THOMAS SAY
PUBLICATIONS
IN ENTOMOLOGY

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Memoirs of Black Entomologists:
Reflections on Childhood, University, and Career Experiences

Edited by

Eric W. Riddick, Michelle Samuel-Foo, Willye W. Bryan, and Alvin M. Simmons

ENTOMOLOGICAL
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James B. Woolley
Editor

Cover photo: Dr. Michelle Samuel-Foo conducting an antixenosis test in a greenhouse in Athens, GA. (Photo courtesy of M. Samuel-Foo)

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Preface

A book on black entomologists probably would have been a great source of inspiration for me 30 years ago. At the time, I had very limited knowledge of entomology as a profession. As an undergraduate student in the Department of Zoology at Howard University, I only knew one black entomologist, Dr. Margaret S. Collins, and only superficially at best. It was not until I began doctoral studies in the Department of Entomology at the University of California at Berkeley, where I met a few successful black entomologists (Mr. Marion Page and Dr. Carroll Williams), that I began to believe that a career in entomology was obtainable and worthwhile. In 1991, I began attending conferences of the Entomological Society of America (ESA), where I met other black scientists and graduate students, many of whom were firmly committed to the science of entomology. Seeing many of these same entomologists, and meeting others for the first time, has been a highlight of my participation in ESA conferences over the years. This book provides a glimpse into the lives of some of the entomologists that I have met over the years; many of them inspire me to "keep going." I hope you will get to know some of them as you read their personal stories in these memoirs. I believe their memoirs will inspire you.

By Eric W. Riddick (Lead Editor)

Acknowledgments

The editors thank...

Dorothy W. Williams, Rob Hagley, Charles I. Abramson, Janice G. Peters, A. Bruce Broadbent, Dave Gillespie, Christian Borgemeister, Dolorosa Osogo, Chris Stelzig, Debi Sutton, Henry C. Mulzac, Diane Sammataro, Dianne Behnke, Joe Graham, Lindy Smith, Karen Kester, Moses T. K. Kairo, Luc Leblanc, Geraldine W. Twitty, Franklin R. Ampy, Lori Podolsky, and others who disclosed information on, or shared their knowledge of, black entomologists, living and deceased. We also recognize the many teachers, scientists, and colleagues who inspired the entomologists contributing to this book. Twenty black entomologists wrote memoirs, thereby sharing their lives with the world. Without their contributions, this book would not have seen the light of day.

Introduction

Objectives

This book provides a glimpse into the lives of black entomologists. The term "black" refers collectively to people of color with origins on the African continent. Thus, African Americans and others of the African diaspora represent the people highlighted in this book. As you may know, historically, blacks and other "people of color" seldom choose careers in the natural or life sciences, including entomology, for reasons that are not completely understood (Richmond and Whitney 1990, Feir et al. 1990, Sammons 1990, Baker 2000, Armstrong et al. 2007). For example, blacks (Africans and African Americans combined; students and nonstudents) represented just 2% of the membership of the Entomological Society of America (ESA) in December 2012 (Stelzig, ESA, unpublished data). Moreover, most universities with departments that offer doctoral programs in entomology have no black students, postdoctorates, or faculty on their rosters (WWB and EWR, unpublished survey data). We believe this pattern of low representation of blacks in the entomology profession in North America can change. Because of the dearth of blacks (American born and African born) in the natural sciences, the objectives of this book are (1) to stimulate more interest in entomology as a viable profession for the undecided student and (2) to become a useful reference work to help high school, college, and university administrators recruit and retain students and faculty. We also hope this book will stimulate more communication among black entomologists currently serving the profession in various venues, including academia, industry, and government, around the world. In a broader context, this book might be of significance to researchers interested in the history and sociology of science.

In the first section of this book, we provide a tribute to the life and career of Dr. Charles H. Turner, who was most likely the first black professional entomologist in North America. In the second section, we provide memoirs of representative, living black entomologists. The third section includes an appendix of abbreviated biographies of five deceased black entomologists and an appendix of contact information for the authors who contributed to this book.

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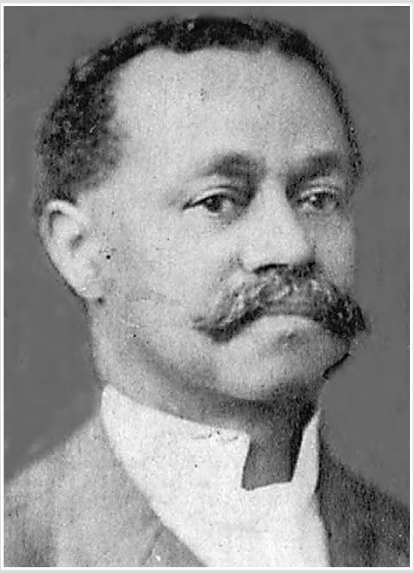
Why Memoirs?

