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From Institute to University: A Brief History of The Rockefeller University

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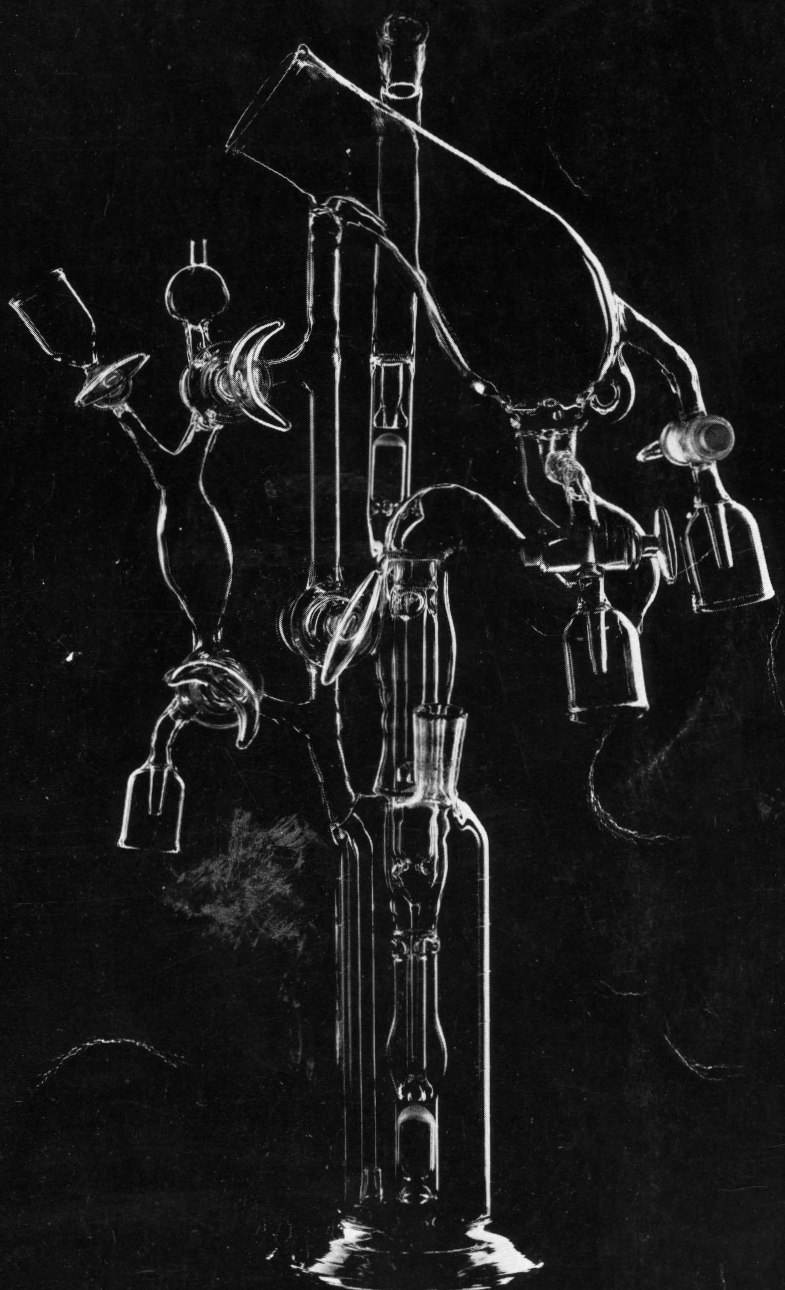


Based on the history of The Rockefeller Institute by George W. Corner and on other historical materials.

COVER

The Carrel-Lindbergh pump is named for its inventors: Alexis Carrel, the first Rockefeller scientist to win the Nobel Prize, and Charles A. Lindbergh, the world-famous aviator who worked in his laboratory. Made entirely of hand-blown Pyrex glass, the apparatus was used to maintain organs and tissues in culture, enabling scientists to study them functioning outside the body.

In the spring of 1897, Frederick T. Gates was on vacation in the Catskills when he read a book titled *Principles and Practice of Medicine.* The book, by Sir William Osler, was to have a profound influence on Gates, who had become the philanthropic adviser to John D. Rockefeller, Sr., in 1891.

From his observations at sickbeds and his conversations with physicians, Gates had become skeptical about the current state of medicine. At the turn of the century, the toll taken by infectious disease in the United States was a sobering statistic. Deaths from tuberculosis alone amounted to 194.4 per 100,000 population (a figure that was to drop to 7.9 in less than 60 years). Even in major cities like New York, Philadelphia, and Boston, approximately 190 infants out of every thousand born died before they were a year old.

The thousand-page Osler survey confirmed Gates's skepticism, but it also made him aware of the potential of scientific investigation for solving the mysteries of disease.

"It became clear to me," Gates later wrote, "that medicine could hardly hope to become a science until medicine was endowed, and qualified men were enabled to give themselves to uninterrupted study and investigation, on ample salary, entirely independent of practice. To this end it seemed to me an institute of medical research ought to be established in the United States. And here was an opportunity for Mr. Rockefeller to do an immense service to his country and perhaps the world."

In a memorandum to Rockefeller, Gates argued that even if such an institute should fail to discover anything, the mere fact that Rockefeller had founded one would lead to the donation of other funds for similar purposes, until research in this country "would be conducted on a great scale."

At that time, medical science was advancing in Europe at a number of university laboratories and clinics and at major research centers headed by such renowned scientists as Pasteur in Paris and Koch in Berlin. In the United States, however, only Harvard, Johns Hopkins, the University of Pennsylvania, and two or three other universities had biomedical research laboratories. Most American postgraduates aspiring to careers in medical research had to go to Europe for their training.

When Gates sent his memorandum to Rockefeller, the industrialist was in the process of withdrawing from the active management of the Standard Oil Companies. Although he was preoccupied, Rockefeller did not ignore the memorandum. He passed it on to his 24-year-old son, John D., Jr., who had just joined the Broadway office where Gates worked.

"Gates did the heavy thinking," the younger Rockefeller said later. "My part was to sell his ideas to Father." Actually, however, the young man was expected to study the project, appraise it, and organize data for a decision. Together, Gates and

Rockefeller, Jr., engaged a lawyer to investigate foreign research laboratories and consult with leading American scientists.

