment of George James, former Commissioner of Health of New York City, as the school's first dean and the head of the department of community medicine, the discipline naturally acquired new stature; how many students it will attract remains to be seen.

The curriculum's fundamental principles are clear:

- Four years of medical school cannot teach physicians everything; thus the greater emphasis on "principles" in the first 2 years and the de-emphasis of some clinical specialities in the last 2 years.
- The most important services the medical school can perform is to impart good habits to its graduates; thus the early introduction to the patient and the emphasis on free curriculum when the student will spend much of his time working with individual physicians.
- Medicine has become so diversified and hence specialization is virtually inevitable; thus, the early chance to explore deeply with electives.

As a set of commandments, the curriculum is firmly formulated, but as a workable plan, it has a long way to go. A curriculum committee has only just been established to take over from a smaller group of faculty members who did preliminary groundwork. "Integrated" teaching for the first 2 years has not been laid out in detail; in fact, so far, only one subcommittee is working.

Some complications are already apparent. Integrated teaching, for example, demands a great deal more of faculty members than did departmental teaching, when each teacher was lord of his own class; under the new system, teachers will have to plan together in order to avoid repetition and make clear their honest differences. Integration of the clinical years, if it is to work, will probably require some of the same preparation. All this consumes time and could conceivably cause resentment.

Time is a precious commodity for the students, too, and Horace Hodes, the chairman of the curriculum committee, worries that there simply will not be enough to go around. There are, of course, some fundamental objections to the new curriculum approach: does all the concentration on distinct organs and diseases imply too much specialization and too little concern for the patient as a whole? And is all this reshuffling worth the effort? One faculty member speculates that the brightest students will prosper regardless of the presentation, that the slow students will encounter difficulty in any scheme, and that only the "middle third"—at best—can gain significantly from the reorganization.

Although the curriculum seems to have captured the faculty's attention, much more is involved in the building of a medical school. The entire developing process demands great motivation and, in Sinai's case, this stimulus was supplied by more than a growing awareness that the country needed greater numbers of physicians. The deeper urge evolved with the hospital's strong desire to retain its role as a leader in American medicine.

For many years, Sinai was the natural home for Jewish interns and residents who faced discrimination at many other hospitals. This inflow gave Sinai both a continuing source of talent and a sense of mission. When discrimination began to decline after World War II, the hospital found not only that Jewish physicians could easily go elsewhere but also that its own special role was evaporating. At the same time, it became apparent that even an excellent hospital could never compete with an excellent university as a center for research.

"When you talk about improving a hospital, you're talking about strengthening its staff," says hospital director Steinberg. And this, in the end, is to be the ultimate gift of the medical school to the hospital. For, although Sinai has never been in any danger of ceasing to be one of the nation's best hospitals, it could not attract those researchers who prefer working in an academic setting. To maintain its position of leadership as a research institution and regain part of its lost role, it was felt that the hospital would have to develop a medical school. The nation's shortage of physicians was a convenient additional factor.

The most serious stumbling block was finding a university affiliation. Ever since the Flexner report of 1910, which said that only a link with a university could assure high standards for medical schools, there has been a universal wariness to begin an independent medical school. Fearing a possible precedent, the American Association of Medical Colleges, which accredits medical schools, asked Sinai to find a university before going ahead. The consensus at the hospital was for an affiliation, but not for a "paper" affiliation—one that satisfied the requirement but did not really help the medical school.

Making such a marriage proved difficult. The hospital held serious talks with Princeton, Brandeis, and the City College of New York (C.C.N.Y.), and made less-determined inquiries at a number of other schools. None of the talks succeeded. Princeton did not want

a medical school, and Brandeis, in Massachusetts, was too far away. The C.C.N.Y. talks failed for a variety of other reasons. As a result, by 1963 the hospital assembled a consulting team of leading medical educators, and their advice was to press ahead without an affiliation. Even alone, the hospital was obviously better qualified to begin a school than most universities. The AAMC reluctantly gave its permission with the proviso that the search for an affiliation should continue.

The affiliation problem, however, continued to plague Sinai. The funding of a federal grant of $26 million for the construction of the main medical-school building was delayed, and no one at the hospital doubts the reason: lack of a university affiliation. Still searching for a tie and needing one more than ever, Sinai opened talks with the City University of New York last spring. The City University (as opposed to City College, an undergraduate institution that is now a part of the university) was created in the early 1960's and is rapidly expanding its graduate facilities. Albert Bowker, former dean of the Stanford Graduate School and now chancellor of the City University, got along well with Sinai's representatives, and the affiliation was quickly arranged. Not surprisingly, approval of the federal grant soon followed.

