



IN MEMORIAM

Yoshinori ("Joe") Tanada
Professor of Entomology, Emeritus
UC Berkeley
1917 – 2016

Yoshinori ("Joe") Tanada, professor emeritus of entomology and eminent insect pathologist at the University of California, Berkeley, was born in Puuloa, Oahu, Hawaii, on June 8, 1917, and passed away on May 24, 2016, in Oakland, California. He began his career as one of a few pioneering researchers then studying diseases of insects. Currently, invertebrate pathology has grown to a fully developed discipline with hundreds of researchers devoted to these studies, along with widespread applications to pest management.

Dr. Tanada had an interest in biology from an early age. He graduated from McKinley High School in Oahu, then enrolled in the Department of Zoology with an entomology major at the University of Hawaii, earning a Bachelor of Science degree with Honors in 1940. He worked in the Department of Chemistry (1941-1943) and then began graduate work in 1943 at the University of Hawaii as an assistant in zoology. As a graduate student at the University of Hawaii during World War II, a close faculty friend nicknamed him "Joe", after "G.I. Joe". He adopted the nickname and his friends and colleagues always called him "Joe" rather than Yoshinori.

His master of science thesis in 1945 was entitled "Feeding habits of the tomato bug, *Cyrtopeltis varians* (Distant), with special reference to the feeding lesion on tomato". Even before obtaining his M.S. degree, he demonstrated a strong interest in research and had his first publication in 1943 (Hawaii Agr. Expt. Stn.). After obtaining his M.S. degree, he was a junior entomologist in the Agricultural Experiment Station at the University of Hawaii and conducted research on the biology and biological and chemical control of various insect pests in Hawaii. With his excellent background in research, he

was encouraged by several faculty members, especially Professor Frederick G. Holdaway, to pursue a study leave for a Ph.D. degree.

In 1950, he entered the Ph.D. graduate program in entomology at the University of California, Berkeley, where he focused in insect pathology under the mentorship of Professor Edward Steinhaus, who then was the world's most eminent scholar and researcher on diseases of insects. In addition to his Ph.D. thesis on the cabbage butterfly ("Infectious Diseases of *Pieris rapae*"), he also investigated viruses, bacteria, and fungi, including the microsporidia infecting the imported cabbage butterfly. Dr. Steinhaus suggested that he study the various pathogens of the imported cabbage butterfly so that he would be a well-trained insect pathologist in Hawaii. One of the most significant findings of his research was that the nucleopolyhedrovirus (NPV) of *P. rapae* was not host-specific. Prior to his study, the NPV of *P. rapae* was believed to be host-specific.

His Ph.D. research completed, he returned to the University of Hawaii in 1952 as an assistant entomologist and completed all the requirements for a Ph.D. in Hawaii, which was awarded by UC Berkeley in 1953. At the University of Hawaii, he was appointed to the professorial series in 1954 and promoted to associate professor and associate entomologist in 1956. His research interests were on insect pests of orchids, the interactions of a microsporidian pathogen on a developing gregarious parasitoid in an infected imported cabbageworm, and pathogens of insect pests in Hawaii with emphasis on viruses of the armyworm.

Shortly after being promoted to the associate level, Dr. Tanada accepted Professor Steinhaus's invitation to become an assistant insect pathologist in the Agricultural Experiment Station at UC Berkeley. He accepted this position and was tenured in 1959 to associate insect pathologist and was promoted to insect pathologist in 1964. The following year, Dr. Tanada received a split academic appointment as professor of entomology in Berkeley's Department of Entomological Sciences and as an insect pathologist in the Agricultural Experiment Station. After a 28-year career at UC Berkeley, he retired in 1987 with a combined 34 years as an insect pathologist in Hawaii and California. Although officially retired, he continued to review manuscripts for journals, edited manuscripts for colleagues whose first language was not English, completed writing up the last of his data from his own research, and culminated his career by publishing the textbook *Insect Pathology* in 1993 (Academic Press, Inc.). Over his career, Dr. Tanada published over 200 scientific articles, including 97 that were in refereed journals plus numerous book chapters and reviews, and coedited two books, one with Hisao Aruga entitled *The Cytoplasmic-Polyhedrosis Virus of the Silkworm* (University of Tokyo Press; 1971), and the other with James R. Fuxa, entitled *Epizootiology of Insect Diseases* (John Wiley & Sons; 1987).

