Rockefeller Braces for Baltimore

The selection of David Baltimore as the university's next president has prompted soul-searching among the faculty about the institution's future

ON 17 OCTOBER, David Baltimore stood before the faculty of Rockefeller University as its president-elect. He spoke of the beauty of the midtown Manhattan campus' "abundant trees" and said he was refreshed by the "cooling green of the tended lawns." Baltimore said that the "calming influence of the campus" played a role in his decision to accept an offer from the Rockefeller board of trustees to succeed Joshua Lederberg as president. "For me, coming here is coming home," he said.

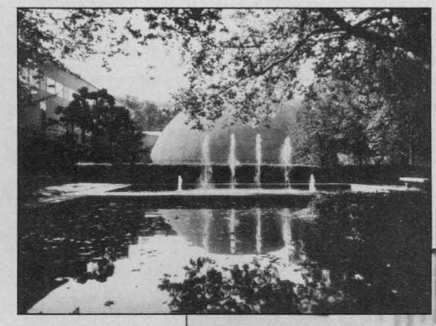
While Baltimore spoke of being refreshed, the faculty was still tense from a fight over his appointment that not only had half of the university's 50 full professors in open opposition but that had spilled onto the front page of *The New York Times*. While Baltimore, who was born in New York and earned his Ph.D. from Rockefeller in 1964, talked about coming home, many faculty members were wishing he would stay in Cambridge where he is director of the 6-year-old Whitehead Institute at the Massachusetts Institute of Technology.

The ostensible reason for the opposition lay with Baltimore's now infamous run-in with Congressman John Dingell (D–MI) over the handling of a research paper whose validity had been challenged by a postdoc. Baltimore fought back, taking the position that the dispute had been dealt with by the institutions involved and that "science should not be debated in the halls of Congress."

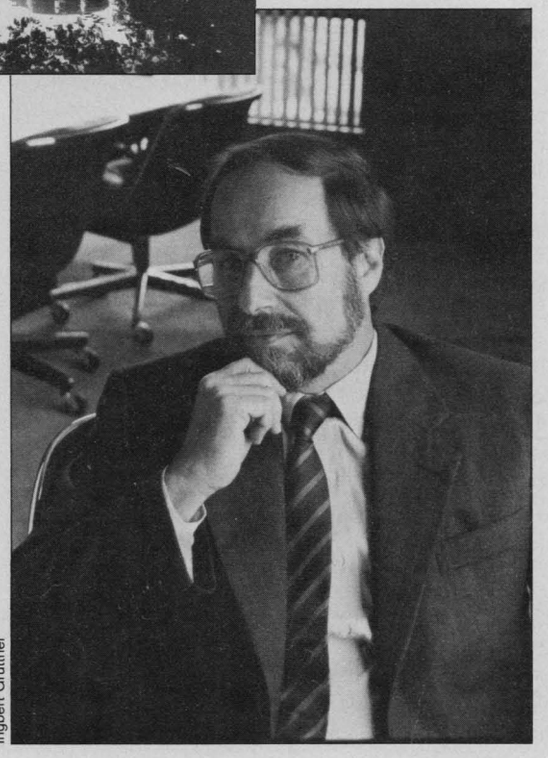
Some faculty see the episode as evidence that they are getting as president a man who "gets his back up" and lacks the demeanor they associate with a Rockefeller president. Others see his encounter with Congress as evidence that Baltimore has the backbone to take on tough issues—like those he will inevitably face as soon as he takes office in July.

Rockefeller University is an institution whose strengths and vulnerabilities are rooted in its unique traditions. Its full professors are akin to powerful medieval lords with a vested interest in keeping the monarchy in line. But Baltimore is likely to prove a powerful king and it is the premonition of change that lies deep behind some faculty members' opposition to the president-elect.

Rockefeller today is challenged by many of the problems that face research institutions nationwide: money, for instance, and an aging professoriate. It also faces problems that derive from the traditions it cherishes. A small corps of full professors means there is little room at the top for aspiring younger researchers. Its lack of traditional academic departments encourages professors to build empires around themselves.



