

Joshua Lederberg receives honorary doctorate of science

Professor Emeritus Norton Zinder introduced Sackler Foundation Scholar Joshua Lederberg, who was awarded a doctor of science honoris causa at this year's Convocation. Excerpts of Zinder's remarks appear below:

Joshua Lederberg was born to do science. When he was 7 years old he expressed an interest in being like Einstein. However, at Stuyvesant High School he joins the biology club. He takes a new direction from then on in his area of interest: biology, all of biology!

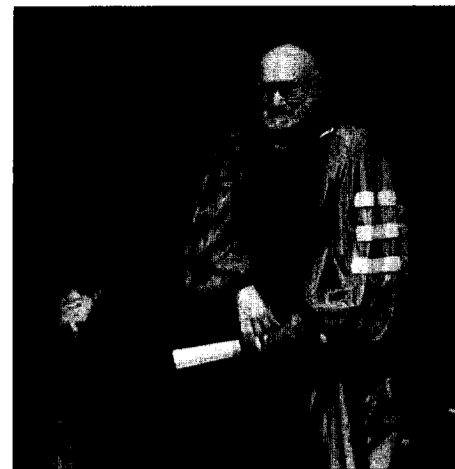
At Columbia College during the early war years, too young to be drafted, he works with Francis Ryan on *Neurospora* genetics. Graduating, he enters the Navy's medical program at Columbia.

Stimulated by the work here at RU on pneumococcal transformation, he decides to look for genetic exchange: sex in bacteria. Learning from Ryan that Yale has the requisite bacterial mutants that would allow him to test the ingenious scheme he had devised for seeking sex in bacteria, he takes a leave from the program, never to return.

In the spring of 1946, within two months of his arrival at Yale, he has shown that the bacterium *E. coli* can exchange genetic material. We now know that the *a priori* probability that the strains he used would be sexy was less than one in 30. He then continued to a doctorate at Yale.

In a stroke of genius, R.A. Brink, a corn geneticist at Wisconsin, hired this 22-year-old as an assistant professor of genetics. (For those of you who don't know, modern genetics was born in the Midwest, with Lederberg, Benzer, Luria, Levinthal, Novick, Szilard and Spiegelman, all at the Midwest's land grant state schools. Only when they had become famous and had created modern genetics did the coastal schools steal these scientists away.)

I arrived in Josh's lab 51 years ago. For the next years, that lab was the site of a burst of invention and discovery perhaps nowhere ever equaled in experimental science. First was a procedure for isolating easily the necessary mutants for all other experiments. Then, in no particular order, two bacteriophages, P22 and lambda, which were to be early on the most studied of all phage, were discovered; associated with them was general and specific transduction; the means for transferring genes from one bacteria to another via phage vectors, nature's recombinant DNA. They also had the ability to insert themselves into the next



Sackler Foundation scholar and RU President Emeritus Joshua Lederberg received an honorary doctorate of science at this year's convocation.

host's genome, presaging in totality the mechanism of action of the cancer-causing viruses. Also found were accessory bacterial chromosomes or plasmids containing many interesting genes, including those which promoted bacterial conjugation, sex at high frequencies. The genetics of the genes that caused fermentation of the sugar lactose was developed (a system later exploited by Jacob and Monod to develop their classic studies on gene regulation). At the center of it all stood the 26-year-old Josh, while circling around were two graduate students: his then-wife, Esther, and the 22-year-old, me. We were later joined by Bruce Stocker, a scientist from the U.K. and Larry Morse, another graduate student. It was quite a place and quite a time!

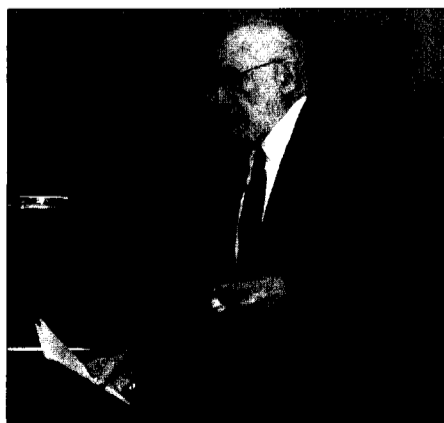
Josh's interests broadened. He was one of those who changed the theory of antibody formation from the instructive (directed protein folding) to the elective (preformed and then selected antibodies). This was no mean feat considering that the former theory was backed by such as Linus Pauling. Moving to Stanford and with the arrival of the space program, Josh became interested in and coined the term exobiology. Wisely he cautioned the government not to contaminate space. Perhaps not so wisely, he worried about reverse contamination.

Computers became a major focus of his interests, and with Ed Feigenbaum he developed the first expert systems beginning with the facts of organic chemistry then moving on to medicine and computer-aided diagnosis.

In 1978, he became president here at Rockefeller. After a complicated 1970s, the university needed replenishment. He recruited Jan Breslow, Martin Carter, Tom Kaiser, Paul Greengard, Bob Roeder and Torsten Wiesel, who was our last president. Later in his term, he expanded the fellows program and created the first truly independent junior faculty, some of whom are currently tenured professors.

His service to both the government and the academic community in terms of advisory committees are far too numerous to mention as are the many awards he has obtained, including the Nobel Prize and the President's Medal of Science.

However, all in all, I believe nothing would make Josh happier than to be able to teach a computer to answer questions the way that he does. It is with great personal pleasure that I present for the degree of doctor of science *honoris causa* Joshua Lederberg, one of the most important and most influential scientists of any time.



Among Lederberg's many projects is the National Emergency Health Plan Support System, the first ever physician-driven Internet National Early Warning System for infectious diseases. He spoke on this topic at a conference at Rockefeller University on Mon., May 24.