We decided that we could achieve the objectives of this book if some of the entomologists currently working (or retired after a successful career) would share their lives with students and others interested in entomology by writing a personal memoir (biography). We provide the memoirs of 20 black entomologists currently working, or retired after working, in North America. Many others are active in this profession on a global scale; unfortunately, due to time and logistical constraints, memoirs from black entomologists currently working in other countries were not obtainable at this writing.

Most entomologists begin their memoirs by reflecting on one or more childhood experiences that probably guided their path to a career in entomology. Others mention challenges they endured and surmounted while in college/university or afterwards, while engaged in their careers. In an attempt to standardize the content, we developed several questions for each author to answer as they developed their memoirs. The questions used are as follows:

1. What is your birthplace and hometown?
2. Describe when and how you became interested in insects and/or other organisms.

3. Was your family (or other individuals close to you) supportive of such interests?
4. Where did you attend college/university and what were some of the challenges that you faced during your time there?
5. How influential were mentors, teachers, or supervisors in guiding your studies or career path?
6. What are some of your most important post-graduate experiences relative to research or teaching opportunities that became available after completing your degree(s)?
7. How did these opportunities (or lack of) influence the direction of your career?
8. What is your mission statement as a scientist?
9. What is your vision statement?
10. What is your current place of employment or affiliation? If retired, please indicate.
11. What are a few of your major accomplishments (publications, awards, foreign travel, conferences, teaching, and/or outreach successes), to date, that might serve to inspire others?
12. What are the citations of several of your representative peer-reviewed publications?
13. What is your key advice to students or others considering a career in entomology?



Dr. Charles H. Turner
Courtesy of Dr. Charles I. Abramson

"The epitaph on Turner's tombstone aptly summarizes his life and simply reads, 'Scientist.'"

Dr. Charles H. Turner

One of the greatest names in the study of insect behavior is Charles Henry Turner. Turner does not easily fit into any one discipline; he has been called a zoologist, entomologist, and comparative psychologist. His contributions are many and varied. During his career, Turner published at least 71 papers. These papers include observational studies; anatomical studies; investigations into the learning ability of cockroaches, ants, and honey bees; development of apparatus; classical conditioning of moths; and even civil rights.

Life and death: Charles Henry Turner was born on February 3, 1867, in Cincinnati, Ohio (Cadwallader 1984). Following a 33-year career, Turner died in Chicago, Illinois, on February 14, 1923, of acute myocarditis. The epitaph on Turner's tombstone aptly summarizes his life and simply reads, "Scientist."

Factors contributing to decision to study insects and early influences: The biographical record regarding the factors contributing to Charles Henry Turner's

decision to study insects is sadly incomplete and unclear. Both parents supported his education but whether or not they held any interest in insect behavior is unknown. His father, Thomas Turner, was a custodian, and his mother, Addie, was a practical nurse from Lexington, Kentucky (Davis 1968). Turner's parents settled in Cincinnati because of its support for African Americans (Woodson 1916), and they encouraged young Charles' studies.

Turner spent his high school years at Woodard High School and graduated valedictorian. Following graduation, he enrolled in the University of Cincinnati in 1886 and earned his B.S. degree in biology under the tutelage of the comparative psychologist Clarence L. Herrick in 1891 (Cadwallader 1984). Upon graduation, he remained at the University of Cincinnati, earning his M.S. degree in 1892, also under the guidance of Herrick (Cadwallader 1984). During his days with Herrick, Turner began studying invertebrates. However, many of his early studies followed the interests of his mentor and were anatomical studies of avian (bird) species. For example, his first publication was a morphological study of the avian brain (Turner 1891). His first invertebrate paper was a psychological study of the web-making habits of the gallery spider (Turner 1892a). Turner also published a paper describing new species of aquatic invertebrates he discovered in Cincinnati (Turner 1892b).

