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Laudatio: In Celebration of the 80th Birthday of Maurice R. Hilleman, Ph.D.

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Ladies and gentlemen, friends and colleagues, it is an extraordinary honor to be a part of Maurice Hilleman's 80th birthday celebration. My remarks will be brief, but my preparation for them has been long since I have had the privilege of knowing Maurice and interacting with him for many years. I also have been thoroughly fascinated by reading the historical accounts of Maurice's career. In this regard, I have also had the pleasure of recounting the history of Maurice's accomplishments at several ceremonies where he has received awards over the years. For those of you who were present at those occasions, you will be reminded of some of the things that I said then. For those of you who were not there, I hope that you enjoy hearing about a side of Maurice with which you may not be familiar.

For instance, I never knew how fortuitous it was that Maurice made it to college at all, much less that he became an eminent scientist. Growing up on a farm in Montana during the decade of the Great Depression, Maurice learned from an early age that personal reliance, individual responsibility, and hard work could produce tangible results. In his family, the concept was to put in a 7-day work week with Sunday morning off to go to church, or, in Maurice's words, "to work like hell." But despite this work ethic, college was not in the cards for many Montana farm boys back then, and when Maurice graduated from high school he considered himself lucky to enter a management training program at the local J.C. Penney's store.

Starting at the bottom at J.C. Penney's, he spent a lot of time helping cowpokes buy presents for their girlfriends. He said that cowpokes made about $1 per day, so $5 was about all they could spend on a present. So he would always take the cowboys over to the ladies department and help them pick out chenille bathrobes which cost about $5. Like everything else he has done, Maurice excelled at selling ladies' apparel—he sold a lot of chenille bathrobes in that summer of 1937! If J.C. Penney's had offered stock options, Maurice might still be there now.

As luck would have it, toward the end of the summer he thought more about college and had his high school records sent to Montana State College—who promptly wrote back to offer him a 4-year scholarship! The rest is history. Maurice went on to Graduate School at the University of Chicago, spent 4 years at Squibb, 10 years at Walter Reed, and more than 40 years with Merck.

For those of you who are not scientists, let me attempt to put Maurice's career and accomplishments into a readily understandable context. I and many of my colleagues present tonight have had the opportunity to serve on juries for a number of scientific prizes where groups of peers sit around a table and attempt to appreciate and rank the accomplishments of nominated scientists. A common experience is that an individual has made what appear to be elegant scientific contributions, but you are not sure how important and relevant these contributions really are.

Then, very, very rarely, you run into someone whose list of accomplishments shines out at you like headlights from an automobile. With Maurice Hilleman, it is not only headlights shining at you; it is like getting hit by a Mack truck. Most scientists would be thrilled to have achieved only one of the scores and scores of Maurice's accomplishments.

Let me put it another way: as the sports fans in the audience know, three of the all-time great professional athletes in their respective sports—Michael Jordan in basketball, John Elway in football and Wayne Gretzky in hockey—recently retired. Jordan, Elway, and Gretzky would routinely perform feats that seemed al-

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most superhuman. Sportscasters would inevitably comment that these great athletes were in "another zone"—a zone that most of us "mere mortals" never enter. Maurice has been in another zone for most of his professional life, a zone that most of us can only marvel at from a distance. Only, unlike Jordan, Elway and Gretzky, retirement does not seem to be on the Hilleman agenda any time soon!

One can say without hyperbole that Maurice has changed the world with his extraordinary contributions in so many disciplines: virology, epidemiology, immunology, cancer research, and vaccinology. His accomplishments in disease prevention are unparalleled. His pioneering work on conjugate vaccines, combination and recombinant vaccines, adjuvants to enhance the scope and duration of immunity, and many other concepts have brought us into vaccinology's golden age.