This may have been a major practical and psychological breakthrough, freeing the medical school to concentrate on more detailed planning. There are three major problems:

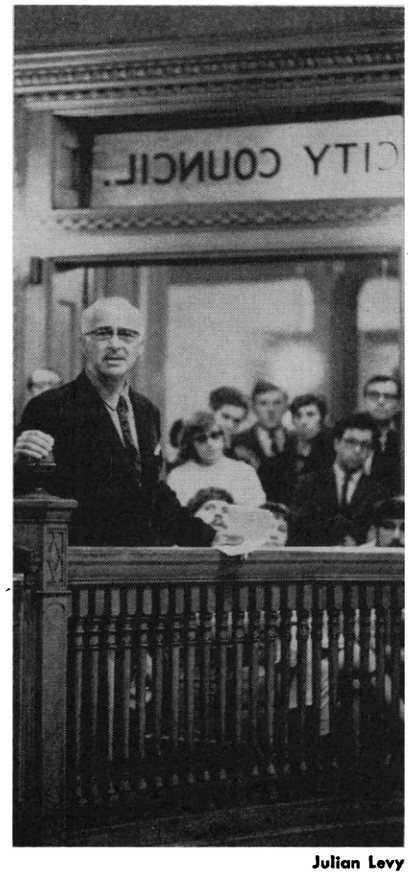
- *Recruiting.* So far, the school has done well in attracting men to fill gaps in the present hospital staff (primarily in the basic sciences). To head the department of biochemistry, for example, Panayotis G. Katsoyannis, who has synthesized both human and sheep insulin, will come from the Medical Center at the Brookhaven National Laboratory. Irving Schwarz, former head of the department of physiology at the University of Cincinnati, heads the department of physiology. To replace the retiring chairman of the department of medicine, Sinai persuaded Solomon A. Berson, an expert on diabetes, to leave the Veterans Administration, where he is a senior medical investigator and head of the radioisotope service at the V.A. Hospital in the Bronx. The school has yet to recruit chairmen of the departments of pharmacology and microbiology. The rule of thumb among school officials is that finding a good chairman is the key to successful re-

Wald Urges Cambridge Vietnam Referendum

Cambridge, Massachusetts. Prestige is a scarce and valuable commodity. George Wald has it, and 6 days after he received his Nobel prize in medicine he used it.

Appearing before the Cambridge City Council, Wald pleaded that the Council allow an initiative petition (referendum) about the war in Vietnam to be placed on the city's ballot 7 November. Strictly speaking Wald's presence was probably superfluous; the organizers of the initiative petition knew that the Council had little choice but to put the question on the ballot. But Wald's quiet 15-minute speech added stature to the campaign and reflected the biologist's conviction that scientists should not shy away from public issues.

"When I was a kid in a civics course in Brooklyn, I learned . . . of the pride Americans take in initiative, recall, and referendum," Wald told the Council. He explained that he had been a member of the Scientists and Engineers for Johnson in 1964, but that in early 1965, when the war was stepped up, he began to feel that "my franchise had been violated." In "this strange situation of undeclared war," it was necessary that "someone rise and question the government's actions." That role, he said, was shunned by politicians and most public commentators and had to be played by the university community.



Julian Levy

Harvard biologist George Wald speaks to the Cambridge City Council.

It is a role that scientists and other scholars should continue to play, Wald said in an interview with *Science*. Along with many of his Boston-area colleagues, Wald has criticized other government programs, including the much-publicized civil defense and bomb shelter proposals of the early 1960's. The recently announced Anti-Ballistic Missile (ABM) system may become another target. The ABM is "just exactly like the bomb shelters," because it lets "people become accustomed to the idea of nuclear war and [gives them] some vague notion that they have protection."

Wald's appearance before the City Council—his first—went smoothly, though one councillor, who has bitterly denounced all criticism of the war, responded by interrupting Wald's speech and quoting Nathan Hale: "I regret that I have only one life to give for my country."

The petition's supporters, well-organized though they are (Wald's wife is a district leader), call the petition an experiment; conceivably, the vote could boomerang by reflecting support of the war. Many of the opponents of the wide-scale initiative petition seem intent on making the vote not simply a sampling of war opinion but a test of fundamental patriotism and a contest of life-styles—with Cambridge's growing hippie community strictly identified with the antiwar sentiment. For their part, the petition's backers have been emphasizing that Cambridge is not just Harvard and M.I.T., but a "typical" community. There is a good deal of truth in this, and an antiwar victory, they reason, would clearly demonstrate that not only professors are against the war.—R.J.S.

cruiting, for a good chairman, they say, brings some former colleagues with him and naturally attracts other talented men.