Why Turner decided to focus on insect behavior is not clear, but I offer several possible reasons. First, anatomical studies require laboratory facilities and specialized equipment; Turner had neither. He continued his anatomic work for several years after leaving the University of Cincinnati, with the last paper appearing in 1901 on the mushroom bodies of crayfish (Turner 1901). Second, insects are readily available and easily housed compared to vertebrates. This is important because Turner could not find stable work until his appointment at Sumner High School. Third, insects are useful subjects to investigate psychological topics dealing with the evolution of learning and the generalization of learning phenomena. His work on color and pattern discrimination in honey bees, for example, was designed to show whether bees see color and patterns associated with flowers. He was most likely influenced by the studies of ant behavior conducted by one of his teachers, William M. Wheeler. In 1907, Turner published a review of Wheeler's ant work in the *Psychological Bulletin* (Turner 1907a) and it is not surprising that Turner's dissertation was on the learning of ants (1907b). He received a Ph.D. in zoology from the University of Chicago in 1907.

Obstacles and challenges faced and surmounted: It is difficult to imagine the challenges and obstacles Turner faced as an African-American scientist.

During his days at the University of Cincinnati, it was his mentor's custom to hold regular laboratory meetings. Herrick was concerned that the presence of Turner might be disruptive and offensive to his white students. Opinions were solicited. In short (Herrick 1955): "…He reported back that there was no objection to the plan by anybody. On succeeding Fridays a long laboratory table was cleared, spread with a white cloth, and we all sat around it discussing our scientific reports over tea and cakes, a beautiful demonstration of the cardinal principle that science recognizes no distinction of sex, creed, or race. Indeed, after Turner's graduation in 1891, my brother's successor had him appointed as an assistant in the department."

Herrick's observation on the "cardinal principle" aside, it is interesting that in 1907 when Turner applied for a position at the University of Chicago, he was rejected, in part because of his race. By the time of his application, Turner had over 20 publications, many of them major contributions containing several experiments with two or more species. As W. E. B. Du Bois (1938, 1939) recounted, "C. H. Turner, one of the great world authorities on insects, nearly entered onto the faculty of Chicago University, but the head professor who called him died and his successor would not have a 'nigger.' Despite a reputation which was European, Turner died in a high school of neglect and overwork."

Another obstacle Turner had to overcome was the perception that African Americans could not do scientific work. This must have been especially painful to Turner because of his excellent publication record and the quality of his contributions. Turner may hold the distinction of being the first African American to publish in the journal *Science,* yet J. McKeen Cattell, the editor of *Science* at the time, stated at the 1913 annual meeting of the American Association for the Advancement of Science, "There is not a single mulatto who has done creditable scientific work…" (Cadwallader 1984). Turner had published 54 papers with three of them in *Science*—the very journal Cattell edited.

How Turner overcame such obstacles and challenges is difficult to say. He left behind no written record of his personal philosophy. It is clear that he made time for research, used his high school students to help collect data, published high-quality work, wrote on civil rights issues, and joined organizations and held offices. In regard to the latter, Turner was elected to membership in the Entomological Society of America (ESA) on August 21, 1907, and was an active participant presenting papers and holding positions of responsibility such as serving as a member of the Auditing Committee for both the 14th and 16th annual meetings (Abramson 2009).

One of the few existing glimpses into the personality of Turner that may help us account for his achievements was written by his friend, entomologist Philip Rau, who commented in *Entomological News* on the occasion of Turner's death, "The handicaps under which Dr. Turner's work was accomplished were many and were modestly and bravely met" (Rau 1923).

Key works: A volume on Turner's publications, bibliography, and biography is available (Abramson et al. 2003, Abramson 2006), as is an analysis of his entomological work (Abramson 2009). Turner was a major figure in the literature on insect learning and contributed to the growing body of early experimental work demonstrating that insects were not "reflexive machines," but had memory and problem-solving ability and perhaps emotion. He used controls such as the use of heat filters that were rare for the time and insisted upon replication of his results. Turner regularly investigated variables including age, developmental stage, and sex. The manipulation of variables such as the time between training trials (known as the intertrial interval) was also a regular part of his research methodology.

Turner published on a wide range of entomological topics including death feigning in ant lions (Turner 1923) and naturalistic observations in a variety of insects including wasps (Turner 1908a), flies (Turner 1908b), and parasitic bees (Turner 1911a). He is perhaps best known for his work on learning in ants, honey bees, and cockroaches. His learning work with insects reveals both creativity and attention to detail. All of the learning studies required him to construct apparatus and to extrapolate observations made in the field to laboratory situations. He discovered, for example, that the maze-learning ability of ants was influenced by olfactory, visual, kinesthetic, and tactile stimuli; exhibited variability; and contained a memory component. He also discovered that ants hear airborne sounds and that female ants outperform their male counterparts (Turner 1907a, 1907b).