David Baltimore. *Even as a student he was "renewed by the tranquility and beauty" of the Rockefeller campus with its fountain and abundant trees.*



Ingbert Gruttner

Once the most illustrious of American medical research institutions, and still preeminent to be sure, Rockefeller nonetheless needs to be rejuvenated. Nearly everyone from trustees to faculty agrees on that.

The question, put somewhat dramatically by E. D. G. Cohen, is simply this: Can Rockefeller afford to continue to exist?

Cohen is a theoretical physicist expert in the theory of fluids. He was recruited more than 25 years ago when president Detlev Bronk transformed the Rockefeller Institute for Medical Research into Rockefeller University, expanding its intellectual horizons to include physics and mathematics and, briefly, philosophy.

"Rockefeller University is an experiment in education," Cohen told *Science*. "It is not a normal university at all. Normal universities educate 'the people.' We have only 100 graduate students. We educate only the elite. Therefore, to justify our existence, we need to be really excellent. Our relevance in the long term is not absolutely sure. There is a fear that Dr. Baltimore will change us. He may have to."

Assuring the future quality of Rockefeller is David Baltimore's challenge. Says one trustee, "I think he's a brave man to take it on."

"Ironically enough, Rockefeller University's greatest liability may be its name," says university president Lederberg, who, like Baltimore, is a Nobel laureate. "We're three times larger now than we were when John D. Rockefeller founded this place in 1901. We can no longer live off Rockefeller's patrimony."

But an institution with an endowment of some $500 million, 15 acres of riverfront property between York Avenue and the East River that may well rival Rockefeller Center in value, and a professoriate that numbers fewer than 50, is hard pressed to convince potential donors to put Rockefeller at the top of their charitable lists.

"Let me tell you a story," Lederberg said recently in a wide-ranging conversation with *Science*. "I have a friend who

makes donations to Rockefeller in six figures. And we are grateful. But recently she made a donation to another institution in eight figures. Why? Because they took care of her daughter who was sick. In giving, it is the heart that matters. We can't compete with the heart."

With only a small research hospital, Rockefeller has never had the luck to rescue a wealthy patient from the brink of death. It has no football team to fuel the loyalty of the rich. It graduates only some 25 Ph.D.'s a year and so has but a small body of alumni. "It is not a group of millionaires," Lederberg laments.

As he prepares to relinquish the presidency of Rockefeller after a decade in office, Lederberg is clearly anxious to leave a legacy of "fiscal equilibrium," by trimming $2 million from the operating budget.

But the real issue facing Lederberg's successor is not how to balance the books but how to change the way Rockefeller is structured and run.

From the time Lederberg moved into the president's office a decade ago, it was evident that he is not a man with either the inclination or social graces to court potential donors. Nor is he a man whose talents lie in fostering institutional esprit de corps. Detlev Bronk, a former president, is remembered for giving dances. His successor, Frederick Seitz, entertained frequently at the president's house on the river—like Gracie Mansion one of the few freestanding residences in Manhattan.

But Lederberg concerned himself more exclusively with things of the mind—with books and computers and scientific meetings. "Josh is just not a social being," is the way colleagues put it. A friend, not wishing to be quoted by name, said this: "Josh was not entirely comfortable as president. He knew there were fundamental things that needed changing but he felt stymied. Administratively, he kind of gave up early on."

Baltimore, by contrast, is a social being who says one of his explicit goals is to bring the "Rockefeller community closer together," both to improve morale and to stimulate imaginative, cross-disciplinary ideas in research. And he knows that may not be easy. "My most immediate goal is to heal the wounds that have been opened," he says. And he wants to "increase the teaching role of the university."

As a student himself in the 1960s, Baltimore is remembered for his brashness and arrogance. The old guard recalls that Baltimore never gave a professor more than one or two chances to impress him as a teacher. "Lord Baltimore," they called him.

Baltimore, for his part, relishes students who place high demands on their teachers. "Graduate students today seem to lack that fire lots of us felt," he observed in a recent interview with *Science*. "Students are technically much better trained than we were but they're much less inclined to challenge their elders. It's a loss."

