The Rockefeller University: Science in a Different Key

New York, New York. The institution which is now the Rockefeller University in New York City awarded its first degrees less than 7 years ago. But as heir to the property, faculty, prestige, and very considerable financial resources of the distinguished research institute which it supplanted, the new university was born both rich and influential.

The original Rockefeller Institute for Medical Research, established just after the turn of the century, exerted a strong shaping force on the development of modern research in medicine and the life sciences in the United States. While circumstances in research have changed drastically since the Rockefeller's early days, the new university, into which the institute evolved, could play a unique role in graduate education.

The original institute was founded during the period of grand benefactions by Rockefeller and Carnegie, which established the pattern for "big" philanthropy in the United States. Creation of the institute in 1901 followed by a decade John D. Rockefeller's endowment of the University of Chicago and preceded his establishment of the General Education Fund and the Rockefeller Foundation.

In bringing the institute into being, the founder apparently expected it to become an arsenal for an attack on infectious diseases. One of the first acts of the institute—which in its earliest days was a pioneering grant-giving agency—was to pay for a study of the milk supply of the city of New York. The conditions exposed were so appalling that the study led directly to a strengthening of sanitary controls on milk. The elder Rockefeller and some of his advisers were highly pleased by the result and seem to have expected Rockefeller scientists to continue on the path of applied research. The institute was growing up in a golden age of bacteriology, and members of the staff did make a number of contributions which had immediate and sometimes dramatic application. But from the outset, and particularly after the institute occupied its first permanent building, in 1906, a tendency to concentrate on fundamental research grew steadily stronger. This trend was tolerated by the founder and, in fact, handsomely supported. The Rockefeller family maintained a close interest in the research institute, and David Rockefeller is now chairman of the university's board of trustees.

The institute was modeled on the European laboratories presided over by such dominating figures as Pasteur, Koch, and Pavlov. The decision not to attach the Rockefeller Institute to a university seems to have been due at least in part to the underdeveloped state of research in these institutions and also to a wish to avoid involvement in the internecine conflict then raging in American medicine over the allopathic versus the homeopathic systems of treatment.

The Flexner Era

The institute was to attract a galaxy of men distinguished in medical research, many of them European born and trained. It was never dominated by a single scientist, as the European institutes were. It seems generally agreed, however, that Simon Flexner, director from 1903 to 1935, gave the institution its essential form and set its scientific course.

Flexner, himself a pathologist and bacteriologist, was a very strong personality with a clear conception of what he wanted. To him is attributed exposition of the principle for which the Rockefeller came to stand in life-sciences research: the application of the achievements of biochemistry and the physical sciences to biology.

Flexner's successor, Herbert S. Gasser, director from 1935 to 1949, presided over the institute during the period interrupted by World War II, when many Rockefeller scientists turned to wartime applied research. In this same period it became clear that many of the lessons taught by the Rockefeller had been learned and were being vigorously applied in university and medical-school research laboratories and that the institute no longer so securely occupied the position of innovator which had accounted, in part, for its eminence.

After the war the trustees and board of scientific advisers began to consider what appropriate course the institute might take in the future.

As it had done in the days of Simon Flexner, the Rockefeller found, at the same time, both a new plan and the man to carry it out. Detlev W. Bronk, a trustee during the period of reappraisal, headed a committee to develop recommendations on the institute's future. The proposals strongly reflected Bronk's ideas. The trustees liked the ideas and recruited Bronk, then president of Johns Hopkins, to preside over the transition of the research institute into what amounted to a new kind of educational institution for the United States, a graduate university in the natural sciences.

As a scientist, Bronk, now 67, had anticipated the recent tendencies toward crossing of disciplinary frontiers. A graduate student in the 1920's, his interests shifted from physics to physiology, and his Ph.D. from Michigan was a double-barreled one, signed by the chairmen of both departments. He went on to work at Cambridge with the famous physiologist Lord Adrian, and the collaboration produced papers praised, in the specialized vocabulary of the researchers, as "elegant work."

Bronk's career as an academic administrator seems to have been useful preparation for his task as an innovator at Rockefeller. As a young professor of zoology and dean of men at Swarthmore in the mid-twenties he helped Frank Aydelotte organize the college's honors program for undergraduates. In 1929 Bronk became first director of the Johnson Research Foundation of Medical Physics at the University of Pennsylvania, a post he held until he became president of Johns Hopkins.