Another example of his interest in learning was revealed in experiments on color and pattern vision in honey bees. The experiments required him to design apparatus in which bees flew into a training device resembling a cornucopia. In two publications, 51 separate experiments were described (Turner 1910, 1911b). He believed that the bees were creating "memory pictures" of the environment and developed a technique in which patterns and colors were combined in what might be the first experiments on compound conditioning in honey bees. The experiments were conducted in O'Fallon Park in St. Louis, Missouri, near Sumner High School, and represent an excellent example of how Turner overcame the lack of laboratory facilities to conduct experiments.

In addition to an analysis of learning in ants and bees, Turner was interested in the learning of cockroaches. He demonstrated that roaches could modify their avoidance of light after receiving an electric shock when entering a dark location (Turner 1912). He tested adult males, adult females, nymphal females, and individuals with amputated antennae. Turner showed that roaches learned to associate darkness when punished, memory of the task lasted 21 days, male roaches learned faster than female ones, young ones faster than old, and learning behavior persisted even after molting.

Turner confirmed that roaches could profit by experience in a second paper (Turner 1913). Here he describes a new type of maze apparatus, which allows the insect to return to the home container as a reward. He reports how the roach uses a variety of sensory systems to solve the problems offered by the maze. Turner also provides interesting descriptions of "jumping activities," "acrobatic feats," and "toilet-making habits." Turner also suggests that roaches "…act as though experiencing the emotion the psychologists call will."

Of all of the insect learning experiments conducted by Turner, the one I believe is most often overlooked is his study of moths (Turner 1914). In one study, the polyphemus moth, *Telea (Antheraea) polyphemus,* was confined to a dish. A whistle was presented that elicited no visible reaction and was soon followed by "rough handling." The rough handling elicited wing movement. After a number of pairings of the whistle and rough handling, the moth began to move its wings in response to the whistle. This study may be the first demonstration of classical or Pavlovian conditioning in an insect. In discussing the experiments, Turner stated, "There is much evidence that the responses of moths to stimuli are expressions of emotion. The fact that an insect does not respond to a sound is no sign that it does not hear it. The response depends upon whether or not the sound has a life significance."

Many influential psychologists, such as John B. Watson, Margaret F. Washburn, Theodore C. Schneirla, Carl Warden, and Edward L. Thorndike, cited Turner's work. Watson, for example, characterized Turner's maze experiments as "ingenious" (Watson 1907). Turner's ant work is also mentioned along with seven others, for making "…important contributions to our knowledge of the ways of ants," in John H. Comstock's (1930) influential entomological textbook, although there are no citations or discussion of Turner's work.

Awards: In 1910, the French naturalist Victor Cornetz named the exploratory circling movements that ants make upon re-entry to the nest "Tournoiement de Turner" (Cornetz 1910), and in 1912, the African-American magazine

The Crisis named Turner one of the "Men of the Month" (Du Bois 1912). Following his death, Turner's contributions as a scientist, educator, and civil rights leader were recognized on several levels including: (1) the Charles Henry Turner Open Air School for Crippled Children, established in 1925, (2) the Charles Henry Turner Middle Branch, founded in 1954, and (3) the Charles Henry Turner MEGA Magnet Middle School, founded in 1999. Now the Turner MEGA Middle School is closed. So are the others. In 1962, Turner-Tanner Hall (now known as Tanner-Turner Hall) at Clark College in Atlanta was named in his honor. More recently, in 2002, the Animal Behavior Society created an annual Charles H. Turner Poster Session and Travel Award for undergraduate students (Abramson et al. 2003). I am currently attempting to have Turner honored with a commemorative United States postage stamp; an example is available in Abramson and Long (2012).

By Charles I. Abramson
(Department of Psychology, Oklahoma State University, Stillwater, Oklahoma)

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Jessica L. Ware

"Evolutionary biology is one of the key disciplines in science that can help us understand our world."

Memoirs

Jessica L. Ware

I was born in Montreal, Quebec, with an identical twin. My family moved to Toronto, Ontario, Canada, shortly after we were born, and we lived there until I was 18. In Toronto, the only insects we saw at home were ants and flies! We were lucky that my grandparents had a cottage up north that we visited often throughout the winter and summer months when school breaks permitted. Their cottage sat on Lake Muskoka, a large lake surrounded by birch, poplar, maple, and pine trees. We spent every summer at the cottage, playing outside from sun-up to sunset. Whether canoeing on the lake, picking blackberries in the forest that surrounded their cottage, or playing in my grandmother's garden, we were surrounded by insects. Large, colorful dragonflies and damselflies landed on the dock while we were swimming, grasshoppers jumped through the bushes as we hiked, and the ever-annoying mosquitoes were a constant presence when we were weeding the vegetable garden.