Everyone who goes to Rockefeller goes to do research. Rockefeller offers no courses. It does not encompass all fields of science within its walls. Rather, it is organized around individuals and their scientific predilections.

The university phone book says it all. Everyone is identified by the professor he works for. Only D. Martin Carter runs a lab that is identified by its activity—investigative dermatology—rather than its chief.

From the outset, Rockefeller has organizationally been more like a medieval university or a Germanic institute than an American institution of higher learning. Each professor follows his own path, runs his own fiefdom, selects his own lab members (there are no women among Rockefeller's full professors), and reports directly to the university president.

This, it is said, is Rockefeller's strength. But it is also its weakness.

Among the issues in Rockefeller's future are these:

■ **Young faculty.** The faculty is aging. The "herr professor" system is more congenial to herr professor than to young scientists who are not willing to be buried for life under a banner bearing someone else's coat of arms. In fact, Rockefeller has not done well at recruiting young scientists in recent years. As professor David Luck told *Science*, with the system the way it is, at Rockefeller "associate professor is just a bastard term for a prolonged postdoc."

Because it is organized around the laboratories of stellar individuals, and because it has no formal tenure track and few tenured positions, young researchers have a hard time establishing their identity at Rockefeller.

One attempted solution has been the creation of a "university fellows" program in which researchers with five or so years experience are recruited not by an individual lab head but by the university at large to come and establish a laboratory in an area that is not already strongly represented on campus. Although the program has existed on the books for years, it was recently reinvigorated when James Darnell and Luck took it upon themselves to recruit fellows in the name of faculty renewal.

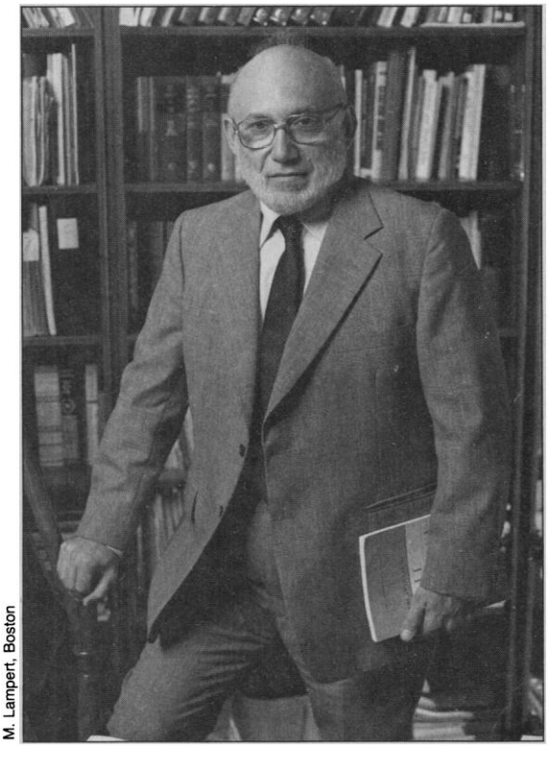
Fate helped out when two senior professors retired and one died, freeing up precious laboratory space for younger workers. "Physical space was an important element in getting things started again," says Luck. "It was important to offer these people space of their own so it would be clear they were not an appendage to someone else's lab." It seems to be working.

■ **Endowment versus grants.** Unlike most American universities, Rockefeller's full professors get their salaries from "hard" money from the endowment. The Rockefeller professors do not have to grub for grants in order to get paid, although the size of their research labs is dependent on grant money.

Paying faculty from university funds is, Lederberg thinks, an expensive and outmoded tradition. But the faculty does not look kindly on the idea of changing things. "It is a very emotional issue around here," says Lederberg.

Norton Zinder speaks for the rest when he says, "If faculty salaries have to come out of grants, Rockefeller would no longer be unique. What's the point then?" The issue is, perhaps, more important symbolically than financially because it stands for an idea of security and intellectual freedom that is best captured by what John D. Rockefeller said at the beginning of the century:

"Don't be in a hurry to produce anything practical. If you don't, the



M. Lampert, Boston

Joshua Lederberg. *A strong advocate of David Baltimore as his successor.*

next fellow will. You, here, explore and dream."

