Acceptance Speech by Martin Blaser

[Check against delivery.]

I begin by thanking the Robert Koch Foundation and its advisory committee for this wonderful honor, and I congratulate my friend and colleague Rino Rappuoli on receiving the Robert Koch Award for his groundbreaking work on vaccines.

I have been lucky to have had a long and exciting career. I began a clinical fellowship in Infectious Diseases in 1977. By chance, 9 days after starting, I was asked to see a patient with meningitis whose blood and spinal fluid cultures were growing a weird bacterium I had never heard of—called *Campylobacter fetus*. Wanting to understand how an intestinal bacterium could reach the brain, I began to study *C. fetus*, and that led to *Campylobacter jejuni*, an important cause of diarrhea. And then when a new *Campylobacter*-like organism was discovered in the stomach by Marshall and Warren—I began to study that one too. Its name was later changed to *Helicobacter pylori*, and it was *H. pylori* that led me to the human microbiome. From my introduction to microbes as pathogens, my work has shifted to a more complex context—now considering those that are beneficial, or are sometimes bad and sometimes good, like *H. pylori*. Forty-two years from seeing that first patient, I continue to walk along this same path, to see where it will yet lead…

I tell students that the best path for success is to follow your nose, to see where your curiosity will lead you. As for me, I like to see the big picture, to make connections—and in that way, I stumbled on one of the biggest pictures of all—one that involves all of us humans. In that way, I am indebted to *H. pylori.*

After studying *H. pylori* for a decade, I realized that it is an ancient organism of humans, and that it has been disappearing. In fact, this disappearance enabled the very discoveries that it played a role in both ulcers and stomach cancer. As might be predicted by the loss of *H. pylori,* these diseases also have been declining-very good news! But other diseases have been rising, and we linked the absence of *H. pylori* to the rise in diseases of the esophagus, like reflux esophagitis and adenocarcinoma of the esophagus—which are new to the 20th century, and to asthma, which has skyrocketed since World War II. This meant that the loss of *H. pylori* was not just good for humans.

And then I understood that if one ancient organism of humans was disappearing—then others must be as well, and that there must also be consequences, potentially both good and bad. This way of

thinking has led into my life's work—to understand the extinctions and their consequences, which I called the *Theory of the Disappearing Microbiota*. At first, it was considered a wild idea, but by now, evidence has accumulated.

One day, about 16 years ago, when counseling a student who was considering joining a lab studying obesity, I told him: "You know, farmers have been feeding antibiotics to their farm animals to fatten them up". As I said it, I thought 'that is what we have been doing to our children: the antibiotics that we have been giving them for their minor infections have been fattening them up too'.

I set out to see if that is true, and then realized that early life is when many important diseases develop—not only obesity, but also allergies, asthma, juvenile diabetes, and a long list. Over the last 15 years, we have been studying children, and establishing models in mice of early-life exposures to antibiotics. These have shown that antibiotics are disrupting the microbiome—and it is the altered microbiome that is causal. These experiments and ones that are ongoing, point to the causes of the global pandemics of metabolic diseases like obesity and diabetes, and immunologic diseases like asthma, food allergies, and IBD. By disrupting the microbiome, antibiotics have been having unintended costs on a large scale.

Once I understood this, I felt it was important to communicate it, not only to scientists and doctors, but also to the general public. Antibiotics are among our civilization's 'sacred cows'. In writing *Missing Microbes,* I wanted to inform the world about how their microbes and their children's are changing. Once people understand the problem, they can act. Like climate change, the extinctions in our microecology are on-going, therefore, our studies continue. We must act to protect the health of future generations. This has become my life's work.

As with all recognition, there are many people to thank; I start with the most important teachers in my career—Wen-lan Wang, Marc LaForce, Emil Gotschlich, and Agnes Labigne. I am grateful to the students, fellows, and colleagues who worked in my lab, entrusting some of their precious years to our studies together. This inspired group made so many observations; it has been my great privilege to work together, trying to guide their ceaseless energies, as we probed the mysteries of microbes.

On a personal level, I am grateful to my parents, who provided the starting materials so I could successfully leave their warm nest. I thank my children—Daniel, Genia, and Simone—Genia is here

today. They have seen me chase after my dreams for their whole life, and with their detached bemusement, they have in fact been incredibly supportive.

I thank my wife and partner Maria Gloria Dominguez Bello. Together we have been following the byways of microbes and early life development of the microbiome. And now I follow her lead in establishing the Microbiota Vault, a repository for humankind to preserve our ancient microbes for posterity.

The prior Robert Koch honorees include many of my scientific heroes, and I deeply appreciate the vote of confidence by the award committee.

Thank you!