Around the age of nine, a friend of my parents mentioned that there were jobs for people who loved nature as I did, and that such scientists were called "biologists." Then and there, I decided to go into biology, although I was not sure what kind of biology I wanted to do. After high school, I enrolled at the University of British Columbia (UBC) and signed up for a marine biology major, which was basically an invertebrate zoology major.

Education:

- B.Sc., 2001, Invertebrate Zoology, University of British Columbia, Vancouver, British Columbia
- Ph.D., 2008, Entomology, Rutgers University, Rutgers, New Jersey

My first entomology exposure was during an introductory invertebrate zoology course at the University of British Columbia, and it interested me enough that I decided to take an entomology class. Drs. Geoff Scudder and Karen Needham taught this entomology course. Coincidentally, they were looking for a work-study student to help relabel the beetles in the UBC Spencer Entomological Museum. I was supporting myself through university and I needed to work, so the job seemed like a dream opportunity! After spending the year working with them, I was hooked. Entomology was my passion from then onward. I volunteered as a field assistant with Dr. Tony Sinclair's then postdoc, Dr. Diane Srivastava, who was working on damselflies, beetles, and flies that inhabit bromeliad plants in the Costa Rican rainforest. Later, I worked with Dr. Judy Myers and her students on tent caterpillar and cabbage looper biological control initiatives.

My family was supportive of my decision to go into entomology, although I was certainly the only person they had ever heard of in that profession. My friends thought it was gross and worried that I would never meet a man to marry. I was fortunate to meet a fellow entomologist, and we have been married for over a decade. I found support in taking African-American history, taught by Paul Krause. He encouraged me to continue in science even though I saw no examples of people of color in professorships or lectureships in UBC's zoology department.

I did not do a master's degree, but went right into a Ph.D. in evolutionary entomology at Rutgers University, Newark, New Jersey. My advisors, Drs. Mike May and Karl Kjer, were supportive of my outreach efforts to encourage women and underrepresented minorities to enter entomology. I did this outreach through library and school presentations as well as by mentoring students.

Hands down, the most important postgraduate experience I had that solidified my career goals was my first trip to the tropics. I graduated with my bachelor of science from UBC and immediately left for a semester in Costa Rica with Dr. Diane Srivastava. I met other scientists of color, and Diane gave me responsibilities that allowed me to grow as a researcher. I undertook a small

independent study while helping her with her community ecology study of bromeliad dwelling insects. Through this experience, I realized that (a) I was not the only person of color in entomology, and (b) I could make a career of doing research that was fun and challenging.

My current research aims are to increase awareness of the biodiversity and evolutionary history of insects through ecology, molecular biology, and morphological analyses. Insects are vital to the future survival of Earth and humanity, but we lack basic biological information on the majority of known species, never mind the perhaps millions of undescribed species that are out there. Evolutionary biology is one of the key disciplines in science that can help us understand our world.

Plate 1: Dr. Jessica Ware and colleague hunt for dragonflies in the tropics. (Photo courtesy of Jessica Ware)

Currently, I am an assistant professor at Rutgers University, Newark campus. I have been at Rutgers since 2010. I am also a research associate at the American Museum of Natural History in New York City and the National Museum of Natural History in Washington, D.C.

Several of my accomplishments are listed below. These include board memberships, teaching, honors and awards, museums visited, and fieldwork destinations.

Board memberships:

- Editorial board member, *Organismal Diversity and Evolution*
- Editorial board member, *International Journal of Odonatology* (subject editor: molecular biology)
- Editorial board member, *Journal of Earth Science & Climatic Change*

Teaching:

- Undergraduate Ecology 240, Fall 2011, 2012
- Rutgers Biology Colloquium, 2011-2013
- Graduate Evolution 532, Spring 2011, 2012, 2013

Honors and awards:

- NSF Postdoctoral Fellowship, American Museum of Natural History, New York City, 2008-2010
- Snodgrass Memorial Award, Entomological Foundation, November 2008
- Comstock Award, Entomological Society of America, November 2008
- Excellence in Science membership, AAAS, September 2007
- Outstanding Presentation Award, World Dragonfly Association, April 2007
- Compton Markle Award, Rutgers Department of Entomology, April 2007
- Ernst Mayr Finalist, Society for Systematic Biology, June 2006

Museum collections visited:

American Museum of Natural History, New York, New York; California Academy of Sciences, San Francisco, California; Smithsonian Institution, Washington, D.C.; National Museum, Sydney, New South Wales, Australia; CSIRO, Canberra, New South Wales, Australia; University of Canberra, New South Wales, Australia

Fieldwork:

I have undertaken several field expeditions, including four to Guyana, where I led students in extensive canopy, aquatic, and terrestrial sampling of Dictyoptera and Odonata. I have also undertaken fieldwork in Australia (two weeks), Barbados (one week), Belize (two weeks), Canada (various provinces), Costa Rica (six months), Ecuador (two weeks), Guyana (three months total), Mexico (one week), Namibia (10 days), Sweden (one week), and the United States (various states).