That philosophy, which researchers hold to be the very essence of good science, is the antithesis of life in the modern world of grantsmanship which is said to be more likely to go for the sure thing than an idea that is no more than a dream.

Still, an increased emphasis on getting grants may be part of the future. According to executive vice president Rodney Nichols, Rockefeller has a total budget of $100 million a year. Half of the money comes from grants. One-quarter comes from private foundations, and the other quarter comes from endowment income.

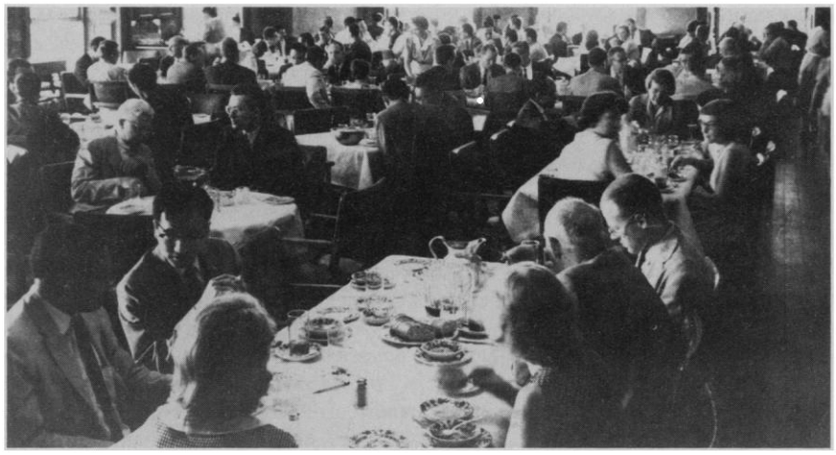
Baltimore, in his early talks with faculty members, roused the fearful specter of the Grants Man when he asked why Rockefeller has not jumped on the AIDS bandwagon and has not embraced the project to sequence the human genome—both projects that are currently prominent. They are, indeed, areas where there is money to be had in the grants business and some people express the fear that Baltimore will try to alleviate fiscal problems by pushing the biological faculty to "go where the money is." His supporters, of whom there are many, put it differently. "He may push them to keep up with the leading edge," said one.

■ **Physics and mathematics.** Detlev Bronk's dream was to see Rockefeller turn into a real graduate university—a place where biology was preeminent, perhaps, but where physics and mathematics and chemistry could also flourish. In 1953, Bronk began the process of conversion that culminated in 1964 when the institute was formally renamed Rockefeller University.

So what to do about physics and math? About one-quarter of Rockefeller's full professors represent those non-biological sciences.

Physicist Cohen reports that "Baltimore says he has to think about the future of physics here." "It is the least directly associated with the biomedical sciences," Cohen admits, "but physics being here is part of the essence of this place. The presence of physics could be very important," Cohen says, "but we don't know that. We can't know what new ideas will be triggered. If Dr. Baltimore says we should be focused only on biology, I may disagree with him but I can't prove he's wrong," says Cohen. "Only the future will tell."

In the late 1970s when Seitz was president, the university faced a similar question about the philosophy department that had taken root under Bronk. A small but eminent department of four philosophers was judged too expensive to maintain in light of competing claims to money from the scientists. The philosophers were asked to go. Will physics and math go now?



In the good old days. *Friendships and scientific insights were born over lunch at Rockefeller. Researchers of all stripes came together for spontaneous discourse that often lasted well into the afternoon. Baltimore hopes that sense of shared community needs can be reborn.*

■ **The hospital.** In the beginning, the Rockefeller Institute for Medical Research was the envy of American medicine. Its hospital, which admits only patients whose diseases match its ongoing research, became the model for the vast Clinical Center Hospital at the National Institutes of Health in Bethesda.

"There was a time," says physician Jules Hirsch, whose patients often stay at the hospital for a year or two at a time, "when 50% of the nation's major medical leaders passed through the Rockefeller hospital." Indeed, for decades, Rockefeller was *the* place. "It set a style and standard for clinical research at the bedside."