THE INSTITUTE IS FOUNDED

In January 1901, Rockefeller, Sr., agreed to establish the institute that had been under consideration for more than three years. His decision was influenced by the fate of his first grandchild, John Rockefeller McCormick, who had died of scarlet fever that month. The physicians attending the child stated that medical science knew nothing about the causes of the disease and could offer no effective treatment for it.

Not long afterward, on June 14, 1901, The Rockefeller Institute for Medical Research was incorporated, and a charter was adopted stating, "The purpose of the corporation is medical research with special reference to the prevention and treatment of disease." Gates himself laid the stress on the prevention of disease.

At the time of its founding, the Institute was headed by a seven-member Board of Scientific Directors. Of the original seven, six had studied in Germany. All of them had strong backgrounds in pathology and a predominant interest in bacterial disease.

Included on the board were two men who had played important advisory roles in the planning of the Institute: L. Emmett Holt, a prominent pediatrician, and Christian Herter, who headed his own small research center. Together, these two enlisted the participation of William H. Welch, cofounder of the Johns Hopkins Medical School.

When the board held its first meeting, in Holt's office at 14 West 55th Street, Welch was chosen to preside. Welch protested, but he did not refuse. As it turned out, he served as president of the Institute's board for the rest of his life.

From Rockefeller, Sr., the board received an initial grant of $200,000 to be used over a 10-year period. Rather than construct a facility and establish a formal research program, the directors chose to launch the Institute by creating a number of scholarships and fellowships to be used in existing laboratories throughout the country. This program of research support was to continue, in progressively decreasing sums, until 1917—14 years after the Institute had opened its own laboratories.

When Rockefeller's grant was announced in the daily newspapers, they gave full coverage and editorial approval to the plans for the Institute. Later, the press was even more excited by the results of a project financed through the first year's budget—a study of New York City's milk supply. An article in the Herald proclaimed: "...Germs Swarming in City's Purest Milk.... Rockefeller Institute experts report that appalling uncleanliness prevails in most of the dairies which supply New York." This investigation, which cost approximately $7,000, aroused the public and enabled the Board of Health to tighten sanitary control of the milk supply and strengthen its program instructing mothers in the care and feeding of infants.

A DIRECTOR, A CAPITAL FUND, AND A PERMANENT SITE

In 1902, Welch, president of the board, proposed that the directorship of the Institute be awarded to Simon Flexner, a board member he had recruited with just this possibility in mind. A professor of pathology at the University of Pennsylvania, Flexner had been Welch's assistant in the pathology and bacteriology departments at Johns Hopkins. Though he had arrived at Hopkins with an M.D. and only a little self-training in research, Flexner had subsequently gained considerable scientific experience, conducting investigations of epidemics in Maryland and San Francisco and heading a commission that studied diseases in the Philippine Islands. The board approved the choice of Flexner for the directorship, and Flexner said he would accept the post "if it is the intention of the Founder and the Board of Directors to organize the Institute upon a liberal scale...."

On June 13, 1902, Rockefeller, Jr., informed his father that the board had proposed a program that would eventually require a capital fund of $5 million. As a start, the younger Rockefeller proposed a pledge of $1 million, to be drawn as the board chose over the next 10 years. This sum would allow the board to purchase land, construct a single building, and cover annual expenses of $40,000 to $60,000. The elder Rockefeller agreed to the $1 million pledge and, on October 25, Flexner was formally elected director of the Institute.

Flexner officially began work on July 1, 1903 and, four months later, after a period of study abroad, he and his staff moved into temporary laboratories in two brownstones at Lexington Avenue and 50th Street. Meanwhile, the board allocated $650,000 for the purchase of 13 acres of land along the East River, between 64th and 68th Streets. Known as the Schermerhorn property, this land was the last open tract in the area and, at the time of the Rockefeller purchase, a few cows still grazed on a sloping pasture near what is now York Avenue.

In July 1904, ground was broken near the center of the property for the construction of Founder's Hall, the Institute's first building. When it was completed in the spring of 1906, Flexner and his staff moved into permanent quarters that were described as "commodious and well-equipped" but "by no means sumptuous."

THE PATHFINDER TYPE

From the beginning, the elder Rockefeller and his closest advisers had hoped that his gift would directly benefit public health. Highly pleased by the results of the New York City milk investigation, they probably anticipated that the Institute would continue to pursue what would now be called applied research. From the outset, however, scientists at the Institute tended to concentrate on fundamental research.

Flexner had been trained in the rapidly developing sciences of experimental pathology and bacteriology. He knew that bacteriology formed the core discipline of the Euro-

Founder's Hall, the first building constructed on the Rockefeller campus, was completed in 1906.

pean institutes. But Flexner did not believe that bacteriology should play so central a role at Rockefeller. Instead, he thought the new institute should extend to biology the knowledge being derived from the physical sciences. This view, shared by many other biologists of the time, was influenced by Jacques Loeb, who contended that biology should become a quantitative, rigorous science based on physics and chemistry. A highly effective proponent of the physicochemical approach to biological research, Loeb had a profound impact on the Institute, where he served on the staff from 1910 until his death in 1914.

During the three decades of his leadership, Flexner recruited a staff that was "made up almost entirely of men of the pathfinder type, who by inclination and training saw the need for basic knowledge and preferred to seek it rather than to aim directly at practical results," according to historian George Corner. To their credit, Corner notes, the two Rockefellers and Gates understood this need and gave "their unquestioning support to basic scientific research."

Although The Rockefeller Institute attracted world-class researchers, and although it was modeled on the great European laboratories, it was never dominated by a single scientist like the European institutions led by Pasteur and Pavlov. Flexner encouraged the investigators on staff to "search where and how they will," and he emphasized a "spirit of easy and free cooperation." Under his direction, the Institute developed a unique structure. Based on laboratory groups, each headed by a senior scientist, that structure persists to this day.

In addition to Flexner, the first group of investigators included five people: Samuel J. Meltzer, Phoebus A. Levene, Eugene L. Opie, Hideyo Noguchi, and Joshua E. Sweet. Although they all had M.D. degrees, each was primarily an investigator capable of conducting research in one or more of the basic sciences. In subsequent years, other gifted scientists joined the ranks of what Flexner called his prima donnas. A history of medicine published in 1947 includes a list of more than 30 historically significant investigations made at the Institute, many during the Flexner years. These investigations span such fields as bacteriology, virology, biochemistry, organic chemistry, immunology, cytology, organ culture, animal and plant pathology, parasitology, and genetics. They deal with a host of disorders and diseases, including cancer, poliomyelitis, rheumatic fever, tuberculosis, African sleeping sickness, meningitis, pneumonia, and swine influenza. The list is in no way complete, and it barely touches on the contributions that the Institute's investigators and skilled craftsmen made to the development of scientific instruments and techniques. It does, however, suggest the range and impact of the laboratories organized under Flexner and the caliber of a staff brought together from this country and abroad.

