**Dr. John Howard Frank**

Professor J. Howard Frank was an indomitable Entomologist! He was determined to become a major force in biological control and insect systematics, and he succeeded admirably. He was well-known for his research and ultimate success in biological control of pest *Neoscapteriscus* spp. mole crickets, primarily using the nematode, *Steinernema scapterisci*, and the wasp, *Larra bicolor*. Howard was dedicated to saving several of Florida’s native bromeliads from an invasive bromeliad-eating weevil, *Metamasius callizona*, first unsuccessfully using biological control, and secondly by promoting the study and use of a Belize bromeliad population that is resistant to the weevil. His life-long passion was staphylinid beetle taxonomy. He also was a passionate and very popular teacher, revered by students who took his classes in Biological Control and Tropical Entomology, for which he taught himself rudimentary Spanish. While a Professor of Entomology in the Entomology and Nematology Department at the University of Florida in 1985-2012, he graduated ten Ph.D. and seven M.S. students and remained an active member of the emeritus faculty. He also was well-known as an expert editor of scientific literature and for his exceedingly high standards of English. He was an environmentalist and dedicated member of the Center for Systematic Entomology (CSE) and Gainesville Bromeliad Society, along with several professional entomological societies. Howard’s awards included Lifetime Membership in the CSE and Pioneer Lecturer for the Florida Entomological Society. His curriculum vitae is at <https://entnemdept.ufl.edu/cv/people/frank/>.

Dr. Frank was born in Stockton-on-Tees, England in 1942 and, in 1948, moved with his parents, George and Hilbre Frank, to Newcastle upon Tyne. In 1960, he entered King’s College of Durham University in Newcastle upon Tyne as an undergraduate to study Zoology. His advisor, Edmund Burt, was an insect physiologist. At one Saturday morning lab meeting, Howard was introduced to Edmund’s predecessor, George Varley, who was then professor and head of the Hope Department of Entomology at Oxford University. After graduating from Durham University in 1963, Howard was invited to attend Oxford University as a graduate student. At Oxford, George Varley began a long-term ecological study of the winter moth, *Operophtera brumata*. Howard worked on all the parasitoids and predators of the moth at Wytham Woods, near Oxford. He used radioactive C-14 and serological methods to identify predators that had eaten winter moth pupae. He graduated in 1966, having showed that a staphylinid beetle and a couple of carabid beetles were the most important predators regulating winter moth populations.

Howard was immediately offered a postdoctoral fellowship at the University of Alberta in Edmonton, Canada. September 1966 saw him sailing from Scotland to Montreal, buying a used car, and driving the 2,224 miles to Edmonton. He really liked the people there, especially students Don Whitehead, Andy Nimmo, and Terry Erwin, and professors Doug Craig, George Ball, and head of department, Brian Hocking. Howard had never taken a course in insect taxonomy, but there he learned the subject by association and discussion. His research involved using the techniques he had learned in England to evaluate beetles as predators of the redbacked cutworn, *Euxoa ochrogaster*, a major pest of cereals. The methods worked, and he was able to show that some carabids were important cutworm predators. His faculty sponsor, Ron Gooding, researched insecticides that were least harmful to the beetles.

Howard needed a permanent job and found one in Jamaica with the help of Fred Bennett, whom he met in Edmonton the previous year. So, Howard and his wife, Audrey, drove from Edmonton through 3,016 miles of blizzards in Montana and Wyoming to Miami and placed their car on a ship headed for Kingston. The Sugar Research Department of the Sugar Manufacturers’ Association of Jamaica Ltd. was his employer for the next 3 years. He worked on the major sugarcane pests: sugarcane borer, *Diatraea saccharalis*; West Indian canefly, *Saccharosydne saccharivora*; yellow sugarcane aphid, *Sipha flava*; and lesser cornstalk borer, *Elasmopalpus lignosellus*. A primary goal was to model the life cycle of the canefly and its parasitoids to support biological control instead of using insecticides. As the only entomologist for the entire industry, Howard was responsible for both research and Extension. He was able, however, to meet other entomologists at the University of the West Indies in Kingston plus Tom Farr, an American entomologist at the Institute of Jamaica. They especially enjoyed discussing Jamaican insect natural history. Also, Bob Woodruff from the Florida Department of Agriculture and Consumer Services, Division of Plant Industry (FDACS, DPI) stayed at Howard’s house, along with University of Florida graduate students, Ed Farnworth and Pete Drummond. For recreation, Howard joined the Jamaica Caving Club and spent many exciting weekends exploring caves and collecting staphylinids.