It was at Rockefeller that Simon Flexner first transmitted polio to monkeys in 1906. Techniques for perfusing organs outside the body were developed at Rockefeller, where Alexis Carrel kept a chicken heart "alive" for an incredible 34 years.

René Dubos discovered the antibiotic gramicidin at Rockefeller. "Henry Kunkle invented clinical immunology here," Hirsch remembers. Vincent Dole and his late wife, Marie Nyswander, pioneered in the use of methadone for heroin addicts in the 1960s.

More recently, Hirsch's group discerned the genetic and molecular basis of obesity.

Despite its continuing successes, the Rockefeller hospital has lost some of its luster. It has only four major clinical research labs and, like the rest of the university, is in need of an infusion of young talent. "We need to identify five or six really imaginative young guys and let them run this place," says Hirsch, who thinks it would be a terrible mistake for the university to close the hospital on the grounds that it costs too much and that the real advances in medicine are coming from the labs of molecular biologists anyway.

Hirsch is a passionate advocate of clinical research who believes that it is still possible to advance medicine by studying sick people. "I'd like to put in a grant to look at patients who have diseases that no one can solve. But if I put in a grant like that, they'd lock me up. But the real problems of society, like understanding behavior and addiction, mean we should once again be at the front lines of clinical research."

Nevertheless, Hirsch realizes that one money-saving choice Baltimore could make would be to close Rockefeller hospital and find ways for its physicians to see patients at New York Hospital which is just next door or at Memorial Sloan-Kettering right across the street.

Even though the hospital has substantial support from NIH, it costs the university about $1 million in hard money every year and that, alone, makes it vulnerable.

"Yes," says Baltimore, "the future of the hospital is something to be considered but I haven't made up my mind about that or any other program yet."

■ **Biology.** Last but hardly least on the list of tough issues that Baltimore has to face is the basic biology that constitutes the very essence of Rockefeller. Once preeminent in fundamental biology, it is said that the molecular era that was ushered in by recombinant DNA has passed Rockefeller by. "Molecular biology never took off here," says cell biologist David Luck. Although Rockefeller has some labs that are on the cutting edge of the molecular revolution, university-wide "we've been ac-

cused of missing the boat and that's fair," he says.

Will David Baltimore try to turn Rockefeller into a molecular enclave?

If anything, Baltimore is a dyed-in-the-gene molecular biologist. He shared the Nobel Prize in 1975 with Howard Temin for the discovery of reverse transcriptase—the unpredicted enzyme that converts RNA to DNA. (He now recalls with pleasure that he got word of his prize at Rockefeller where he was a visiting professor that year.) The Whitehead Institute is the very model of a successful modern bastion of molecular biology and Baltimore is still very active in the lab. He and his Whitehead colleagues reported just last month the discovery of a gene, RAG-1 or recombination activating gene, that may exert control of the immune system's ability to make antibodies in an infinite variety of shapes and forms.

Because Rockefeller is so comparatively small, it is not difficult for one man to put his mark on the place. Baltimore will have an added advantage there because of a controversial decision that Lederberg and the trustees have already made to build a 12-story research tower out over East River Drive. The Howard Hughes Medical Institute, which signed a research agreement with Rockefeller in 1986, will pay for four stories. The university has to come up with an estimated $12 million for the other eight, which is why the decision to put scarce resources into steel and mortar rather than existing labs has been the source of some resentment on campus.

In theory, those eight Rockefeller floors could be assigned to physicists or mathematicians or nonmolecular biologists, but the decision lies with the new president and no one has much doubt that Baltimore will use the space to move Rockefeller according to his own vision.

Baltimore insists that his vision is only now taking shape. Keenly aware of the division his appointment has caused, he says that he is "determined to spend the next few months just visiting the campus and listening." In this regard, a former colleague observes that the controversy over his appointment may turn out to be the best thing that could have happened to Baltimore or to Rockefeller. "Sometimes David talks when he should be listening," he says. "Now I think he realizes he's got to listen."

