



Stanley A. Zahler

May 28, 1926 – April 26, 2016

Stanley Arnold Zahler, age 89, died April 26, 2016 in Cardiff-by-the-Sea, California. Born May 28, 1926, in New York City, he attended Townsend-Harris High School and started college at CCNY at the age of 15, receiving his A.B. in 1944. He enlisted in the Navy air force just before his 18th birthday and was commissioned as an ensign at age 19, immediately after VJ Day. Following his discharge, Stan attended NYU, expecting to become a doctor, but two years later, he changed his mind and instead enrolled as a graduate student in Bacteriology and Immunology at the University of Chicago. He received his Ph.D. in 1952.

In his 35 years at Cornell, Stan was a co-founder of the Biology & Society program, Associate Director of the Division of Biological Sciences, and Chair of the Section of Genetics & Development (1990-93). His research involved studies of several model microorganisms and he taught microbial genetics to multiple generations of Cornell students.

Stan started his Ph.D. work with James Moulder, studying animal viruses that multiplied within the cells of chick embryos. Chick cells are relatively complex but they were chosen not for love of chickens but because they provided a simple way of studying virus multiplication in complex animal cells. His doctoral work was significant in that it provided some of the earliest evidence that a group of diseases that are currently considered a major public health problem were caused not by a virus but rather a small bacterium that lived inside animal cells.

In selecting Salvador Luria as a postdoctoral mentor, Stan displayed his inclination towards genetics and an acknowledgement that the most

progress comes after carefully selecting a system with minimal complexity that is amenable to genetic manipulation. Salvador Luria was closely associated with a small group of biophysicists, geneticists, and microbiologists that focused on bacterium *Escherichia coli* (*E. coli*) and viruses that multiply only within *E. coli*. Later, thousands of scientists worldwide worked with laser-like focus on this system, performing genetic, biochemical and physiological studies that became the underpinnings of modern molecular biology (documented in *Phage and the Origins of Molecular Biology* by Cairns and Stent).

Stan then joined the Department of Microbiology within the medical school at the University of Washington where he continued working with *E. coli* but also assigned more practical problems to some of his medical and dental students. In 1959, Stan moved to Cornell University as a faculty member, initially within a Department of Dairy Science, but after several re-organizations, as a member of the Division of Biological Sciences.

With this major move, Stan changed the direction of his research to the developmental biology of *Myxococcus xanthus* (*M. xanthus*). This area of research had strong appeal because of its potential for becoming a model system for studying development (with abundant food, *M. xanthus* cells glide along as a swarm of individual cells but when starved, they develop into a multicellular fruiting body). This subject also appealed to another facet of his personality, namely, a profound love for biology in its totality. On the other hand, this was a recognized risky undertaking because the methods for studying this organism were not yet worked out. Anthony Bretscher, a current member of our department, commented that Stan pioneered the study of the social bacterium *M. xanthus* that he later worked on as a graduate student at Stanford and that they both left the field because Myxo was too difficult to work on. The nature of the difficulty, according to Ernest Hemphill, one of Stan's first graduate students at Cornell, was that although they could isolate mutant strains of *M. xanthus*, they couldn't devise genetic tools such as transformation, transduction or plasmids to further analyze the mutants.

A sabbatical year in 1966-67 provided Stan with a new direction that suited him in all ways and became the focus of his work for the next 27 years. Working with John Spizizen at the Scripps Research Institute in La Jolla, Stan learned some of the novel genetic approaches that were making *Bacillus subtilis* (*B. subtilis*) an attractive model organism, allowing in depth analysis of one of the two major groups of bacteria (*E. coli* being the model organism for the other major group). Returning to Cornell after his sabbatical leave, Stan and his students set to work isolating mutant strains of *B. subtilis* and employing viruses and other genetic means to map the location of genes that had been altered by mutation. They and others used these strains and map information to explore a number of phenomena, including the mechanisms and effects of gene exchange in *B. subtilis* and

other gram-positive organisms. Their findings had implications for understanding the spread of antibiotic resistance genes in pathogens such as *Streptococcus*, *Staphylococcus* and *Listeria*.

Zahler's extensive knowledge of *Bacillus* genetics and his vast collection of stains made him a sought-after expert when the organism became a major source of secreted enzymes used by biotechnology companies, according to Steve Zinder, professor of microbiology.

The thousands of mutant strains isolated in the laboratory also provided the broad opportunity of studying the metabolism of *B. subtilis*, that is, the pathways by which the organism acquires and breaks down food and uses the resulting building blocks and energy to build new cells. Stan chose to focus mainly on those pathways leading to the synthesis of branched-chain amino acids valine, isoleucine, and leucine. Ruth Korman, who did her doctoral work with Joshua Lederberg and who remained a fast friend of Stan's until her death, joined the lab during this period.

Another scientist whom Stan deeply admired was Thomas Eisner, a neurobiologist at Cornell with whom he had a brief collaboration. Tom was known for uncovering layer after layer of complexity underlying insect ecology and behavior, all beginning from some simple initial observation. It was Stan's wish that there was to be a single scientific talk at his retirement party and that it was to be given by Tom. Some of us remember that talk as one of his signature "stories" of how an insect in Florida could stay attached to a plant in the face of gale-force winds.

Stan's interest in teaching matched his scholarship interests. Peter Bruns, recalled him as a consummate scholar, a literature devotee, a man with an open mind, a colleague who was interested in a broad range of ideas, and an effective teacher with a very impressive reputation.

Stan taught microbial genetics courses to advanced undergraduates and graduate students across the campus, some 2,000 students during his Cornell career. The exam questions for his lecture course were legendary – they did not have simple answers and one was free to consult any written resource in answering them. One of us writing this memorial statement (JMC) remembers Stan throwing reprints of papers he had read into a carton box in his office and that once each year he tossed out his old lecture notes and replaced them with new ones prepared from newer reprints. And Anthony Bretscher, recalling that he sat in on Stan's course as a young faculty member commented "...saying he was a 'voracious reader' doesn't quite capture it...I think he knew every paper on bacterial gene regulation!"

In a separate laboratory course, each student isolated one or several *B. subtilis* mutants that differed in some respect from the parent. For example, one might not be able to make a vitamin, another unable to grow at a high

temperature, and a third able to grow in the presence of an antibiotic. For each mutant, students used genetics methods to determine if the observed effect was caused by a single mutation, and if so, where that mutation was located on the genetic map. Many of these mutants became part of the collection of strains that were freely shared with the rest of the international community (all identified by prefix CU denoting Cornell University).

Stan retired in 1994, and in 2000, he and his wife Jan began wintering in Cardiff-by-the-Sea, California and spending summers at a cottage on a small lake near Ithaca. Each autumn and fall over a 10-year period, they traversed the continent by car, exploring every corner of the country and parts of Canada as they went.

Stanley Zahler is survived by his wife of 63 years, three children, and 3 grandchildren, is remembered warmly by family and colleagues as someone of enormous integrity and deep humility.

Joseph M. Calvo, chair; David B. Wilson and Eric Alani