Key advice to students:

I encourage students to volunteer and gain research experience early on in your training. Entomology is a vast discipline and there are many different avenues to take. Until you get a chance to get your hands dirty doing research, it is hard to know what part excites you the most. I learned far more from my

work study and volunteer positions as an undergraduate, both at UBC and in the field in Costa Rica, than I did in lectures or labs. In fact, my entomological preferences changed with each new experience, as I switched from a focus on biological control to a focus on evolutionary biology. I would not have discovered my true love for dragonflies and damselflies without hands-on experience. Students are often afraid to ask for volunteer positions, but I would urge them not to be nervous about approaching professors whose research looks interesting to them!

By Jessica L. Ware

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Jeurel Singleton

"Because of the unequal allocation of educational monies and resources, my teachers had to be resourceful to make us competitive in the world that was beyond our borders."

Jeurel Singleton

My birthplace on my birth certificate is noted as Helena/West Helena, Arkansas (twin cities on the banks of the Mississippi River), but in reality, I was born at home on a very poor 500-acre subsistence farm near these two towns. My parents were interracially married, which was illegal at that time in the state of Arkansas. Therefore, they could not live in the city limits of either city.

Because my mother was a practicing medicine woman from the Creek Reservation in Oklahoma, growing up also meant summer visits to the reservation (called "the Land") in exchange for the "cousins" coming to spend time on the farm with us to do work. Because both locations, our farm and the Land, were dirt poor, I spent a lot of time down in the dirt. I was always interested in ants because they were down at my level, in the dirt. Ultimately, I had six siblings and none was more fascinated with insects than I was. Because I was the first female after three boys (the first boy died in infancy), my mother made me wear dresses with white pinafores—of which I was not fond because these skirts got caught under my knees while crawling to keep up with various bugs

that migrated through the house. My favorites were the ants because they always knew where they were going and how to get back to their home. My earliest memories are of watching the ants of all colors and sizes march down their hole, "talking" to each other. I saw their little faces and saw them talking to and touching each other, but they would not talk to me; I tried to follow them home by trying to get down the hole in the floor, which resulted in big knots all over my forehead. My mother thought my brothers had done this to me until she caught me in the act of trying to get down the ant hole.

As I grew up, my older brother taught all of us how to read, write, and do arithmetic before we went to school. He scrounged books for us from the city dump, which was near our farm, and encouraged our "teaching or school games." Both of my parents had limited formal education—my father had sixth-grade and my mother had eighth-grade training—but both were avid readers and instilled in all seven of us the need to get an education and find what we liked to do with our lives by watching successful people around us.

This was during the Jim Crow "separate-but-equal" days in Arkansas, in the 1950s and 1960s. Because of the unequal allocation of educational monies and resources, my teachers had to be resourceful to make us competitive in the world that was beyond our borders. All of my teachers—in all subjects from first grade until high school—had master's and Ph.D. degrees. Each summer, many would go to research laboratories and universities in other states (New York, Illinois, Massachusetts, Pennsylvania, Tennessee, New Jersey, Maryland, Washington, D.C., California, and others) to do summer research or gather new teaching methodologies to use in our classes in Arkansas. My biology and physics teacher always went to the Oak Ridge, Tennessee, research laboratory and brought back microscopes, chemicals, physics equipment for optics and electrical engineering experiments, and other supplies. He also brought back information about the National Science Foundation Young Scholars summer program, and I applied in my junior year of high school with a competitive essay on why I wanted to be a scientist. I was accepted for this 10-week program at the University of North Dakota in Grand Forks, North Dakota.

I did not know that this would be a 48-hour bus ride out of the South and into the cold flat North, but I was ready for this adventure because it was all new and exciting. I could not eat or drink any liquids until I reached Iowa, where the "White Only and Colored Only" signs disappeared. I had to sit in the seat behind the white driver of the bus because my father told the driver, who was his friend, to look after me until I changed buses in Iowa and continued to North Dakota. I had a lot of reading material and the countryside was fascinating!