A HOSPITAL OF ITS OWN

October 17, 1910, was a landmark day in the history of the Institute. On that date, John D. Rockefeller, Sr., pledged $3,850,000 to the Institute's endowment fund. New bylaws went into effect, creating a Board of Trustees. And the Institute officially inaugurated its new hospital, a strictly utilitarian structure with an entire floor of laboratories, equipment advanced for 1910, and wards of only six beds—all managed by an unusually well-trained staff.

From the start, the small group who organized the Institute had believed that it should have a hospital of its own, closely integrated with the laboratories. In fact, Flexner had recommended that a small, modern, fully equipped hospital be attached to the Institute to study selected cases of disease.

Just as Flexner was the major influence in organizing the Institute and setting its direction, Rufus Cole gave the Hospital its distinctive character and defined its mission. At Johns Hopkins, Cole had carried out pioneering studies of typhoid bacilli in the bloodstream. His research laboratory there was the first in the United States to be made an integral part of a medical clinic. Later, when he was asked to become the director of the Hospital, he insisted that it be staffed by full-time salaried physicians

working in their own laboratories, but strongly supported by, and free to collaborate with, the Institute's other laboratories. Flexner and others had proposed the Hospital as a testing ground for ideas generated by investigators in those other laboratories. But the board ultimately accepted Cole's argument that physical and intellectual barriers separating ward from laboratory had to be removed if medicine was to advance.

As a result of this approach, the Rockefeller Hospital became the first clinical research center where human disease could be studied and treated in a setting of rigorous scientific inquiry. In the 1950s, the 40-bed Hospital served as a model for the 500-bed clinical center established in Bethesda, Maryland, by the National Institutes of Health. Eventually, some 80 medical schools used federal funds to set up small clinical research centers modeled on The Rockefeller University Hospital.

Medical schools around the nation were even more profoundly influenced by Cole's efforts to develop a generation of physician-investigators or clinical scientists who would revolutionize American medical education. Of the 179 investigators who trained under Cole, 60 percent went on to fill academic posts. To this day, clinical researchers from around the country come to the Hospital for advanced training before assuming key positions in other institutions.

During Cole's 27 years as director, the Hospital's investigators carried out hundreds of studies that validated the link between observation at the bedside and investigation in the laboratory. These studies led to a better understanding of pneumonia, syphilis, rheumatic fever, many viral diseases, renal disease, circulatory disease, and diseases of the blood. Much of this research, however, had an even more significant impact, for it led to a greater understanding of basic life processes.

Clinical investigation of the nature of bacterial virulence, for example, spurred pioneering experiments in what now would be called biochemical genetics; these experiments, in turn, led to the birth of this important discipline. Similarly, the prevention of infectious diseases was the clinical objective that promoted the development of immunology, which eventually led to the discovery of a host of immune-based disorders. In still another area, clinical study of pulmonary and kidney failure resulted in the invention of many basic, now-indispensable tools of biochemistry, such as the analytical instruments used to measure components of body fluids.

Cole himself chose lobar pneumonia as his special problem, a line of clinical research that engaged some of the Institute's most capable scientists. One of these investigators was Oswald T. Avery, whom Cole had chosen to carry on the crucial study of the chemistry of the infectious agent of pneumonia. In 1944, Avery—with Colin MacLeod and Maclyn McCarty—discovered that DNA is the basic material of heredity. Later, McCarty went on to become the physician-in-chief of the Hospital (from 1944 to 1974) and a vice president of The Rockefeller University. Now a professor emeritus, McCarty is still active in the Laboratory of Bacteriology and Immunology. For several decades, he was the co-leader of that laboratory, along with Rebecca C. Lancefield, who spent almost her entire scientific career at this institution, from 1918

until her death in 1981. To this day, her classification of more than 60 types of Group A streptococci is considered the single most important contribution to the medical understanding of streptococcal disease.

THE PRINCETON LABORATORIES

Flexner and the Board of Directors had agreed early on that the Institute should not limit itself to the study of human disease. In 1913, when an outbreak of hog cholera bankrupted many farmers in the West and seriously weakened the region's economy, the Institute was offered $25,000 to investigate the disease. The offer was considered by Flexner and Theobald Smith, one of the original seven members of the Board of Directors. They proposed the creation of a full-scale department of animal pathology and, in 1914, Rockefeller, Sr., pledged $1 million for the project. The directorship of the new unit was offered to Smith, who resigned from his chair in comparative pathology at Harvard to accept the post.

The Institute had already bought a tract of farmland near Princeton, New Jersey, across Carnegie Lake from the town and university. In the fall of 1915, in temporary laboratory space provided by Princeton, the research work began. A year later the Department of Animal Pathology moved into its own buildings. And in 1931, a division of plant pathology was established as part of a combined Department of Animal and Plant Pathology.

The department assembled a brilliant scientific staff that made important contributions to the understanding of plant and animal disease and won worldwide recognition for its leadership in opening up the chemistry of enzymes, initiating the study of virus particles, and advancing the understanding of cancer mechanisms and parasitic diseases in man.

A CHANGE IN LEADERSHIP

After three decades of service, Flexner, at the age of 71, announced that he wished to retire as soon as a successor could be chosen. Corner has summarized how things stood at the Institute in the spring of 1934.

> Looking about him as he went to his office every day, Flexner could see the four chief buildings housing twenty-two active Members, with twelve Associate Members, about thirty Associates, and sixty Assistants and Fellows—a staff numbering more than one hundred and twenty, which he had built up from the twelve who began work with him in the temporary laboratories on Lexington Avenue.... On the library shelves were an even hundred volumes of bound reprints, *Studies from The Rockefeller Institute*, reporting the researches of those years...and he knew

> that scattered through the heavy volumes were the records of achievement that placed The Rockefeller Institute in the front rank of the world's scientific institutions. He knew too that its influence as a training center for the universities had been incalculable. One hundred and fifty-two persons had gone out...to become professors and associate professors in sixty-two American universities, colleges, and professional schools, and twenty to equivalent positions in seventeen foreign countries.

