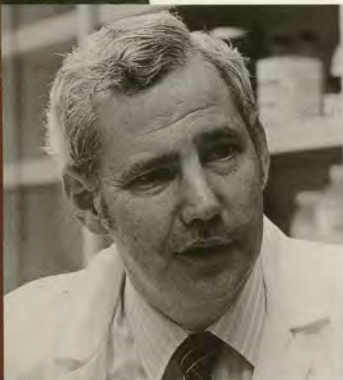


# STANLEY FALKOW, PHD

Recipient of the Maxwell Finland Award for Scientific Achievement 1999

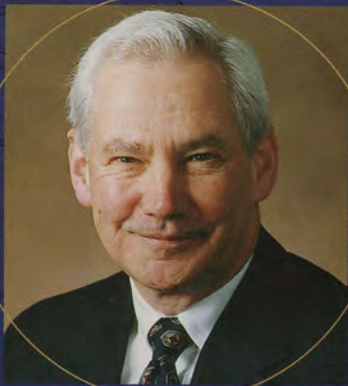


With the advent of the antibiotic era, it became popular to regard infectious diseases as a thing of the past. But in fact they are the leading cause of death worldwide. Investigating the ways that bacteria infect the host and cause disease remains a highly relevant public health endeavor. Few people have played a greater role in advancing our knowledge of this process than has Stanley Falkow, PhD, this year's recipient of the Maxwell Finland Award for Scientific Achievement.

Dr. Falkow, professor of microbiology and immunology at the Stanford University School of Medicine, is widely known as the father of the field of pathogenesis—the study of how infecting microbes and host cells interact to cause disease. By adopting highly unconventional perspectives—for

example, viewing infection as a process that ultimately is mediated by the host—Dr. Falkow has made startling findings such as the discovery that infectious microbes employ genes that are activated only inside host cells. The fruits of his work range from clinical applications, such as a new vaccine for whooping cough to such fundamental advances in knowledge as the discovery of how cells are penetrated by bacteria.

“Dr. Falkow has made an indelible mark on the field of infectious disease research in the second half of this century,” says Jon S. Saxe, president, Protein Design Labs, Inc., Fremont, CA, and an NFID Trustee. “[For] over four decades, Dr. Falkow has pioneered infectious disease research through his recognition of the role plasmids play in the development of antibiotic resistance and by originating the field of microbial pathogenesis, basic findings which reverberate throughout the study of infectious mechanisms. As did Maxwell Finland,



Dr. Falkow has trained a generation of researchers, many of whom have since advanced to leadership roles in academia and industry."

Dr. Falkow has been called the bacteriologist's bacteriologist. But he is far from a conventional investigator of microbial disease. "He looks at life from the bacterium's point of view," says David Relman, MD, a former student of Dr. Falkow's and an assistant professor of medicine at Stanford. "Stanley really feels that bacteria are his best friends. I think he likes most bacteria more than most people."

"He has a great way of looking at things from the point of view of the microbe," adds Mr. Saxe. "He asks: 'What if I were a staphylococcus—what would I do to survive?' That's how he addresses scientific questions."

Stanley Falkow was born in Albany, New York. When he was 11 years old his lifelong interest in microorganisms was stimulated by reading Paul de Kruif's book,

*The Microbe Hunters*. "That's what got me started," he says. In 1951, he went to the University of Maine where he graduated with a bachelor's degree in bacteriology.

During the summers, he worked with a hospital pathologist, assisting at autopsies and learning how to identify microorganisms and associating them with specific diseases. He graduated with a master's degree in biology and received his doctorate in 1961 from Brown University. From there he went to the Walter Reed Army Institute of Research in Washington, DC, and then to Georgetown University Medical School where he was professor of microbiology. In 1972, he moved to the University of Washington and, in 1981, to Stanford University School of Medicine.

"He was probably the first American to investigate antibiotic resistance.

Dr. Falkow studied the genetic packets called plasmids (the critical factors that transmit resistance), demonstrated the role they play in the development of resistance, and then showed how the plasmids were passed from one bacterial species to another, conferring resistance," says Mr. Saxe.

But, Dr. Falkow says, "In those days we didn't have the experimental tools to study how microbial genes interact with the host. But with the advent of recombinant DNA  
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Dr. Falkow continued from page 3 technology—and I was very lucky to be part of the birth of that development—I began to see that this was going to provide the key to study pathogenicity. So, around 1978, I had a group of incoming graduate students begin the research on different organisms at the genetic level to try and understand pathogenicity.”

This work has now advanced to the point where bacterial genes can be identified and tested to show when they are active in the host cell. Some bacteria activate genes only when they need them, such as to enter a host cell. The practical potential of this work is that if these genes could be identified and neutralized, then that bacterium would be unable to enter the host cell and cause disease.

This approach has given new insights into how bacterial pathogens infect the host, how it changes in response to the pathogen, and how the pathogen changes the cells it comes into contact with. “The results have reverberated throughout the study of infectious mechanisms,” says Mr. Saxe.

Dr. Falkow says that there has been “a renaissance in bacteriology. It has been the thrust of my work for the past 20 years or so, and it’s been fairly successful.” Dr. Falkow attributes much of his success to the talented students “who really did the work. They went on and continued in the same area.” As a result, the field has grown, he adds, and “my contribution has been to train a lot of very good people.”

This view is not shared by others in the profession. “He’s modest,”

Dr. Relman adds. “One of the things he likes to talk about are the people who worked for him. He makes it so clear and genuine that he is simply there to help you discover things. He acts as a facilitator, rather than as a dictator or a formal teacher. He helps you to see what you are working on.”

“[Dr. Falkow] has trained a whole generation of microbiologists, and his influence has extended well beyond the Stanford campus,” continues Dr. Relman. He recalls how much fun it was working in Dr. Falkow’s lab. “Stanley is so captivating that many of his students have stayed in science when they might not otherwise have remained more than a year,” he says. “When Stanley turned 60, there was a celebration attended by about 100 of his former students. The list of those who were there reads like a Who’s Who of the world of microbial pathogenesis,” Relman says.

It has been said that we live in a world of microorganisms, and Dr. Falkow suggests that there is a great battle going on between man and microbes. Mr. Saxe says, “There is no question in his mind about who’s going to win; it’s only a question of when. Stanley views his role as just postponing the day when microbes will conquer everything.”