To make a long story short, I successfully completed this program, and my awareness of the world jumped light years ahead. However, the world was rapidly changing because of the Civil Rights movement, the Vietnam War, and the 1960s and 1970s hippie era. The program had such a profound impact on my life that I had even more of a thirst for knowledge and information about the world and the organisms that live in it. I wanted to go out and find the names of all of the animals, plants, rocks, clouds, and minerals in the world. I also wanted to find a way to control the boll weevils and pea weevils that destroyed our crops every year.

The next year, I graduated from high school and started preparing early for entry into any university or college that gave the best scholarships. The National Science Foundation had scholarships for students who had been in the summer programs, so I applied for one and received a six-year scholarship to go to the school of my choice, which was North Dakota, of course. Getting there on my own was another adventure because I had to pay the $58 bus fare myself and I did not have a dorm assignment or people to pick me up at the bus station and take me to school. To raise money for the trip, I worked as a domestic helper for a poor white family the summer before I left and received a fee of $2.50 each day for six 12-hour days a week. They could only afford to pay me $15 a week to care for three little children under age five, make meals, clean house, and do the washing and ironing. I was determined to earn the bus fare to North Dakota and have a little to spare for luxuries such as a soda or chips. This determination was spurred on by my summer internship at the University of North Dakota.

I left for North Dakota to go to preregistration in July and my scholarship started in September. I had planned to get a domestic worker job in Grand Forks to tide me over until the scholarship was activated. When I got to Grand Forks, I had a total of $4.39 after purchasing a bag of chips and saltines while on the bus ride. The only people I knew in Grand Forks were students who had been in the summer program—who were not on campus yet—and one dorm mother. So I thought of places to stay where I would not impose on anyone, especially people I did not know. Since I had no money to pay for a hotel—which I thought would have cost a small fortune—I came up with the best and safest location I could think of, the cemetery about one mile from campus. I squatted in the cemetery as I looked for work and a place to live at the university. This took about eight days. I slept on a piece of discarded carpet near two large “Olson” headstones using my clothes and an army blanket I found in the trash for covering. I ate wild weeds (mustards, dandelions, willow tips, various grasses), grasshoppers, crickets, skinned toads and a frog,

and sparrows—all cooked in tin cans over a larger Folgers coffee can stove. I did try to catch larger game such as rabbits and squirrels, but they were not common in the cemetery. The cemetery had water from a faucet near the locked storage and equipment building that I used for drinking and washing. Since camping was something we commonly did during hunting and foraging trips back home in Arkansas, and at the Land in Oklahoma, I was not afraid.

During the day, I would walk to campus and look for work, but people around campus did not hire domestic workers who just knocked on the door and asked for work. I tried at the different buildings and dormitories on campus to get cleaning work, not knowing that universities had special departments to do this. Finally, I ran into a dorm mother whom I had met during my previous stay in this dorm. She quizzed me and wanted to know what I was doing and where I was staying, so I told her. She was shocked and gave me a bed in the basement of the female-only dorm. We went to the science building, and she helped me secure a job washing glassware and cleaning the labs. I was ecstatic. Over time, I met three people who eventually served as my mentors and professors.

Drs. George C. and Jeannette Wheeler, who were ant people (myrmecologists), guided me through my undergraduate days, along with my academic advisor, Dr. Omer Larson. The two females that impressed me and made me believe females could be scientists were Dr. Vera Facey (a botanist) and Dr. Jeannette Wheeler because they had husbands and children. My research advisors, Dr. Paul B. Kannowski and Dr. Joe K. Neel, found work for me on the ant farm and on the lakes and streams of the prairies—learning about all of the organisms and systems that were at work. These scientists were "old school naturalists" and trained me well. One unforeseen benefit was the exposure and opportunity to work with famous world-caliber scientists such as Drs. Edward O. Wilson, Murray Blum, and Tom Eisner. Therefore, I did my master of science thesis on ants.

After North Dakota, I went to Penn State University at State College, Pennsylvania, to do work on parasites under Dr. K. C. Kim and on forest pests under Dr. Mumma. I completed two years of coursework, candidacy, and comprehensive examinations. During the summer, I conducted research on the gypsy moth project, the two-lined chestnut borer, and on the Allegheny mound-building ants. I was poised to work on pheromones of the two-lined chestnut borer when my Canadian husband—whom I met in North Dakota and married after a brief (four-week) courtship—came to Penn State. I became pregnant with our first child and because I had no maternity insurance, we headed to

Canada where he had his Quebec Medicare card and I could get help. Once in Canada, I had one year out of university with my premature daughter (who I named after Dr. Kim) and started to get acquainted with the universities in Ottawa, Ontario.

