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