● *Research space.* Most of the medical school's activities will be housed in a building to be constructed at the center of the Mt. Sinai medical complex. Construction will not begin until 1968, and until it is finished in late 1971 or early 1972, the school will be cramped. "We're scratching for every inch of space we've got," Dean James says. An initial basic science building, converted at a cost of $6 million from a parking garage, should be ready by next summer in time for the first class. Yet the space shortage may not only hinder the school's operation, but it also could hamper faculty recruitment.

● *Fund-raising.* Sinai has a wealthy and industrious board of trustees (actually, there are two boards now, one for the school and one for the hospital, but their membership overlaps significantly). The cost of beginning the medical school now stands at $107 million—$78 million for the building, $25 million for an endowment, and $4 million for initial start-up expenses—but already the school has nearly $75 million, including more than $32 million in private pledges or gifts. (The other money comes from the federal grant of $26 million, anticipated state aid of about $4 million, and about $12.5 million from the hospital's reserve funds.) Dean James is appealing to foundations for some of the $4 million the school needs in start-up funds. Costs could also go up. "Some of these new devices are fantastically expensive," he comments, and even the normal course of inflation might prove troublesome. Moreover, Sinai is counting on receiving money from two potentially uncertain sources. First, it is negotiating with the City University to buy its basic sciences building for around $6 million; and second, it is hoping that the federal government will modify its normal definition of "hospital facilities" to allow Sinai to qualify for about $3.8 million of the $26-million grant.

Sinai clearly seeks to excel as a medical school. The personality of the institution is proud and ambitious; it wants to do more than alleviate the shortage of physicians. There is opportunity; for example, the City University will establish near Sinai a 4-year Health Career Institute to train skilled medical technicians and teachers for medical technicians at 2-year colleges. The institute's undergraduates will use Sinai as a learning laboratory. With James as dean, this project could conceivably be the start of an expanding program of community medicine.

It may be, of course, that the continuing costs of creating a great medical school are far greater than even the founders have anticipated. This will be a problem, for under the affiliation agreement, Sinai is fiscally autonomous. It will receive about $250,000 annually from the City University to support ten faculty chairs, but except for this payment, the school is on its own. But, whatever a future catalog of institutional anxieties contains, a dearth of admissions candidates will never qualify for inclusion. There are already more than 400 inquiries for Sinai's first very small class.

—ROBERT J. SAMUELSON

Smale: NSF's Records Do Not Support the Charges

In recent months the dealings between Stephen Smale and the National Science Foundation have been copiously reported in these columns, and at this point many, if not most, readers probably feel that more has been proffered about this convoluted controversy than they care to know (*Science*, 15, 22, 29 September; 6 October).

There is, however, a need to take up the subject again, for, on the basis of material that NSF has recently made available from its own files, two very disturbing facts are now clear concerning the Foundation's treatment of the professionally distinguished and politically left-wing mathematician from Berkeley:

(i) NSF is unable, or at least unwilling, to provide any documentary evidence to support its allegations of impropriety or substandard performance on Smale's part in the administration of his government grant; but even more important, (ii) at the time NSF made these allegations, it was in possession of documentary evidence which either clearly contradicted the allegations, or showed them to be based on trivial and technical departures from ambiguous regulations.

Both conclusions are drawn from voluminous files that NSF made available at the request of *Science*. The request for these materials was at first refused, but later was fulfilled when *Science* formally cited the recently enacted "Freedom of Information Act" (P.L. 89-487), which requires federal agencies to make available upon request broad categories of government records that previously could be withheld from public inspection.

It should be recalled that when Smale applied for a new grant to help support and expand the mathematics research group that he heads at Berkeley, NSF replied, "in light of Professor Smale's performance in the administration of the present grant, we cannot tender a new grant to the University based on the proposal in its present form." The letter went on to suggest that the proposal for future support be divided into at least two separate proposals, one of which "should confine itself strictly to the needs of Professor Smale in the pursuit of his own research interests without involving NSF support of other faculty members." Subsequently, Philip Handler of Duke University, who is chairman of the National Science Board, issued a statement that, in part, said, "'The Board . . . concurs with the Director [of NSF] that management of this grant has been relatively loose and has not conformed to appropriate standards."

Smale demanded a bill of particulars, but NSF officials failed to respond. On a nonattributable basis, however, several of the highest officials of the Foundation told *Science* that the allegations concerning Smale's administrative per-