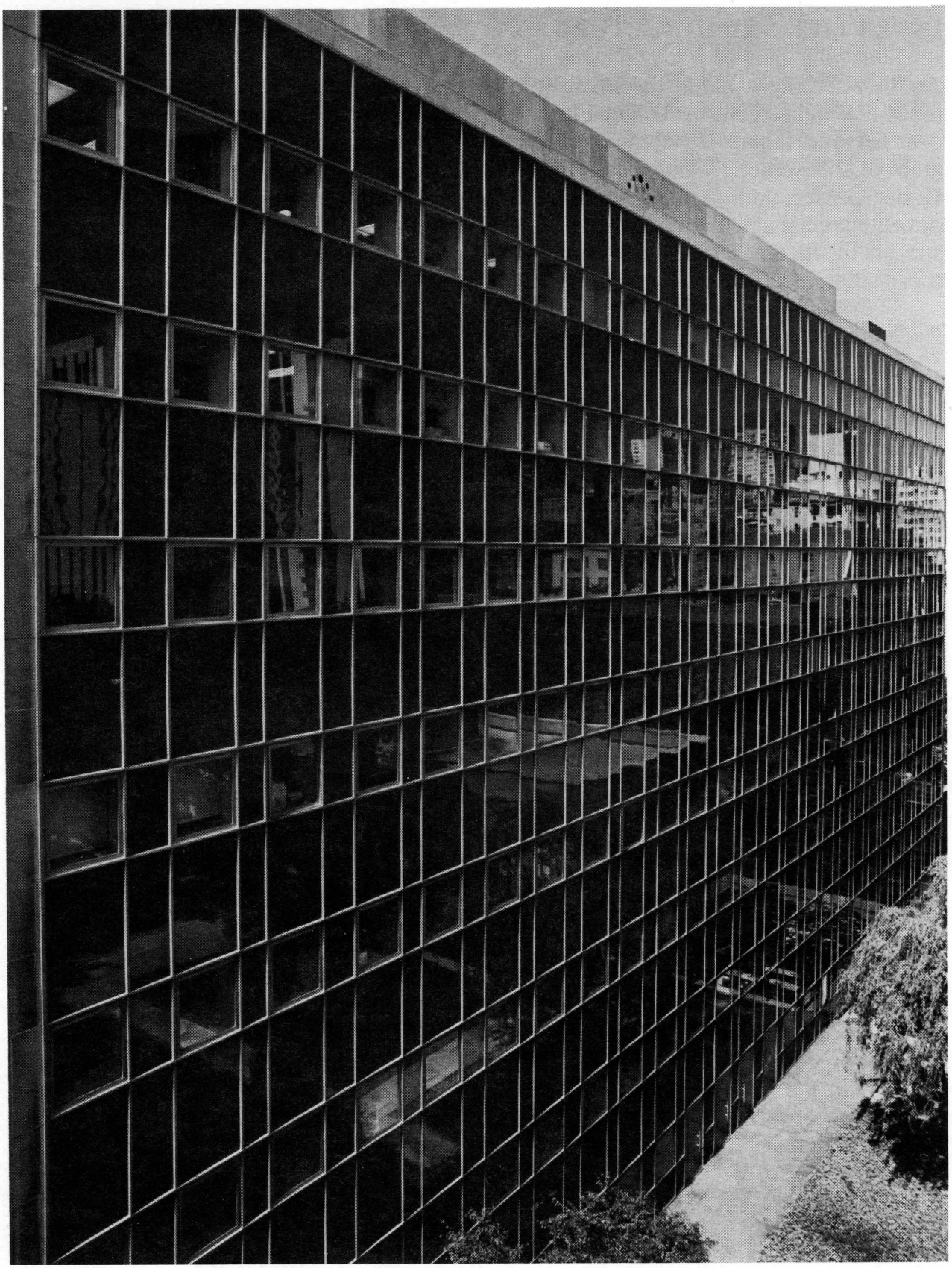
On October 1, 1935, Flexner's resignation became effective, and his successor, Herbert Spencer Gasser, took office. The scientific interests of the new director were wide ranging, and he had achieved eminence in the exacting field of neurophysiology. In 1921, at Washington University in St. Louis, he and his associates had been able to record single nerve impulses in detail and accurately measure them. At the time he was offered the Institute post, he was a professor of physiology, across 68th Street, at the Cornell University Medical College.

The choice of a physiologist to succeed a pathologist was taken by some, including the press, as signaling a major change in objectives. Gasser, however, noted that a shift in biological research had long been evolving at the Institute and elsewhere. After the remarkable advances brought about by research on infectious diseases, the time was ripe to step up the investigation of life processes at the level of the cell and its constituents.

Although Gasser foresaw no great changes in the composition of the Institute's staff, changes did occur. Using the rough index of staff titles, half the Institute's investigators at the close of the Flexner era were called pathologists and bacteriologists. At the close of Gasser's tenure, only one-third would be classified as pathologists and bacteriologists.

But the true nature of the changes that were to occur are best reflected in Gasser's research priorities. Under his direction, the study of proteins and their derivatives expanded until there were six laboratory groups working in this area, applying increasingly sophisticated physical and chemical techniques. Gasser encouraged more research in physical chemistry. In pathology and bacteriology, he favored the use of new methods oriented to basic, rather than applied, medical biology. And in his own field, Gasser brought in biophysicists prepared to apply electronic methods to nerve physiology. A source of knowledge and intellectual stimulus for his colleagues, Gasser himself continued his study of nerve conduction, sharing a Nobel Prize in 1944 for his work in this area.

The Detlev W. Bronk Laboratory is named for the distinguished biophysicist and neurophysiologist who broadened the scope of The Rockefeller Institute for Medical Research and guided its transformation into The Rockefeller University, serving as president from 1953 to 1968.



INNER LIFE AND STRUCTURE

As the scientific scope of the Institute broadened, subtle changes also occurred in its inner life and structure. Under Flexner, each Member—or senior scientist—had his own personal laboratory domain, with junior scientists devoting themselves to the program of their chief. When a Member retired or died, his group usually disbanded. Under Gasser, younger scientists had more opportunity to follow their own ideas and develop special skills and interests. Gasser encouraged a relaxation of intellectual restraints in the Rockefeller community. And, as director of the Institute, Gasser was more accessible.