Howard was not ready to leave Jamaica but was offered a position at the Entomological Research Center of the Florida Department of Health in Vero Beach. Audrey and his three small daughters flew to New Jersey to stay with her sister while he began researching the ecology of mosquitoes. Howard enjoyed working with the staff at the Center that included John Edman, John Linley and George O’Meara, and later Phil Lounibos, Jorge Rey and Earl McCoy. Howard admired and respected Maurice Provost, the Center Director, who encouraged him to continue working on staphylinids. However, his primary research was on egg disappearance of *Aedes taeniorhynchus* during winter and summer; the container-inhabiting mosquito, *Aedes aegypti*; *Culex quinquefasciatus*; and mosquitoes in leaf axils of native *Tillandsia utriculata* bromeliads. Undeservedly, he came under fire from the infamous Director of the Lee County Mosquito Control District, T. Wayne Miller, because Miller saw no use in ecology and used insecticides recklessly to control mosquitoes. Howard also studied mosquitoes in leaf axils of the ornamental non-native bromeliad species, *Billbergia pyramidalis*. He determined that there was an average of 107 adult mosquitoes in every plant, and all belonged to the genus *Wyeomyia*, day-biting mosquitoes that do not vector human diseases. *Wyeomyia* spp. are relatively small and require less food to develop from egg to adult than do *Aedes aegypti* or *Culex* *quinquefasciatus*, so die under normal competition with *Wyeomyia*. Twenty-eight years later, Zika virus occurred in Miami and all bromeliads in its botanical garden were destroyed because of the erroneous belief that these bromeliads harbored the disease-vectoring mosquitoes.

Eventually, the Entomological Research Center was re-named the Florida Medical Entomology Laboratory and transferred to the University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS). Howard, now a member of the UF/IFAS faculty, was encouraged by Professor Will Whitcomb to succeed him in the Entomology and Nematology Department. Before retiring, Will Whitcomb introduced him to the Gainesville faculty as a “dirty-hands ecologist”, an expression Howard liked after a while. Howard was hired and Professor Tom Walker immediately involved him in research on biological control of invasive mole crickets. Ultimately, four natural enemies of the pest mole crickets were imported from South America: the crabronid wasp, *Larra bicolor*; *Ormia depleta*, a tachinid fly; a carabid bombardier beetle, *Pheropsophus aequinoctialis*; and *Steinernema scapterisci*, an entomopathogenic nematode. He distributed the wasp and fly widely in Florida and, along with Professor Norm Leppla and Lucy Skelley, established the nematode throughout most of the state. The predatory beetle could not be released because it fed on the eggs of *Neocurtilla hexadactyla*, a native mole cricket. However, the other three biological control agents brought about a 95% reduction in pest mole crickets.

In 1991, Howard heard about an invasive weevil attacking native bromeliads in Florida and involved Mike Thomas, a beetle expert at FDACS, DPI. They drove to the Broward County Parks Headquarters and discovered windrows of dead *Tillandsia utriculata*. After reporting this occurrence in the Journal of the Bromeliad Society, Nat Deleon, a leading bromeliad advocate and member of the Florida Council of Bromeliad Societies (FCBS), asked Howard to start a biological control project to protect Florida’s native bromeliads. The FCBS provided early financial support for weevil and bromeliad research and continued to do so for many years. The weevil had been identified by beetle specialist and Howard’s friend, Charles O’Brien, as *Metamasius callizona*, native to southern Mexico, Belize and Guatemala. Howard began mapping the weevil’s progression in Florida, which eventually spread to 23 counties. He obtained USDA Agricultural Research Service foreign exploration funding and with Mike flew to Merida, Mexico in the Yucatan and drove over 600 miles to a nursery in Fortín de las Flores that had exported weevil-infested bromeliads to Florida. They collected bromeliads infested by *Metamasius callizona* and transported them to Gainesville where all of the weevils died in quarantine without producing a parasitoid. Subsequently, Howard contacted Ron Cave at Escuela Agricola Panamericana at Zamorano in Honduras and asked him to collect local bromeliads infested by the weevil. Ron recovered some tachinids from the weevils and along with Monty Wood, a retired Canadian tachinid expert, described the flies as *Lixadmontia* *franki*, in honor of Howard. Howard and Teresa Cooper struggled to rear flies from weevils collected at several locations and were able to release 7,000 flies at10 natural areas in Florida but the parasitoid never established.

Howard was asked to develop a graduate course in biological control in the Entomology and Nematology Department in 1989 and taught it every other year for 30 years. Reece Sailer taught the subject previously. In 1995, Howard was on sabbatical at the Instituto de Ecología in Xalapa, Mexico to gain the ability to lecture in Spanish. Subsequently, Dr. Pepe Clavijo of the Departamento de Zoología Agrícola, Universidad Central de Venezuela in Maracay suggested to the chairman of the UF/IFAS Entomology and Nematology Department that Howard should begin a course in Tropical Entomology, including a field trip to Venezuela. Howard consequently began teaching this second course every two years for both undergraduates and graduates in 1997. The course continued until 2011, when Venezuela became unsafe for the students. Howard began his active retirement the next year, being characterized at his career celebration as Florida’s David Attenborough! He passed away on January 21, 2023. Howard is survived by Audrey and their three daughters, Christine, Jocelyn, and Susan. He is also survived by his sister Leslie Crossley and Luton England. The family will hold a private Celebration of Life at a later date.



Dr. Norman C. Leppla

Dr. Teresa Marie Yawn