Karl Maramorosch

Professor *emeritus* and renowned scholar **Karl Maramorosch** was born 16 January 1915 and died of natural causes on 9 May 2016 at the age of 101 while visiting friends in Poland. He was born in Vienna where his family had fled at the outbreak of World War I to evade the advancing Tsarist Army. After the war the family returned to their farm in eastern Poland where Karl attended primary and secondary schools, graduating from the Moniuszko Conservatory of Music in 1934. He considered becoming a concert pianist, but followed his father's footsteps in agriculture and entered Warsaw University, graduating *magna cum laude* in agricultural engineering in 1938. The same year he married his college sweetheart, Irene Ludwinowska, who was his steadfast companion for the next 70 years. His childhood dream of becoming a virologist was interrupted the following year when the Nazis and subsequently the Soviets invaded Poland. Karl and his young bride escaped across a heavily guarded bridge into Romania disguised as a Polish officer and his wife. Here they were interred in refugee camps for the remainder of the war and where Karl became a skilled shoemaker. His parents, brother and 127 close relatives perished in the Holocaust.

Eager to escape for a third time, now from Soviet-occupied Romania, Karl obtained a sham transit visa from friends in the Swedish Embassy in Bucharest that took the couple through Czechoslovakia and France to Sweden. Here the American Consul classified Karl as a 'skilled agriculturist" entitled to a First Preference immigration visa. They arrived in New York City on 24 February, 1947. Karl entered Columbia University and received his PhD in two years while working as a technician at the Brooklyn Botanical Garden. Upon graduation he was hired by Rockefeller University and was finally free to independently pursue his long deferred scientific interests. Over the next 12 years, Karl was influenced by some of the most famous scientists of the time, particularly at Cold Spring Harbor where he worked most summers. He spent long hours with Luria, Delbruck, Mayr, McClintock, Hershey and scores of other luminaries. At Rockefeller, he modified the method of Weigl, who had been his brother's professor in Poland, to microinject plant pathogenic viruses and phytoplasmas into leafhopper vectors. This permitted him to obtain the first evidence that some plant pathogens multiply not only in plants but also in invertebrate vectors. He performed experiments definitively demonstrating that the agent causing aster yellows multiplies in its vector.

Karl moved from Rockefeller University to the Boyce-Thompson Institute in 1961 where he made his most important contributions to science. As Program Director of Virology, he and his coworkers were at the forefront of new and fascinating studies using the electron microscope to detect and characterize viruses and phytoplasmas in cells of diseased plants and insect vectors. In 1974, Karl joined the Waksman Institute at Rutgers University where he later earned the coveted title Robert L. Starkey Professor of Microbiology. In 1984, he made his final career move when he joined the Entomology Department at Rutgers. Invariably the first to arrive to work, Karl continued to write, edit, lecture, travel, organize international conferences and mentor over the next three decades, until an injury finally forced him to retire to his daughter Lydia's home in California. Advancing age did not dim his passion for travel as he demonstrated by visiting Mt. Kilimanjaro on his 98th birthday. When asked the secret for this exceptional vigor, he always responded "never stop working."

Karl pioneered insect tissue culture, making significant advances to our understanding of the replication of plant-pathogens in insect vectors and the interactions between insects, viruses, and plants. His research laid a foundation for diverse and increasingly important use of invertebrate-based *in vitro* expression systems used today in agriculture, medicine, drug discovery, and mammalian cell gene delivery. His early enthusiasm for what was once a small and unrecognized field developed into an important branch of science now demonstrating its enormous potential including the first cancer vaccine

Karl was a prolific writer and editor in serving the disciplines of virology, plant pathology and entomology with uninterrupted distinction across eight decades. He edited more than 90 volumes and authored/coauthored hundreds of journal articles covering his research interests in comparative virology, invertebrate cell culture, parasitology, plant and insect disease, spirochetes, viroids, phytoplasmas, spiroplasmas and biotechnology.

Karl's fluency in seven languages fueled his extensive international activities. When the Justus Leibig University in Germany invited him, Karl lectured in German. In Romania, as a guest of their Academy of Sciences, he made use of the Romanian he had acquired during World War II. In St. Petersburg, Moscow, Armenia and Uzbekistan, he lectured in Russian, and in Poland in Polish. He used his 37 visits to India to secure sufficient grasp of Hindi to impress his audiences.

Recognized throughout his life with awards and accolades, Karl's proudest moment came in 1980 when he was awarded the $100,000 Wolf Prize, considered agriculture's equivalent of the Nobel Prize, "for his pioneering and wide-ranging studies on interactions between insects and disease agents in plants." Countless further awards followed including the Jurzykowski Award in Biology, American Institute for Biological Sciences Award of Distinction and Distinguished Service Award, Japan Society for Promotion of Science Distinguished Professorship, two Fulbrights, Waksman Award and Medal, American Association for the Advancement of Science Campbell Prize, Distinguished Lifetime Achievement Award of In Vitro Biology Society, Warsaw University Award of Distinction, and the Society of Invertebrate Pathology Founder's Lecture Honoree. He was elected to the German National Academy of Sciences, and was a Fellow of the American Association for the Advancement of Science, American Phytopathological Society, New York Academy of Sciences Indian Virological Society, Indian National Science Academy and others. He was an Honorary Member, Fellow and most significantly designated a "Legend" of the Entomological Society of America which also nominated him for the National Medal of Science. His alma mater awarded Karl an Honorary Doctorate which he received at a ceremony in Warsaw in October 2014.

Karl Maramorosch, eminent virologist, entomologist, and plant pathologist, was a truly remarkable and multifaceted individual. Not only was he a celebrated scientist, but a gifted pianist, amazing sleight of hand magician, a polyglot, world traveler, avid photo and videographer, and owner of a phenomenal memory. Karl was an extraordinary person who lived a extraordinary life. He will be missed by all those whose lives he touched over his long life.

Safe travel, Karl.

Obituary prepared by Randy Gaugler, Rutgers University, May, 2016.