Regardless of what his inclinations might have been, however, Gasser found himself administering a holding operation during most of his tenure. Though the Institute had come through the financial crash of 1929-30 relatively unscathed, it suffered a sharp fall in endowment income in the late 1930s and an operating deficit in 1939-40. The number of scientists of all ranks at the Institute fell from 134 in 1935-36 to 105 in 1941, as many of the vacancies created by retirement went unfilled. By that time, the Institute was becoming involved in the national defense effort being mounted for World War II. During the First World War, the Institute's staff and resources had been almost wholly given over to wartime assignments. During World War II, however, the Institute contributed to the war effort mainly by applying "its established lines of research to problems that arose in the emergency," according to Corner. This made the transition to a peacetime environment much easier.

The years from war's end to 1953, when Gasser retired, have been described as a period of progress along established lines. Gasser and his boards maintained the Institute's research standards and enabled the staff to devote more attention to fundamental science and open up new pathways of investigation in such broad areas as the chemistry of proteins, other basic molecules of life, the mechanisms of immunology and heredity, the nature of viruses and viral disease, and the components and energy systems of the cell.

Some of the major achievements of the Institute were credited to the Department of Animal and Plant Pathology in Princeton, where the staff included two Nobel Prize winners and almost a dozen Members internationally recognized as leaders in their fields. In 1947, however, the Board of Trustees discussed a proposal to close the Princeton laboratories, transfer most of their research to New York, and discontinue the rest or subsidize it elsewhere. The factors prompting this proposal were a falling rate of income from the Institute's investments, a rising budget (caused in part by duplication of facilities), and the physical separation of what some had come to regard as two distinct organizations. After considerable study and discussion, the Princeton laboratories were closed in September 1950. Approximately half of the members of the research staff chose to continue their work at the New York laboratories.

REAPPRAISING THE INSTITUTE

American medical science and The Rockefeller Institute for Medical Research grew up together. By the middle of this century, both had come of age, and scores of institutions were rivaling the Institute in one or more fields. For years, the Institute had stood almost alone, but now it faced serious competition for medical science's best and most promising investigators.

A significant factor in this change had been the hundreds of scientists trained at the Institute who had gone on to fill key positions at other institutions. During the Institute's first half century, approximately 650 persons had served on the research staff in ranks below that of Member. By 1953, 200 of them held full professorships or equivalent positions in research institutes, industry, or public service in 31 states and 16 foreign countries, where they helped to establish the ideals of medical research first championed by the Institute and a few medical schools.

At the same time, the scientific staff of the Institute had, by 1953, grown to 125, including guests and fellows. In addition, the administrative and supporting staffs, a mere seven persons in 1904, now totaled 410, in the laboratories, offices, hospital wards, staff residences, record rooms, kitchens, greenhouses, shops, and powerhouse.

Gifts from John D. Rockefeller, Sr., combined with funds from the Rockefeller Foundation, had given the Institute a $65 million endowment. By 1953, as a result of conservative management and a rising market in securities, the value of this endowment had risen to $107 million.

Now that the Institute had matured and flourished, questions arose about its future. This subject was uppermost on the trustees' agenda when Gasser retired in 1953. The times and his own temperament had not allowed Gasser to become the dominant leader that Flexner had been. But Gasser had distinguished himself as director by broadening the research program of the Institute and holding its staff together through a difficult period. In so doing, Gasser had exhibited a rare understanding of the values that best nurture the work of the scientific investigator.

In anticipation of Gasser's retirement, the trustees formed a committee to consider the future of the Institute. This committee was headed by the president of The Johns Hopkins University, Detlev Wulf Bronk, who was a member of the Rockefeller Board of Scientific Directors. Bronk, like his close friend Gasser, was a distinguished biophysicist known for his research on the electrical activity of nerve fibers. Bronk also had considerable experience as an academic administrator—first at Swarthmore, then at the Johnson Research Foundation of Medical Physics at the University of Pennsylvania, then at Johns Hopkins. A man of exceptional energy and zest for whatever project he undertook, Bronk had what amounted to a parallel career in public posts,

including three terms as president of the National Academy of Sciences, from 1950 to 1962.

In reappraising the Institute, the committee consulted more than a hundred top-ranking scientists and educators, but Bronk's views proved to be the most persuasive. In effect, the committee proposed that the Institute become a graduate university of science and that Detlev Bronk preside over the transition.

In 1953 the trustees voted to incorporate the Institute as a graduate university empowered to grant the degrees of Doctor of Philosophy and Doctor of Medical Science. Bronk was appointed president. At the same time, the trustees merged with the Board of Scientific Directors to form a single Board of Trustees. The chairman of the new board was David Rockefeller, who had succeeded his father as chairman of the former organization of trustees. The Institute received its new charter in 1954, but it was not until 1965 that it officially changed its name to The Rockefeller University.

FROM INSTITUTE TO UNIVERSITY

The transition from institute to university was not a revolution. Informally, the Institute had functioned as both an educational and a research institution. In fact, the early Institute offered one of the few equivalents of a scientific graduate education available in the country. The only revision of the original charter required in 1954 was the legal right to grant specific academic degrees. The scientific staff already included two of the three traditional components of a graduate school—faculty and postdoctoral fellows. In 1955, the admission of 10 graduate students provided the third component.

What lay behind the decision to enlarge the educational role of the Institute was a desire to avoid cultural isolation and inbreeding in the Rockefeller laboratories. Bronk himself argued that the Institute must welcome "our young successors to this community of scholars and gladly teach and guide them as they prepare for scholarly careers."

During the first decade of his tenure, Bronk personally interviewed most of the prospective students invited to the campus. The Institute, he said, should accept only those individuals whose commitment to advanced study and research matched the faculty's. Bronk also worked directly on every aspect of the academic program, assisted by a Faculty Committee for Educational Policies. A descriptive pamphlet written in 1956 still accurately conveys the spirit and nature of that program.

> The students are considered to be intellectually mature and are assumed to be capable of self-directed study. Accordingly, there is little formal instruction; teaching is mostly done in seminars, tutorial conferences, and in faculty research laboratories. Students have little opportunity to be passive recipients of

formal teaching; they have much freedom for the actual process of learning.