The vaccines he and his colleagues developed have saved the lives of literally millions of children and adults and improved the lives of countless others. Due in no small measure to Maurice's work, the life expectancy at birth in more and more countries has increased remarkably. In the United States, for example, the average life expectancy has lengthened by more than 30 years since 1900.

The vaccines developed by Maurice, and by many others based on the concepts he elucidated, also have greatly reduced the burden on health care delivery systems in both developed and developing countries. This has added immeasurably to the economic prosperity of the world.

It is truly remarkable to consider the proportion of our most important vaccines that can be attributed to the work of Maurice and his outstanding colleagues, particularly those at Walter Reed and Merck. In his 55-year career, Maurice has guided more than 40 vaccines along the arduous path from promising concept to licensed product. These include measles, mumps, rubella, pneumonia, meningitis, chickenpox, and the first vaccine against a cancer-causing agent, hepatitis B.

The list goes on and on, but let's discuss just a couple. One of Maurice's most important triumphs was the development of a vaccine against rubella, also known as German measles. Today, rubella is extraordinarily rare in this country; fewer than 1000 cases have been reported in the past few years. When I was in medical school, however, the picture was very different. For example, from 1963 to 1965, the United States suffered one of its worst rubella outbreaks ever. During those 3 years alone, rubella caused at least 20,000 fetal and infant deaths and afflicted another 20,000 children with permanent brain damage. Undoubtedly, many of you remember the anguish caused by this disease, especially during that epidemic in the early sixties.

During this period, Maurice and his team had isolated rubella viruses and developed means of weakening or attenuating them such that they could be safely used as a human vaccine. After extensive preclinical and clinical testing, Maurice and his Merck team launched their live-attenuated rubella vaccine in 1969, and a feared repeat (or worse) of the 1963–1965 epidemic never occurred. The world finally had an effective weapon against a disease that struck fear into the hearts of pregnant women everywhere.

Maurice's most important vaccine was developed with the help of his daughter Jeryl Lynn. Jeryl Lynn came down with the mumps in 1963, and after Maurice and his wife Lorraine tended to their 6-year-old girl and made her comfortable, Maurice took saliva samples to his laboratory. From these samples, he isolated the "Jeryl Lynn" strain of mumps virus that formed the basis of a mumps vaccine first licensed in 1967 as well as the mumps component of the measles-mumps-rubella vaccine widely in use today. Like rubella, cases of the mumps are very rare today, with only a few hundred cases reported each year in the United States.

There are many other stories I could tell you, and they deserve telling, because very few people, even in the scientific community, are even remotely aware of the scope of what Maurice has contributed. This is particularly true of the younger people, many of whom are completely unaware of the enormity of his contributions or even of who he is. I recently asked my postdocs whether they knew who had developed the measles, mumps, rubella, hepatitis B, and chickenpox vaccines. They had no idea. When I told them that it was Maurice Hilleman, they remarked: "Oh, you mean that grumpy guy who comes to all of the AIDS meetings."

In this regard, in addition to his achievements in vaccine development, Maurice has made many seminal contributions to basic science, which are sometimes overlooked in discussions of his career. He is, for example, the discoverer or codiscoverer of several viruses including hepatitis A virus, SV40, and several adenoviruses and rhinoviruses. His work with SV40 and adenovirus 7 have contributed important insights into cancer biology.

He also has illuminated a great deal of what we know about influenza viruses, including the phenomena of antigenic shift and drift. These insights enabled him to detect and correctly predict the Asian influenza epidemic of 1957. In prototypic Hilleman fashion, he initiated the vaccine production effort, which led to the production of 40 million doses of vaccine that saved countless lives in the fall and winter of 1957.

From my perspective as an immunologist, Maurice's work with interferon is among his most interesting. He purified and characterized interferon, and subsequently illuminated its induction by double-stranded RNA. I really could go on and on. It would amaze you.

And all this from a country boy from Montana who, believe it or not, flunked arithmetic in first grade!