Physicist Cohen captures the essence of the challenge ahead. "What Rockefeller needs is a president who is wise in the biblical sense. To win a Nobel Prize doesn't mean that you are wise even though you are smart and clever. We will see how wise David Baltimore is."

■ BARBARA J. CULLITON

How the Soviets Got the H-Bomb

On 31 October 1952, the Pacific island of Elugelab disappeared in a blinding flash. Its spectacular demise was brought about by the world's first thermonuclear explosion, a U.S. hydrogen bomb test code-named "Mike." Just 3 years later, the Soviet Union followed suit with a thermonuclear blast of its own, and the arms race completed another lap.

It has long been popularly assumed that Soviet scientists managed to stay so close in the hydrogen bomb race in part because they were handed details of the early U.S. work by the atomic spy Klaus Fuchs. But a new, revisionist history published in the January/February issue of *The Bulletin of the Atomic Scientists* suggests that some of the information passed along by Fuchs was worse than useless. According to this account, the Soviets actually gained their crucial insights into hydrogen bomb design by analyzing fallout from the Mike test.

Written by Daniel Hirsch, a physicist who heads the Los Angeles–based Committee to Bridge the Gap, and William Matthews, an astrophysicist at the University of California at Santa Cruz, the new narrative relies heavily on a secret memorandum penned in 1952 by nuclear physicist Hans Bethe, which has recently been partially declassified. The memorandum fills in some key details in the history of the U.S. hydrogen bomb effort, in particular highlighting the crucial role played by the mathematician Stanislaw Ulam. A similar account of the U.S. efforts, written by Thomas Cochran and Robert Norris of the Natural Resources Defense Council, will be published later this year in the 1990 edition of the *Encyclopaedia Britannica*.

During the late 1940s, the U.S. program focused on a concept relentlessly pursued by Edward Teller. In essence, Teller's idea was to use the enormous temperatures generated by a fission bomb to ignite a fusion reaction in deuterium. A critical feature of Teller's so-called "Super" bomb was the addition of a small amount of tritium, which fuses more readily than deuterium, to get the fusion reaction going. Fuchs, a British national who worked at Los Alamos between 1944 and 1946, took part in early discussions of the Super. In 1950, he confessed to spying for the Soviet Union; 4 days later, President Truman authorized work to proceed on the hydrogen bomb.

Within weeks of Truman's directive, however, calculations done by Ulam showed that the Super concept was fatally flawed. According to Bethe's memo, Ulam found that Teller had seriously underestimated the amount of tritium required to initiate fusion and it later became clear that the fusion reaction would probably not be self-sustaining anyway.

Having helped demolish the Super, Ulam went on to provide a key insight that ultimately led to the successful design. Drawing on his own research on fission bombs, he proposed focusing the shock waves from a fission explosion to compress deuterium fuel. Teller responded by taking the idea on a different tack, suggesting that radiation released by the fission blast be used to compress deuterium. It was this concept that was incorporated into the Mike test. In a covering letter to his memo, Bethe wrote, "the designs for which we now expect success are almost exactly the opposite of those proposed in 1946," to which Fuchs had access.

If Fuchs' espionage led the Soviets up a blind alley, how did they recover so quickly and find the correct route? Hirsch and Matthews suggest that evidence from the Mike test steered them in the right direction. The immense compression generated inside the device would have resulted in a very high density of neutrons formed by nuclear reactions. These neutrons would be readily absorbed by heavy nuclei in the compressed material, leading to the formation of unusually large numbers of elements with high atomic numbers.

The Russians' detection of these elements would have led them to conclude that extreme compression had been generated in the device. In addition, Bethe said in an interview, "if you analyze the debris carefully, you could tell it was a two-stage device." From those two facts, he says, the Soviets could have concluded that the compression was generated by a primary fission blast. Indeed, Bethe says he was told that British scientists conducted just such an analysis of fallout from Soviet tests, and this led them to their own hydrogen bomb design.

Thus, if Hirsch and Matthews' account is correct, Fuchs' espionage may have added political impetus to the H-bomb race, but technical analyses of radioactive dust really pushed it along.

■ COLIN NORMAN