There was initial concern about how to turn an almost exclusively research-oriented scientific staff into a faculty involved in academic matters. The proudly borne title "Member of the Institute" was exchanged reluctantly for "Professor." Many Rockefeller scientists, however, expressed their interest in the new program at the very beginning. Later, the students drew in others when seeking advisers on the research required for their degrees. During the transition, freedom remained the keynote—for both student and laboratory head. The organization on the basis of laboratory units, in sharp contrast to the hierarchical departmental structure of most universities, was able to accommodate the new program without imposing on those scientists who did not want the formal obligation of guiding graduate students. That same structure held the burden of academic routines to a minimum for those faculty members who did take students.

Even commencement—or "convocation," as Bronk chose to call it—departed from traditional graduation ceremonies. At the first convocation in 1959, when five graduate fellows received degrees, Bronk said, "I have vowed that our commencement should be for those whom we would honor rather than for a speaker to the public which seldom listens." Accordingly, then and since, degrees have been conferred without oratory. Each student is formally presented by his or her research adviser, who summarizes the original work that qualifies the candidate for his or her degree.

In 1972, with the Cornell University Medical College, The Rockefeller University also launched a joint M.D./Ph.D. program designed to meet a pressing nationwide need for an educational program integrating scientific and medical interests.

As of June 1984, Rockefeller had graduated 443 men and women. At the time, approximately 95 percent of the University's graduates were engaged in full-time research and teaching; nearly 100 were full professors at universities all over the world; six held endowed chairs; and 30 headed departments or research programs at such leading institutions as the Harvard Medical School, Cambridge University, Memorial Sloan-Kettering Cancer Center, M.I.T., the National Institutes of Health, and the World Health Organization. Among this small but influential alumni body, two graduates have won Nobel Prizes.

WIDENING SCOPE OF RESEARCH

The transition from institute to university also brought a second major change: the extension of the institution's broad research programs in the biological sciences by the addition of laboratories in related behavioral sciences. To develop its behavioral sciences laboratories, the University appointed Carl Pfaffmann, a psychologist from Brown University who had been at the Johnson Foundation when it was headed by Bronk. Pfaffmann, who was made a vice president as well as professor, recruited

a group of highly regarded investigators in animal behavior and physiological psychology—two areas where biology and psychology converge. Though questioned at the time, the introduction of behavioral studies has progressively opened up opportunities for interaction with such traditional University disciplines as biochemistry, molecular biology, neurophysiology, and clinical studies.

In keeping with his model for a university of science, Bronk also recruited faculties in mathematics and experimental and theoretical physics—three groups that have since added much to the University's intellectual environment.

To round out the academic scope of the new university, Bronk introduced a small program in philosophy. A distinguished group of philosophers assembled on campus, and they in turn attracted a number of graduate students. This program, however, rarely interacted with the scientific programs, and it was discontinued when the economic pressures of the 1970s forced a readjustment of priorities toward the basic mission in the sciences.

In launching the new programs, Bronk restated the view that "the purpose of the Institute is to further natural science" and appended a reminder that "there is an especial emphasis on the life sciences and their application [to the] improvement of human welfare...."

The expansion of scientific and educational programs resulted in the addition of a graduate student body of about 100, a tripling of faculty and staff, and a building program that transformed the physical setting of the University. New structures included a graduate students' residence and a building with two wings: Abby Aldrich Rockefeller Hall, which provides a dining room, lounges, a library, and accommodations for visiting scientists; and Alfred H. Caspary Hall, which houses administrative offices, as well as meeting and seminar rooms. Connected with Caspary Hall is a domed auditorium seating 500. At the south end of the campus, a modern nine-story laboratory building and several smaller structures were also erected. The contrasting styles of two eras of architecture are harmonized by plantings, walks, and fountains.

By the time Detlev Bronk retired in 1968, it could be said that the University had proved it could handle its expanded role with distinction. In the words of David Rockefeller, "The transition was a great adventure." But, as he was to recall at a 75th Anniversary gathering in 1976:

> By the late 1960s the climate for science was changing, and challenges to traditional concepts of excellence were mounting. These, coupled with financial pressures compounded by inflation and an energy crisis, made it obvious that the University would have to face up to another reappraisal. Under these changing conditions, the University could not hope to sustain the rate of growth set in the previous decade and a half. Inevitably, there had to be a readjustment, a stabilization that would slow the

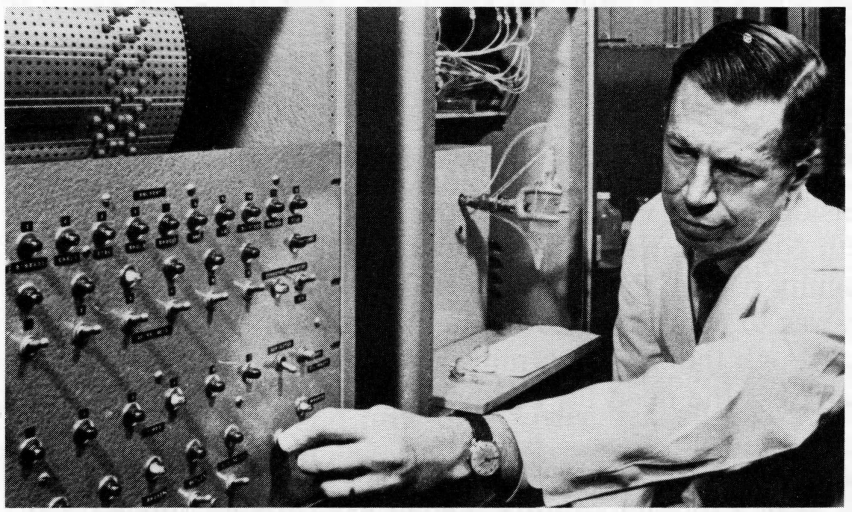
pace without eroding the University's unquestioned position of excellence.

Actually the reappraisal had begun in 1965 when Rockefeller divided the trustees into three committees to confer with outstanding figures in education and science. Bronk himself, believing that the faculty should play a greater administrative role, created a Senate, composed of all the senior faculty. The Senate then elected an Academic Council to act as a steering committee and to advise the president.

