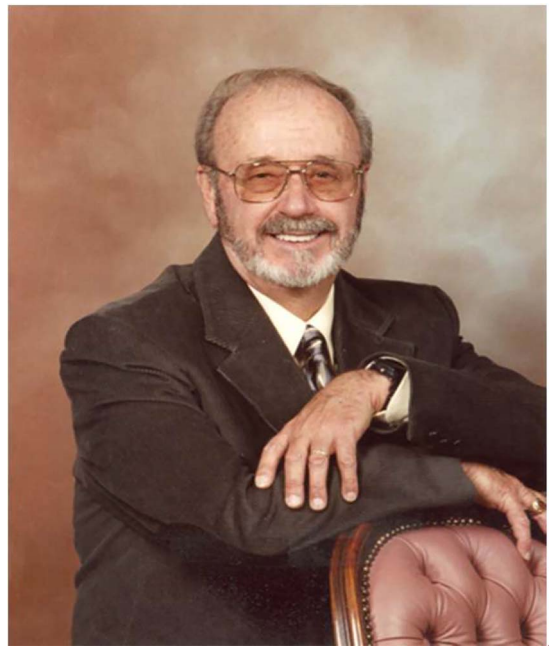
IN MEMORIUM

WAYNE JOHN CRANS 1937–2025



It is with deep sadness that we report the passing of the renowned mosquito biologist Wayne John Crans on July 30, 2025. Our beloved grandfather, father, uncle, teacher, mentor, colleague, and friend passed away peacefully from natural causes in his home after living a completely fulfilled life of 87 years. "Doc" as he was affectionately called by his family, students, and others was born in New Jersey on November 28, 1937, and grew up in the New Market area of Piscataway, about a half hour from New York. His father, David LaTourette Crans, owned and operated a radio repair shop in Dunellen, NJ; his mother, Olga Noge, was a pianist who taught music out of their home. His father died tragically when Wayne was just a young boy (five years old), and he was raised by his mother along with two siblings (a younger sister, Ruthy, and an older brother, David). As a child, Wayne was an avid baseball fan, closely following the New York teams along with his childhood friends. This attraction to baseball would follow Wayne throughout his life. He also loved the outdoors. Any chance to go outside, play in the streets, or go fishing for the day was a welcome adventure. His mother bought a vacation house in Cape Breton, NJ, near the Jersey shore, where she took the family to spend the summer months. Wayne was introduced to boating and saltwater fishing during this time, which became lifelong pastimes. Wayne also became an avid fly fisherman and tied his own flies (entomology in practice, and he would even teach a course at Rutgers University, Aquatic Entomology for Anglers). As an adult, Wayne learned to hunt: small game, pheasants, grouse, quail, checkers, woodcock, waterfowl, and deer. When Wayne took on a new endeavor, he threw himself, and any willing others, into the mission at hand. Wayne spent many hours outdoors hiking, bird watching, cycling, swimming, snorkeling, and gardening. Wayne's understanding of and passion and and love for the outdoors was passed on to his three sons, his grandchildren, and many of his students and colleagues.

Wayne entered Rutgers University in 1956 after graduating from Dunellen High School. He majored in Pre-Veterinary Medicine but changed to Biological Sciences after Entomology courses caught his interest. Wayne worked as a seasonal employee for the Department of Entomology during his junior year at Rutgers and gained a great deal of field experience with biting fly research. It was at this time that he caught the attention of the Entomology faculty. The summer of 1959 was the year that New Jersey experienced an extensive outbreak of eastern equine encephalitis (EEE), which stimulated the Rutgers University New Jersey Agricultural Experiment Station (NJAES) to fund new faculty positions in mosquito research (Fig. 1). The Entomology Department

Fig. 1. Wayne Crans (Rutgers University) taking a blood sample from a bird to help implicate the role of avian populations in EEE ecology. The seminal works by Wayne were instrumental in elucidating the enzootic, epizootic, and epidemic disease cycles of EEE and the various role of mosquito species, which led to eventual development of effective surveillance and control measures.

