

Obituary: Dr. Keith H. Steinkraus



March 17, 1918 – October 23, 2007

Dr. Keith H. Steinkraus, 89, died October 23, 2007 at his home in Ithaca, New York. Keith was born to Henry and Alice Steinkraus in Bertha, Minnesota. He married Maxine Curtiss, the love of his life, on August 26, 1941 and they celebrated their 65th wedding anniversary in 2006. Maxine died of cancer on December 8, 2006. Keith was a Professor of food science and microbiology at Cornell University for 36 years.

He received his B.A. from the University of Minnesota and his Ph.D. in bacteriology in 1951 from Iowa State University. He was a world expert on food fermentations, such as tempeh, idli, soy sauces, wines, beers, kombucha, and soy milks. However, he also worked for 50 years on the bacteria causing milky disease in scarabs and American foulbrood in honey bees.

The focus of Keith's research on milky spore was the factors that affect sporulation of milky spore bacteria *in vitro*. This is a fundamental problem with milky spore bacteria for biological control. Unlike Bt, milky spore bacteria sporulate poorly on artificial media. Production of viable, infective spores for biological control has had to be done using expensive *in vivo* methods.

In 1955 Dr. Steinkraus published a paper with Cornell's turf entomologist, Dr. Haruo Tashiro, in *Science* on production of *Paenibacillus popilliae* and *P. lentimorbus* on artificial media. This led to many papers in the *Journal of Bacteriology* on variability of milky spore strains, saprophytic growth, and factors affecting germination of spores. He often worked with Dr. Tashiro on virulence of milky spore bacteria in different scarab hosts, such as *Amphimallon majalis*, and *Ataenius spretulus*.

They investigated milky spore disease histopathology and cations in hemolymph and gut tissues of healthy and infected grubs. These resulted in publications in the *Journal of Invertebrate Pathology and Applied*

Microbiology. Dr. Steinkraus had a patent on enhancement of milky disease bacteria using fatty acids (U.S. Patent 4,626,508).

He gave lectures on milky disease bacteria in Dr. John Kramer's insect pathology course at Cornell, each time it was taught. These lectures were a highlight of the course. Keith had an excellent sense of humor and told the class "When I was a Ph.D. student at Iowa State, my major professor, Dr. John Ayres, taught me that a scientist needed patience. Now, after working 35 years on *in vitro* sporulation of milky spore bacteria, and still not solving the problem, I understand the meaning of patience."

Dr. Steinkraus never lost his interest in milky spore bacteria and in his late 80's was working on a book on the history of bacteriological work on this group. As late as 1990, when Keith had been retired two years, he was an author on a JIP paper (56: 286-288) on plasmids in *P. popilliae*. Two weeks before his death, when he was very weak, he gave a guest lecture to a food science class at Cornell, his last lecture.

He also worked closely with Dr. Roger Morse, the apiculturalist at Cornell. They worked for a decade on honey wine fermentations, the chemical composition of honeys, and also on research on the American foulbrood bacterium, *Paenibacillus larvae*, in honey.

They examined honey samples from around America and Canada using the Hansen method and found that foulbrood spores were present in 8.5% of the samples (published in *Apidologie*). Further studies compared various media for the detection of foulbrood spores in honey (published in *Acta Biotechnologica*). Finally, they studied growth of foulbrood bacteria in lepidopteran cell cultures (*Acta Biotechnologica*).

Keith was an excellent photographer, jazz pianist, and mentor to many students from around the world.

Survivors of Dr. Steinkraus include his five children: Bonnie (a librarian in Syracuse, NY), Nancy (a teacher in Carbondale, IL), Donald (Professor of Entomology and Apiculture at University of Arkansas, Fayetteville), Anna (an orchard farmer in Newfield, NY), and Karen (a home maker in St. Paul, MN), eleven grandchildren, and one great grandchild.

Don Steinkraus