REAFFIRMATION OF MISSION

The ensuing readjustment was carried out under the leadership of the new president, Frederick Seitz, who had played an influential role in the development of solid state physics. Like Bronk, Seitz had served as president of the National Academy of Sciences. He had been on one of the trustee committees appointed by Rockefeller. Later, as president, he had the benefit of three in-depth studies. One, prepared by a group chaired by Trustee William O. Baker, concerned itself with guidelines for the University's long-range research and educational development and questions about its physical scope. A second group, headed by Trustee J. Richardson Dilworth, produced a study analyzing financial resources. A third group, led by Trustee Patrick Haggerty, integrated the two prior studies and carried the process a step further by drafting proposals to monitor the balance between programs and resources. Recommendations also developed from the deliberations of six faculty committees formed in 1969.

What emerged from all the discussions and studies was the primary conclusion—so often affirmed in the institution's history—that its mission should continue to be research in the biomedical sciences *pro bono humani generis.* Many of those consulted on the University's future also endorsed the conviction that the University should continue to provide first-rank doctoral and postdoctoral education for future leaders in basic and clinical research.



Bruce Merrifield won the 1984 Nobel Prize in Chemistry for developing a simple and ingenious method for synthesizing peptides and proteins. He is shown here with his automated peptide synthesizer in 1969, the year he and a colleague became the first scientists to synthesize an enzyme.

After two decades of growth, Seitz and the trustees believed that the institution had reached its optimal size. By the 1970s, the University community included approximately 200 regular faculty, more than 150 postdoctoral fellows, approximately 100 graduate students, and a supporting staff of 900. "Even if the economic picture were much more favorable," Seitz wrote in 1974, "most of us would continue to favor a dynamic steady state with natural expansions and contractions of programs.... We can remain independent and best in what we do only if we remain relatively small."

BROADENING THE BASE OF SUPPORT

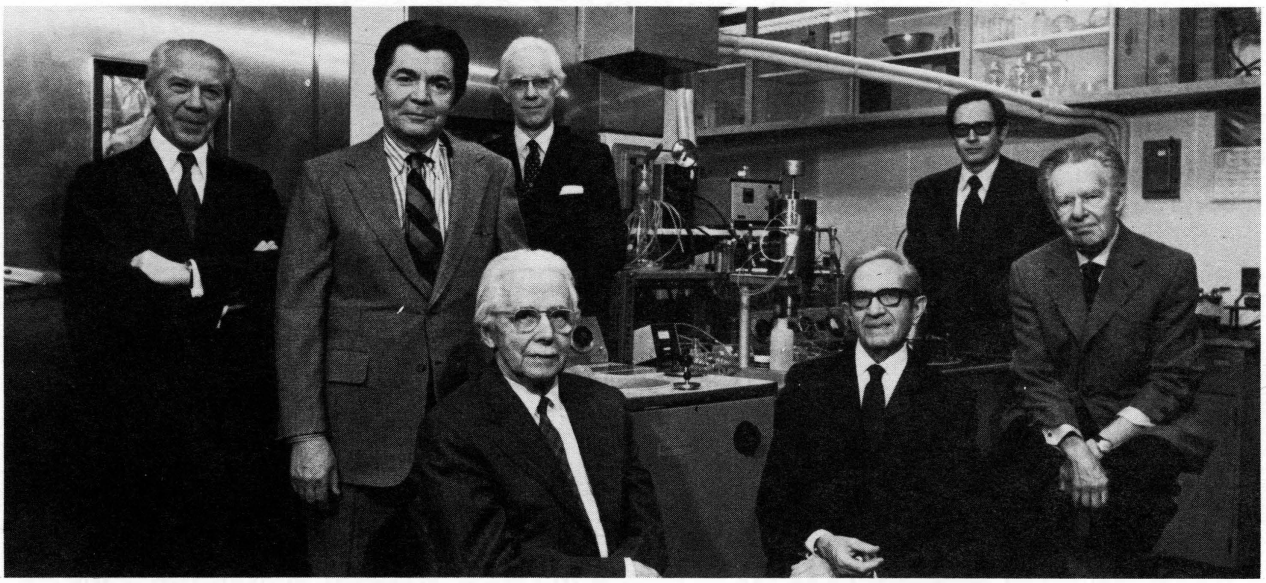
Despite its rapid expansion, the University had remained a relatively small institution. The growth in people and physical facilities, however, had led to an increase in the operating budget from $3 million to almost $28 million.

For more than 50 years the institution had operated entirely from the financial base provided by John D. Rockefeller, Sr., and broadened by subsequent additions from other Rockefeller family sources. By the late 1950s, however, it had become evident that the scope of the University's work and its importance to society had grown beyond the point where it was either practical financially or appropriate in principle to depend on such a limited base of private support. As a result, the University began to seek federal research grants. The high quality of the University's research attracted an ever-increasing percentage of federal support, but Seitz and the trustees became concerned that this could affect the University's free spirit and flexibility. They agreed that the best safeguard for the University's financial future was to develop an entirely new constituency of private donors. As a result, the University's first development program was launched in 1971.

By 1976, the year of the institution's 75th anniversary, Seitz was able to announce an encouraging financial outlook as a result of a comprehensive program that emphasized energy conservation, economies in services and administrative areas, and intensified fund raising. The following year, Seitz reported that the University's development program had opened up significant opportunities "to increase our investment in people." Private donors had established fellowships at both the doctoral and postdoctoral levels. At the senior level, seven named professorships had been created—the first in the University's history.

Another development of considerable significance was the construction of a 250-unit apartment house on the south edge of campus. The lack of adequate housing at affordable rents for junior faculty had by then become an increasingly difficult problem. Although the situation was to continue into the next administration, the new apartment house—financed through the State Dormitory Authority—represented an important initial attempt to address the need for additional housing.

These and other changes came about even as the leadership of the University changed. In the fall of 1975, after a quarter century, David Rockefeller stepped



Seven Rockefeller Nobel laureates were photographed together in 1975. Standing, left to right: Christian de Duve, George E. Palade, Stanford Moore, and Gerald M. Edelman. Seated, left to right: H. Keffer Hartline, Albert Claude, and Fritz A. Lipmann.

down as chairman of the board. He is, however, still closely involved with the University and, as chairman of the trustees' executive committee, he has pledged to devote himself to gaining support for the University from a wider public.

Rockefeller was succeeded as chairman of the board in 1975 by Patrick E. Haggerty, chairman of the board of Texas Instruments, Inc. When Haggerty died in 1980, he was succeeded by William O. Baker, the retired chairman of Bell Laboratories who had served as vice chairman of the Rockefeller board for 10 years.