sought out Wayne, interviewed him, and appointed him to a Research Associate position in 1960. This allowed Wayne to complete his undergraduate degree on a part-time basis and to continue his education at the graduate level. He received his B.S. in 1962, his M.S. degree in 1965, and his Ph.D. in Entomology in 1968. Two years after being promoted to Assistant Professor, Wayne applied for sabbatical leave and served as a Research Officer at the East African Institute of Malaria and Vector-Borne Diseases in Amani, Tanzania. His work focused on developing a Bancroftian filariasis research program at the institute, and he was able to gain experience with physiological aging techniques in malaria vectors by working with G. B. White and C. Garrett-Jones. Wayne used his tropical experience to enrich his teaching of Medical Entomology and Arthropods and Human Disease when he returned to Rutgers. He was also able to use the age-grading techniques he learned in Tanzania to structure a surveillance program for encephalitis vectors in New Jersey. These skills were passed on to the New Jersey mosquito control community and put into operational practice. Wayne was promoted to Associate Research Professor with tenure in 1973 and took another sabbatical in 1976 to participate in an African Tsetse Fly Abatement Program funded by the US Agency for International Development. Once again, tropical experience stimulated new ideas for his New Jersey research programs and enriched his teaching at all levels. Wayne worked with Donald Sutherland for many years in the Mosquito Research and Control Program based at Headlee Laboratories on the George H. Cook campus in New Brunswick, New Jersey. The Mosquito Program advises the Director of NJAES on mosquito-related matters to ensure that legislative mandates are met and that advances in mosquito control are based on science. One primary duty is to review Plans and Estimates of the 21 county mosquito control agencies in the state of New Jersey (the first state to adopt legislation for the creation of mosquito control districts in 1912, thanks to the efforts of the renowned entomologist and lawyer John B. Smith) and report results to the county boards of commissioners on an annual basis. This important work helps to guide local agencies preserving local funding and science-based decisions for vector control programs that operate in a political environment. This mandate was also the first of its kind to increase collaborations between academia and operational mosquito control districts, an effort that continues today, not only in New Jersey, but it is now modeled by the Centers for Disease Control and Prevention (CDC) Centers of Excellence.

Wayne's research focused on the epidemiology of mosquito-borne diseases as well as the basic biology of individual vector species with funding from the National Institutes of Health, National Science Foundation, United States Environmental Protection Agency, National Aeronautics and Space Agency, and various state sources. His publication record includes more than 150 titles. His seminal work on elucidating the enzootic, epizootic, and epidemic vectors of EEE and the involvement of avian populations has been monumental in leading the research and control efforts of entomologists, ornithologists, virologists, epidemiologists, and vector control technicians globally. Doc provided expertise on mosquito surveillance and developed a state-wide resting box program for *Culiseta melanura* (Coq.) and *Anopheles* species, as well as sentinel chickens, parity dissections, incrimination of *Aedes sollicitans* (Walker) and *Coquillettidia perturbans* (Walker), blood-feeding preferences, and many mosquito biology and ecology discoveries (Fig. 2). In particular, ask any of his students or son (Scott) about oddball species such as *Aedes dupreei* (Coq.), *Aedes thibaulti* Dyar and Knab, or *Orthopodomyia signifera* (Coq.) or establishing a colony of *Culex territans* (Walker) with bullfrogs using human urine!

Wayne also established many service programs that were funded by the state of New Jersey on an annual basis. Examples included Surveillance for the Mosquito Vectors of Encephalitis (funded by the New Jersey State Mosquito Control Commission [NJSMCC]), Black Fly Control in the Delaware River (funded by the New Jersey Department of

Fig. 2. Wayne Crans sampling for *Coquillettidia perturbans* in a freshwater pond using his modified system of a floating soil sieve and bilge pump. Although the adults are quite abundant and pestiferous, the larvae of this species possess a modified siphon that attaches to subemergent aquatic vegetation and never surface to acquire oxygen, thus making sampling extremely difficult. The larvae were first discovered in the Spring Lake area of Trenton-Hamilton Marsh in Mercer County, NJ.