By any criteria—offices held or honors received, for example—Bronk has long been a member of the inner circle of the American scientific establishment. During World War II he served as coordinator of research in the Air Surgeon's Office. At one time in the early 1950's, in addition to being president of Johns Hopkins he was president of the National Academy of Sciences–National Research Council, a member of the National Science Board of NSF, and president of AAAS. He holds more than twoscore honorary degrees from

universities and colleges here and abroad and is a foreign member of the national academies of science, or their equivalents, in six other countries. He continues to be called on as a consultant in Washington and he holds a full portfolio of university and foundation trusteeships.

How Bronk has managed to meet these heavy commitments while guiding the development of Rockefeller is an obvious question. First, he is a man of exceptional energy and zest, accustomed to working long and late. He also delegates authority, looking for competent people and then expecting them to handle their jobs. But perhaps most characteristic of Bronk's mode of operation is his reliance on friends, many of them of long standing. Bronk started out when American science was a comparatively small enterprise and when everyone, almost literally, knew everyone. Bronk has many friends, and he feels that friends should be able to depend on each other for information, advice, and help. Whenever possible, he has carried his preference for the personal into his activities as one of the builders of Big Science and into his work as president of Rockefeller.

One of the men Bronk remembers fondly as a friend and mentor is Abraham Flexner, educator, author of the famous report on medical education, and an influential foundation executive. Bronk found many of Flexner's ideas on graduate education congenial and adapted them for use at Rockefeller; this is oddly appropriate, since Abraham and Simon Flexner were brothers.

In the 1920's Flexner, even then an elder statesman in education, argued that the mixing of undergraduate and graduate education in American universities imposed the conditions of the former on the latter, to the detriment of graduate study. Flexner believed that a graduate school should assume no parental or disciplinary responsibility for its students; in general, he felt, the less regimentation the better. He saw as the ideal organization for graduate education a genuine community of scholars, with the student in the role of apprentice but with no sharp divisions maintained between students and faculty.

Furthermore, Flexner questioned whether a university should aspire to a full range of graduate and professional schools. He suggested that an institution should seek to do a limited number of things very well. As he put it in an article in the *Atlantic* in 1925, "the very incompleteness of single institutions will force all real universities to view themselves as parts of one great organic whole."

With its strength in the life sciences and its resources in faculty and finances, the Rockefeller Institute appeared to offer a superb foundation on which to build this sort of alternative to the multiversity. The problem, as one senior administrator put it, was to take an idealized situation and make it a policy.

The shift to graduate education actually required no total metamorphosis of the Rockefeller. Since the early days of the institute young scientists, many of them M.D.'s with an inclination toward research, had come there to work with senior members of the institute. This traffic, in fact, had been a major factor in the transmission of Rockefeller

Present Rockefeller University campus covers six blocks. Buildings of original institute line bluff above East River.

influence. Under the new dispensation at Rockefeller these "guest investigators" fill many of the functions of junior faculty. And their number has doubled from 34 in 1955–56 to about 70 today.

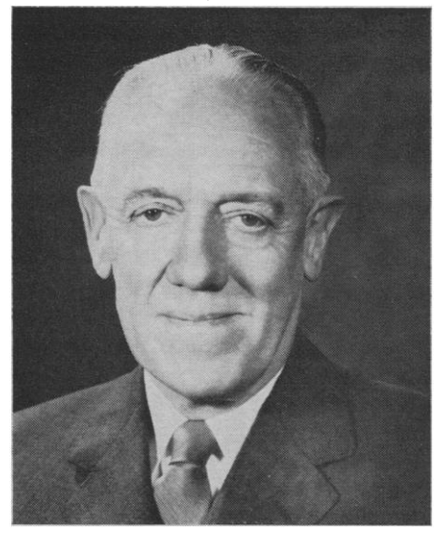
Emphasis in the new educational program, however, is on the graduate fellows. In 1954 the charter of the institute was changed, and the Rockefeller became a part of the University of the State of New York with authority under the Regents to grant the Ph.D. and Doctor of Medical Science degrees as well as honorary degrees. At that point, when its purposes were broadened, the name of the institution was shortened to the Rockefeller Institute. Last spring, to accord with changes and aims the institution became The Rockefeller University.

There were ten students in 1955. A total of 118 students currently hold fellowships. Between 25 and 30 students are accepted each year. Students with M.D. degrees are in a decided minority; there are usually three to five in each new class. This year five of the 25 first-year students are women. All are on full fellowships.