NEW RESEARCH PROGRAMS

Through financial uncertainty and changing social and economic conditions, the University continued to remain at the forefront of the biomedical sciences. Under Seitz, new basic research programs were begun in reproductive biology, cell biology, molecular biology, and the neurosciences. Though not a cancer center, the University was engaged in an interdisciplinary cancer research program involving 15 laboratories. Researchers in such fields as genetics, virology, immunology, and basic cell biology investigated a wide array of carcinogenic determinants, including environmental pollutants, chemicals, damaged genes, viruses, and immune deficiencies. Meanwhile, the University's research hospital pursued related clinical studies.

At Millbrook, New York, the University established the thousand-acre Field Research Center for Ecology and Ethology, where behavioral scientists and biologists study a wide range of natural phenomena related to animal behavior and environmental biology. These scientists have made important progress in many areas, including the

understanding of the neurophysiological and hormonal mechanisms underlying behavior and its modifiability.

The 40-bed Rockefeller University Hospital underwent extensive renovation in 1975 when all open wards were converted to single rooms—a distinct advantage in the University's program of long-term studies of chronic or degenerative diseases. During the Seitz administration, investigators at the Hospital initiated several new lines of clinical investigation and engaged in a wide spectrum of studies of two basic types of disorders—metabolic and immunological.

The University's physical resources for research were significantly increased by the completion of the Tower Building, a seventeen-story laboratory complex, and a new six-story Laboratory Animal Research Center.

REWARDS AND RECOGNITION

Some of the most gratifying moments of the decade came with the awarding of three Nobel Prizes—two in 1972 and one in 1974—to six of the University's scientists. This recognition was also a testimony to the continuity of scientific leadership at the institution. Among the scientists honored was Gerald M. Edelman, a 1960 graduate of the Ph.D. program, who had been named a professor at the University in 1966.

On October 12, 1972, Edelman was notified that he would share the Nobel Prize in Physiology or Medicine with Rodney Porter of Oxford for their independent studies that led to the determination of the structure of immunoglobulins, the key molecules of immunity.

Eight days later, on October 20, 1972, Stanford Moore and William H. Stein were named corecipients (with Christian B. Anfinsen of the National Institutes of Health) of the chemistry prize for working out for the first time the complete structure of the enzyme pancreatic ribonuclease. In more than 30 years of research together, they had developed techniques for analyzing the complex structures of proteins. These techniques were put to use in laboratories around the world. Both Moore and Stein had achieved the title of Member of the Institute and continued, as Professors of the University, to be active contributors to the science of protein chemistry.

The 1974 Nobel Prize in Physiology or Medicine was awarded jointly to Albert Claude, Christian de Duve, and George E. Palade for their discoveries concerning the structural and functional organization of the cell. These discoveries were major contributions to the birth and coming of age of modern cell biology. Claude had spent 20 years at the Institute, Palade had come in 1946, and Christian de Duve had been a professor at the University since 1962.

NEW INITIATIVES

When Frederick Seitz retired in 1978, he was succeeded by Joshua Lederberg, a co-recipient of a Nobel Prize in 1958 for his work on the organization of genetic material in bacteria. Lederberg came to Rockefeller from Stanford University where he was chairman of the department of genetics, a professor of biology, and a professor of computer science. Active on a number of government advisory committees and boards dealing with environmental medicine and problems of mental health and retardation, he chaired President Carter's Cancer Panel. He also played an active role as consultant on the Mariner and Viking missions to Mars, sponsored by the National Aeronautics and Space Administration. One of the leading figures in the development of molecular genetics as a major catalyst in modern biological research, Lederberg had formed close ties with a number of Rockefeller faculty members and had been influenced early in his career by research discoveries made at the University.

An administration in progress is an unfinished story, but Lederberg, with the close cooperation of trustees and faculty, has moved to launch a set of new initiatives in research that will keep the University at the forefront of the biomedical sciences. In recent decades, Rockefeller has contributed heavily to the revolutionary developments in molecular biology and biochemistry. The new initiatives under way at the University are keyed to the opportunities that have emerged from these developments. Recent progress in mapping the human chromosome, for instance, is providing the key to deeper knowledge of genetic disorders, cancer, and aging. Molecular and biochemical insights can also foster better understanding of the brain and nervous system, help to show the way to advanced agricultural production, and uncover the causes of a broad array of diseases for which there are currently no effective approaches to prevention or cure.

In planning research initiatives and carefully selecting the leaders for new laboratories, the University has set three goals:

- to sustain the University's mission of fundamental research;
- to seize those research opportunities that relate directly to major unsolved human problems—fostering applications that will make a genuine difference in the world;
- to sustain research leadership by adding a younger generation of gifted scientists, replacing those who have retired recently or will retire during the next decade.

Between 1981 and 1984, the University established eight new laboratories, conducting research at the molecular level in biochemical genetics, plant biology, organic chemistry and biochemistry, parasitology, neurobiology, neurochemistry, and the biology of skin. The appointments of the outstanding leaders of these new laboratory groups, along with their gifted young colleagues, constitute the most important influx of first-rank scientific talent at the University in the past 20 years.

At the close of the 1983-84 fiscal year, the annual operating budget was in hard-won balance at a level of about $72 million. Federal support for research accounted for almost half of this total. Private sponsorship by individuals, foundations, and corporations provided approximately one-quarter. And endowment income accounted for the remaining quarter. Even without net growth, budgets will increase in the next decade, and the University will have to increase significantly the amount from private sources.

As President Lederberg has said:

> The task before us is not to be taken lightly. But we have a compelling message and a sound plan to communicate to prospective supporters, and the confidence that comes from knowing we are proposing investment in an enterprise that has always been productive of public good.

A LOOK BACKWARD

Frederick Gates was involved in virtually all the major Rockefeller philanthropies, but his favorite was the research center that resulted from his reading of Osler. Perhaps the best last words for this historical sketch are these from remarks he made at the 10th anniversary of the Institute:

> One day I chanced to be walking down Broadway with President Eliot (of Harvard). We were talking about The Rockefeller Institute and I ventured to confess to him that to me the Institute was the most interesting thing in the world. "Nothing," said I, "is to me so exciting, so fascinating as the work the Institute is doing."
>
> Dr. Eliot stopped short in the street and turned to me and said, with emphasis and emotion, "I myself feel precisely so. The Rockefeller Institute is to me the most interesting thing in this world." ...Why is it so?
>
> It is for one thing...because the values of research are universal values....

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