Fig. 3. Wayne Crans and colleagues responding to the initial outbreak of West Nile virus in the northeastern USA in 1999. Pictured from left are Warren Staudinger (Bergen County Mosquito Control), Lyle Peterson (CDC), Wayne Crans (Rutgers University), Peter Bosak (Cape May Mosquito Control), Chet Moore (CDC), Scott Crans (Rutgers University), and Bob McLean (USGS).

Environmental Protection), and Ecological Studies with West Nile Virus (funded by the New Jersey Department of Health). Although these programs were initially created in response to EEE, Wayne was also on the front lines when West Nile virus was first detected in northeastern United State (Fig. 3). Each of these programs helps fulfill the legislative mandate that requires Rutgers NJAES to maintain a viable program of research to enrich practical vector control efforts with science. Some of these programs are still continuing and have been further elevated to increase mosquito surveillance/control efforts in New Jersey for better public health protection (https://vectorbio.rutgers.edu/surveillance.php).

Wayne was elevated to Director of the mosquito research program in 1997 and adopted a personal mandate to continue to improve the level of professionalism in mosquito control. These extension-related activities were needed, very much appreciated, and deeply valued by the mosquito control and research community. Wayne believed strongly that university research professors had a responsibility to teach and share what they have learned through their experiences. He dedicated a tremendous amount of time to these teaching efforts. His lectures and professional presentations reflected this investment in time. When you had the opportunity to hear him speak, you couldn't help but listen carefully. He captured your attention, delivered meaningful information, and left you wanting more. If Wayne was on the program, the session was well attended. Today, if one of his students is on the program, you will want to hear what they have to say.

Wayne's research programs generated assistantships for graduate students who were trained as mosquito biologists. He actively involved these students in the mosquito research and control community. They were expected to attend professional meetings and report on their research annually. Doc would always provide "one free" meeting to his students, but if you wanted to attend any meeting thereafter, you had better be on the program. His drive to make students speak professionally not only disseminated valuable information for the community, but it also allowed the students to develop as better speakers. As a result, his students were so valued that they frequently filled job openings as they became available within the state and across the nation, at times before they had finished their own thesis research studies. Wayne still has many of his students leading professional mosquito control programs across the country (Fig. 4). It became known that when you hire one of Wayne's students, you have an individual who can do the job that needs to be done on day one. Mosquito control programs were willing to wait for these individuals.

But perhaps Doc's greatest love was teaching. His presentations were always captivating, and you found yourself completely immersed in the story. And without knowing it, you were learning too. He loved every course that he taught, not only at the graduate level, but also to undergrads and even professionals in the field. Doc's undergraduate class "The World of Insects" was one of the most popular classes at

Fig. 4. Students and family of Wayne Crans during a 2001 annual conference of the Northeastern Mosquito Control Association. Back row from left: Tadhgh Rainey (M.S.; Hunterdon County Mosquito Control, NJ), Jamesina Scott (Ph.D.; Lake County Vector Control District, CA), Ary Faraji (Ph.D.; Salt Lake City Mosquito Abatement District, UT), Kristen Healy (Ph.D.; Louisiana State University, LA), Priscilla Matton (M.S.; Bristol County Mosquito Control Project, MA), Peter Bosak (Ph.D.; Cape May Mosquito Control, NJ). Front row: Wayne Crans, Alice Crans, Scott Crans, Topaz Crans.

Fig. 5. Wayne Crans sampling for the most common salt marsh mosquitoes of New Jersey, *Aedes sollicitans* and *Ae. taeniorhynchus*. These species were responsible for the creation of the first mosquito extermination commissions in 1912 through the efforts of the Rutgers professor and attorney John B. Smith. In 2000, Crans would provide the Memorial Lecture on Smith during the annual conference of the American Mosquito Control Association.