Maximum independence for students is the policy at the university, and the success of the policy depends heavily on the selection process. It is typical of Bronk that, in the university's formative years, he has relied heavily, in selecting students, on the opinion of sponsors who know the new university and are known there. Students are chosen not only for their ability but for their suitability for the Rockefeller program. Qualities of maturity and independence are emphasized. As the catalog puts it, "students must be capable of self-directed study." In the beginning, transcripts were not even required, but, as the number of applicants has grown, the common formality of asking for undergraduate grades has been instituted.

The mechanics of graduate study at Rockefeller University differ substantially from the conventional. The usual requirement of a quota of course work leading up to preliminary exams, which are followed by research leading to a thesis is varied at Rockefeller.

During the first 3 months of a fellow's initial year he is involved in what is known locally, though not officially, as the "orientation course." This amounts to lectures, seminars, and less formal discussions ranging across the natural sciences and into the adjacent precincts of the behavioral sciences.



Detlev W. Bronk

The aim is to help the student put his special interest in broader perspective, to acquaint him with the opportunities around him, and to expose him at close range to the distinguished scientists at the university.

A graduate fellow is expected, in effect, to propose his own curriculum. After the orientation period, if he is not ready to plunge into self-directed study and research—and many are not—he may select a combination of courses, tutorials, and independent reading. Courses at Rockefeller are different in that faculty members are moved to give them more through interest in a particular subject than from an intention to fill out a mosaic of graduate offerings. The courses do, however, offer a familiar recipe of lectures, seminars, problem sessions, and laboratory work.

There is, of course, no undergraduate college at Rockefeller, and students must make up deficiencies as they can. The level of courses offered is suggested by one course in mathematics for students not working in mathematics. It is called Remedial Calculus.

The Rockefeller graduate fellow follows no fixed timetable but is encouraged and expected to establish contact with the faculty with a view to finding faculty members who will advise him and one in whose laboratory he wishes to do his research.

Students may request permission to take the equivalent of preliminary exams, but one checkpoint which all must pass is a set of oral examinations to be taken not later than the beginning of the student's third year of residence. In the life sciences the student is expected to demonstrate not only a satisfactory general development as a scientist but a competence in three fields related to his special interest. In the orals, as in the case of some other requirements, a process which some faculty and students term a "tightening up" seems to be in progress, and it is expected that written examinations will become more common.

The judging of a student's progress still rests primarily with the faculty who have contact with him, and faculty members are encouraged to file reports on students they have had in lectures, seminars, and tutorials. The student submits an annual report on his research and other activities. There is no conventional marking system.

Freedom is the keynote. A student may work for weeks or even months with a particular investigator and then withdraw, apparently with much less trauma than would be likely in another setting. As one young chief of a laboratory said, "the student is not committed to the lab nor the lab to the student."

No Departmental Structure

This sort of flexibility is abetted by the organization of the university on the basis of separate laboratories operated by accomplished investigators and their associates, as contrasted with the hierarchical departmental structure of most universities.

Freedom can bear heavily on the fledgling scientist, however. As one graduate fellow expressed it, "If you know what you want to do, OK. If not, it can be harrowing." A fairly familiar phenomenon among Rockefeller students is what the same student called a "crisis of confidence." The crisis is likely to occur when the student is called on to demonstrate his ability to operate on his own as a scientist. At Rockefeller the experience comes early, but it can be compared with the time when the conventionally trained postdoctoral fellow must initiate his own research unaided.

At the young university the attrition rate does not seem excessive. Since 1954 there have been about 220 appointments to fellowships. Through last June there had been 73 graduates, and there are still 118 holders of fellowships. This leaves 29 unaccounted for. Many of these have moved to graduate schools which offer more specialized programs, and they have fared well. Rockefeller

fellows have come from about 70 colleges, universities, and medical schools.

Location and physical surroundings unquestionably contribute to the university's character. The campus occupies some 14 acres of premium real estate overlooking the East River in New York's East Sixties. In the immediate vicinity are the Sloan-Kettering Institute for Cancer Research, Cornell Medical College, and the New York Hospital. The neighborhood is a fast-changing one, with shabby old five- and six-story walkups giving way to modern apartment buildings, many in the luxury category but almost all with graceless exteriors. Midtown galleries, theaters, and concert halls are near at hand.

On the campus, three laboratory buildings and a 50-bed hospital built before World War II have been extensively remodeled and reequipped. A modern nine-story laboratory and office building costing $3.5 million (including some $650,000 in federal funds) has been built at the south end of the campus, and more laboratory space is being constructed above the power plant.