Dr. Tanada had a distinguished career in insect pathology and conducted research on all pathogen groups with particular emphasis on insect virology. His pioneering research in insect pathology demonstrated how pathogens interact with each other, which added significantly to our basic understanding of the infectious process, especially with insect viruses. In 1959, he published a seminal paper entitled "Synergism between Two Viruses of the Armyworm, *Pseudaletia unipuncta* (Haworth) (Lepidoptera, Noctuidae)" (*J.*

Insect Pathol. 1:215-231), where he demonstrated that a granulovirus, originally isolated in Hawaii and called the Hawaiian strain, synergized the NPV of the armyworm. This paper would be the basis for much of his research career at UC Berkeley until his retirement. This research was well funded by grants from the National Science Foundation. His last paper on this subject was published two years after he retired. The foundation laid by Dr. Tanada's research led other researchers to further delineate the pathways by which the NPV and granulovirus entered their hosts.

Dr. Tanada was a strong advocate for invertebrate pathology and introduced the concept of insect pathogens to manage pests to many graduate students. He taught the first insect pathology course at the University of Hawaii in 1954. His course at UC Berkeley provided the basic foundation for graduate students to understand the biology of insect pathogens, the infectious process, epizootiology, and microbial control. His laboratory manual for students provided hands-on experience with insect pathogens. He served as major professor for two M.S. and seven Ph.D. students and was generous with his time to encourage them in their thesis research. His generosity extended into his retirement years. He gladly gave permission to Fernando E. Vega and Harry Kaya to coedit the second edition of *Insect Pathology*, which was published by Academic Press in 2012. Moreover, he was pleased that all the contributing authors of the book would forego the royalties for their contributions and agreed to donate them to the Chris J. Lomer Memorial Fund to defray travel expenses for scientists from developing countries to attend the annual meeting of the Society for Invertebrate Pathology (SIP).

Dr. Tanada was instrumental in the development of insect pathology in Japan. His Fulbright Fellowship (1962-63) to conduct research at the University of Tokyo established a long-lasting relationship with many established and up and coming Japanese scientists, and many of them conducted research in his Berkeley laboratory on insect viruses. In 1980, he received an award from the Japan Society for the Promotion of Science and spent three months at the University of Tokyo to conduct research in insect pathology. He also was a consultant for a number of national and international agencies including the U.S. Army (1950), South Pacific Commission (1959), United Nations Food and Agriculture Organization to Thailand (1971), Government of the Azores (1972), and in Western Samoa and Tonga (1972).

In 1943, while a graduate student at the University of Hawaii, he was elected to full membership in the Hawaiian Entomological Society (HES) and was an active member serving as president of HES for 1956. He was also very active in SIP and was one of the founding members of this society in 1967. He served as treasurer (1972-1974), trustee (1976-1980), and on numerous committees. He contributed significantly to the establishment of the *Journal of Insect Pathology*, serving as acting editor in 1960, as well as being on the editorial board from 1961 to 1964. After the journal was renamed the *Journal of Invertebrate Pathology*, he served on the editorial board from 1970 to 1972 and from 1977 to 1982.

For his many scientific contributions in Hawaii, nationally, and internationally, he was elected as an honorary member of HES in 1992, and in further recognition of his significant contributions and service to HES, he received the Lifetime Achievement

Award in 1997. In addition, Dr. Tanada received a number of other awards during his scientific career. These awards included Fellow of the American Association for the Advancement of Science (1964), Founder's Lecture Speaker honoring Professor Steinhaus (1984), honorary member (1988) and Founder's Lecture Honoree (1999) from SIP, and the Japanese Government Research Award for Foreign Specialists (1989). On the personal front, he married Edna Noriko Saito in 1949 and had two daughters, Karen and Ruth. In his spare time, he loved fishing for salmon and striped bass in San Francisco Bay on party boats and for shad on the Sacramento River from shore and for trout on various inland lakes and streams. He enjoyed gardening and was especially proud of his orchid collection, which he shared with friends and colleagues. In 1999, his two daughters invited a number of relatives, friends, and colleagues to Joe and Edna's 50th wedding anniversary in Las Vegas. The three-day affair was filled with lots of sight-seeing, entertainment, and food, which everyone enjoyed. Joe is survived by his wife, two daughters, and a granddaughter.

Yoshinori "Joe" Tanada was a noted insect pathologist who made many significant contributions to the discipline as well as to Hawaii's agriculture early in his career. His pioneering research on a granulovirus isolated in Hawaii being synergistic to the NPV of the armyworm laid the foundation for understanding of the infectious process of insect viruses. He was dedicated to and served as an ambassador for insect pathology. He was a gentle giant as a scientist and a loving husband, father, and a friend to many. He will be missed by his family, friends and colleagues.

Harry Kaya
Alexander Purcell
2017