Rutgers University. Enrollment was always at full capacity with up to 1,000 students, and another 500 on a standby list! The class was so big and popular that during finals or tests, all hands had to be on deck, and he would recruit all the graduate students and staff to help with proctoring. He also developed Mosquito Biology at the graduate level and would eventually open this up to county employees and professionals working in vector control. This format eventually led to additional training courses for county mosquito control biologists and a NJAES certification in Mosquito Biology, Ecology, Identification and Habitat Recognition. This knowledge formed the foundation for understanding mosquito research and control at the county level. Wayne would take the students into the field to sample for larvae and adults of more than 60 species in New Jersey from various habitats and teach them everything from taxonomy to dissections and bionomics to vectorial capacity. Every student has fond memories of wading through woodland pools with Doc looking for univoltine *Aedes* in northern New Jersey, or sampling salt marsh mosquitoes on the Jersey shore (Fig. 5), or bilge pumping out *Cs. melanura* from cryptic holes in cedar swamps (Fig. 6), or looking for *Cq. perturbans* still clinging to a pulled-out wad of subemergent vegetation (Fig. 2). Grabbing a hoagie with Doc at a Wawa afterwards and listening to another "tale from the swamps" was the bonus.

Wayne was also active at all levels of the mosquito control profession. In addition to his involvement with many other organizations, he served as a Board of Trustees member, Secretary, Vice President, and President of the New Jersey Mosquito Control Association (NJMCA), was Northeastern Regional Director of the Society for Vector Ecology (SOVE), was a member of the Governor's Lyme Advisory Council, and served as Treasurer, Vice President, and President of the Associated Executives of Mosquito Control Work in New Jersey during his active career. Wayne attended the monthly meetings of the NJSMCC, offering them his consultation on arbovirus activity in New Jersey while making recommendations on how best to move forward, together. He was made an Honorary Life Member of the Northeastern Mosquito Control Association, NJMCA, the American Mosquito Control

Fig. 6. Wayne Crans sampling for the elusive *Culiseta melanura* and *Aedes thibaulti* larvae in cryptic habitats. The contributions of Crans helped solidify the role of *Cs. melanura* as the primary enzootic vector of EEE in the northeastern USA.

Association (AMCA), and Associated Executives of Mosquito Control Work in New Jersey. He was also recipient of numerous societal awards, including the Distinguished Achievement Award in Teaching from the Eastern Branch of the Entomological Society of America, the Cooperative Extension Award for Excellence from the Northeast Cooperative Extension Directors, the Alexander Operational Award from the Louisiana Mosquito Control Association, the Jesse B. Leslie Award from the Associated Executives of Mosquito Control Work in New Jersey, and the Faculty Service Award from Rutgers University. Doc was regularly invited to deliver many lectures at various local, regional, and national meetings. His publications also inform the pages of the *Journal of American Mosquito Control Association*, *Journal of Vector Ecology*, *Journal of Medical Entomology*, and many others. He also served as a long-time reviewer for many scientific journals. Doc was extremely proud of his Distinguished Achievement Award from SOVE in 2003 on his "A classification system for mosquito life cycles: life cycle types for mosquitoes of the northeastern United States." Wayne was also honored by AMCA in 2000 when he delivered the Memorial Lecture on John B. Smith and was awarded the Memorial Lecturer Award. In addition to Smith, Doc follows other great mosquito crusaders of New Jersey, such as Thomas Headlee, Tommy Mulhern, and Daniel Jobbins. In retirement, Wayne was awarded Emeritus Faculty status from Rutgers University.

Wayne was predeceased by his older brother, David L. Crans Jr., in 1949, his sister, Ruth Eileen Crans-Brescher, in 2008, his son Terrence David Crans in 2012, and his wife of 56 years, Alice Margaret (Sutherland) Crans, in 2015. He is survived by his sons Scott Cameron Crans and Brett Allen Crans; grandchildren Courtnye Ruth Crans-Koivisto, Brittney Lynn Larvins, Alexander Robert Crans, Victoria Lee Crans, Alexandria Nicole Crans, and Benjamin Michael Crans; and great-grandchildren Morgan Alice Koivisto and a boy yet to be born and named (Fig. 7).

Fig. 7. Wayne Crans and his extended family circa 2006.

The world has lost an expert mosquito biologist, but his legacy lives on through his family, students, colleagues, and friends. Until the next dip, Doc!

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