Over the past several years, Maurice has taken a leading role in our search for a thus far elusive vaccine against HIV. It is in this context that I have had the privilege to know Maurice as a colleague, close advisor, and dear friend. He had already long been a role model for me. As the person who probably knows more than anyone alive about vaccine development, he has helped to define in a coherent way the obstacles to developing an AIDS vaccine and the steps that academia, industry, and government must take together to achieve that goal. Indeed, Maurice is one of the few individuals I know who can transcend the borders between industry, academia, and government.

Maurice's extraordinary accomplishments cannot be readily dissociated from his personal style. To have accomplished what he has in a single lifetime requires a special kind of vision. Maurice has described his approach to problem-solving as "cutting the Gordian knot." As you may recall, in Greek mythology a peasant named Gordius was made King of Phrygia, as a result of the fact that an oracle had proclaimed that the next king would appear in a wagon. Gordius and his wife fortuitously pulled into town in a wagon shortly after that proclamation. In appreciation, Gordius dedicated his wagon to the oracle, and tied it in place with an intricate knot. It was said that the person who could untie the Gordian knot would become the ruler of all Asia, but all who tried, over several centuries, failed.

When Alexander the Great came to Phrygia he took a more direct approach: he cut the Gordian knot with a single swipe of his sword, and went on to be the ruler of all of Asia. "Cutting the Gordian Knot" has come to mean solving a problem by bold and simple means, and in my mind is an apt metaphor for Maurice's career and personal style.

As many of you know, Maurice is not an individual who minces words; his personality is, shall we say, irascible and straight-shooting. In an interview in the Merck archives, he is asked about the one thing in his life of which he is most proud, he replied that "it is being able to survive while being a bastard."

Maurice of course was being quite unfair to himself. In reality, his ability to cut to the heart of an issue has sped many a meandering advisory committee to a fruitful conclusion. Indeed, I often wish that I could bottle Maurice like some sort of genie that I could carry around with me to some of the countless meetings and bureaucratic activities that we in government must endure. When things got bogged down, I could release Maurice from the bottle and let him loose on the meeting. Things would get back on track very quickly. But he is not "all business," however. His jokes and, shall we say, "audible asides" at meetings are legendary, often irreverent, and sometimes profane.

Another side of Maurice that is not fully appreciated is his extraordinary generosity and willingness to help younger colleagues. My wife Christine and I will forever be indebted to him for the time and effort he put into serving as the unofficial advisor for Christine's doctoral thesis at Georgetown University on "Ethical Issues in the Development and Testing of a Preventive HIV Vaccine." She had the unique opportunity to tap his encyclopedic knowledge of vaccinology and broad experience in designing ethical vaccine trials.

Here too, however, he did not mince words. His advice to Christine was: "You may be getting a Doctor of Philosophy, but don't talk or act like a philosopher. They don't make a lick of sense and nobody listens to them anyway."

Remarkably, I see few signs of Maurice slowing down—this Montana farm boy has a work ethic and energy level that border on the superhuman. His wife Lorraine tells him that he has to learn to relax. Maurice's response is: "relaxation is what comes after rigor mortis."

A couple years back we celebrated the 200th anniversary of what many consider to be the birth of vaccinology, when the English country doctor Edward Jenner inoculated a boy named James Phipps with material from the hand of a milkmaid who had developed cowpox. The boy subsequently proved immune to a much more serious diseases—smallpox—and the vaccine was born. If Jenner, the country doctor, is the father of vaccinology, then Maurice Hilleman, the country boy from Montana, has to be one of his favorite sons.

Maurice, I have been in awe of you since I first entered the fields of medicine and science. One of the exciting things about our profession is that you sometimes get to meet and interact with your heroes. It is particularly exciting and gratifying when that hero becomes your friend and confidante. For that, I will always be grateful. Maurice, it is an honor to celebrate your birthday with you. Your work has been awe inspiring, your friendship enduring.

Maurice, thank you and happy birthday!