Social Engineering

Two buildings, one old, one new, particularly symbolize the changes at Rockefeller. In the pre-war Welch Hall is the dining hall where students and faculty mingle at long tables to eat a mildly subsidized lunch and talk interdisciplinary shop. The building also houses a library, now open 24 hours a day, with a collection which is growing rapidly in size and in breadth of subjects. A cafeteria downstairs stays open until midnight to serve its late-working clientele. Until relatively recently it was impossible to get into the library or buy a cup of coffee after regular office hours.

The new building actually has two sections, which form an architectural whole. Caspary Hall in one wing has space for senior administrative staff, meeting and seminar rooms, and a connected auditorium which seats 500 and is used not only for lectures but for the university's excellent concert series.

The other wing is Abby Aldrich Rockefeller Hall, which provides an inviting common ground for students and faculty, with a dining room open for breakfast and candle-lit dinners and with formal and informal social rooms and library. The hall provides comfortable accommodations for visiting scientists, domestic and foreign, making Rockefeller an even more attractive place for distinguished callers and a favored spot for meetings of scientists in New York.

The campus landscaping, the furniture and appointments of the social rooms, and such touches as a handsome David portrait, in the library, of Lavoisier and his wife and bold abstract expressionist canvases prominently displayed give the impression that the university is well financed—and, in fact, it is.

The market value of the university's investments, as of 30 June 1965, was $211.3 million. With roughly 450 faculty and students (including guest investigators) to be considered, this, of course, makes the per capita resources impressive. The operating budget for the year which ended in June amounted to $8.1 million, exclusive of expenditures of funds from outside grants. Some $1.3 million from income was placed in reserve. Construction at Rockefeller has been financed on a pay-as-you-go basis out of institution funds and gifts.

The research program supported by outside grants has grown steadily. In 1954–55 it amounted to $57,000. In 1964–65 the total was $3.4 million. More than half these funds came from the National Institutes of Health.

While to many in struggling graduate schools life at Rockefeller would seem affluent, investigators at Rockefeller deny they are engaging in science deluxe. They argue that the strong administrative and technical support services at the university make it possible to avoid the waste, delay, and confusion that afflict many university research operations. But most acknowledge that the availability of institutional funds provides a base not enjoyed by investigators in many other places, who must rely almost entirely on grant funds for their research.

There seems to be a general feeling among graduate students that they are a privileged lot. They are chosen under a highly selective process, the surroundings are pleasant, and their fellowships are full-time study fellowships, continued, as one administrator put it, "for as long as students are considered to be making progress in research or intellectually." The fellowship carries a stipend of $2500 a year ($4000 for M.D.'s) plus $1000 a year for such incidentals as books and summer travel and study. The allowance for children is generous. If graduate students bring along fellowships from the government or from other sources, the university supplements these to the extent necessary to put all fellows on an equal footing. Guest investigators, most of them in the postdoctoral phase, are expected to have outside support.

Some of the students bridle at what they consider the paternalistic system, or the "formality" which decrees jackets and ties for men, and skirts rather than trousers for girls, in the dining rooms. A few take exception to the wall-to-wall comforts provided, or the social system that sets apart the Ph.D.'s, present and future, from the technical and secretarial staff. But it is difficult to find any student who faults the opportunities for research or the quality of work and instruction at Rockefeller.

An extraordinary 2-to-1 ratio of faculty to students is the foundation to the Rockefeller system. The question of whether or not this system is justified is of concern to many at the university, including Bronk himself.

Perhaps the most succinct statement of the rationale of the university's educational program is found in a quote, which Bronk often cites, from a past editor of the *Atlantic*, Ellery Sedgwick: "One can influence many by inoculating the influential."

At Rockefeller, which has been a center of the work in cell biology and genetics that has dominated biology since the war, a deliberate effort is being made to open new frontiers in "behavioral biology." This effort will be discussed in a later story in this space.

Judgment Deferred

The real test of Rockefeller as a university depends on the future performance of its graduates. Their association with Rockefeller's distinguished faculty, which numbers three Nobel prize winners and 36 members of the National Academy of Sciences among its 40 or so full professors and 10 emeriti, should prepare them for achievements in research. Students at Rockefeller are chosen, in part, for their desire and potential to pursue careers in university teaching and research. But the aim is even higher at Rockefeller, where the ideal is the scientist who is not only a broadly educated and civilized man or woman but one who feels a responsibility to work on issues of science and public policy. Rockefeller's program can, therefore, properly be judged in the future by the influence exerted by its graduates both in the laboratory and beyond.—JOHN WALSH