This is when I found my new Ph.D. advisor, Dr. Bernard Philogene, and one of my best friends, fellow graduate student, Juan F. Chang. I chose the University of Ottawa, which was one of three bilingual universities in Canada at that time. I had to immerse myself in French so I could complete my degree, teach in both languages, and succeed. My research was on the ecophysiology of the larval stemmata of selected caterpillars. This project involved the use of light, transmission electron, and scanning electron microscopy with behavioral and ecological studies on the behaviors of these insects. I was at the end of the Ph.D. course of study when my second daughter Jeannette was born (no complications) and my marriage fractured, but did not fall completely apart.

Education:

- B.A. (B.S.) 1969, University of North Dakota, Grand Forks, North Dakota: Major: Composite Sciences (Zoology, Ecology, Botany, Geology, and Limnology). Senior thesis: Aquatic Diptera of three saline lakes in North Dakota
- M.S. 1971, University of North Dakota, Grand Forks, North Dakota. Major: Zoology (Entomology), Minor: Botany, Ecology, and Aquatic Biology. Master's thesis title: Male genitalia of four species and species-groups of the ant genus *Formica*
- Ph.D. 1980, University of Ottawa, Ontario, Canada, and Pennsylvania State University, State College, Pennsylvania. 1972-1974. Major: Entomology (Biology)
  - Dissertation title: The internal anatomy and external morphology of the stemmata (lateral ocelli) of some Lepidoptera larvae and their physiological implications

I applied for and received a postdoctoral fellowship at Agriculture Canada in Winnipeg, Manitoba, to work with the red turnip beetle, a pest of canola crops, under the mentorship of Dr. George Gerber. I lived in a tent in the Provincial Park until I found housing in Winnipeg. I stayed in the park with my little girls (eight months and three-and-a-half years old) for two weeks. This was July, so it was hot and rainy. Eventually we found a place in a Francophone Village, which was close to the research station.

In Winnipeg, I became a Canadian citizen, then moved to Calgary and worked in the oil industry as a biological consultant. I did biological assessments and inventories, and developed mitigation plans all over mountainous terrain, the high arctic of Canada and the United States. Here, I examined the stomach contents of seals, whales, caribou, arctic foxes, fish, and moose. After my marriage failed, I moved to Vancouver, British Columbia, and took a position with Simon Fraser University, under the tutelage of Dr. John Borden. I worked on insect pheromones and the ultrastructure and function of antennal receptors. This was a teaching post, but it did have a research component.

As many changes occurred in the Canadian government, I left Canada to go to the University of Washington at Seattle, then to the U.S. Fish and Wildlife Service's Endangered Species program in Sacramento, California, where I listed invertebrates and one mammal—all of which are still protected. Later, I was recruited to the University of Arkansas at Fayetteville, Arkansas, to join the Cooperative Fisheries Biology Group, but was hired by the university to serve on the biological sciences faculty as a parasitologist and teach general biology courses. I stayed at the University of Arkansas for eight years after I was tenured and promoted to associate professor. I taught at Northwest Arkansas Community College as a full professor for two semesters and then was in a position to leave Arkansas. As my new husband completed his Ph.D. at Little Rock Medical School, my oldest daughter Kim had completed a bachelor's degree at the University of Arkansas and my youngest daughter Jeannette had completed high school. It was time to move.

After putting in applications at several universities and colleges, both private and public, I started to get to know more about historically black colleges and universities (HBCUs)—I first learned of them in Seattle, Washington—and decided I wanted to work at one of these types of schools since I had no experience with this student population. I later learned that many of my high school teachers had earned their master's degrees from these schools. I applied to Meharry Medical College where my husband was doing his postdoctoral fellowship and to Rust College in Holly Springs, Mississippi, which is closer to Nashville, Tennessee, than to Fayetteville, Arkansas. I was ready to serve as tenured full professor at Rust College when I got a call from Dr. William Hytche, the president of the University of Maryland, Eastern Shore (UMES), in Princess Anne, Maryland. I had never heard of this school and had to look it up. When I saw all of the beautiful foliage on campus and nearby fields, I was hooked. Dr. Hytche stated that the ocean (in close proximity), forests, and fields were ripe for my type of interests and that the student population was in need of my type of unique teaching and research interests.

I told him about my plans to begin an appointment at Rust College. He said he would match the Rust College offer and go higher on the pay scale as well as provide more opportunities if I joined UMES.

Therefore, I packed the U-Haul truck, the cars, the pets, and the kids, and drove over 2,000 miles to the Eastern Shore of Maryland, and here I have remained since August 1996. I have taught in the Department of Natural Sciences at UMES consistently, except for a semester-at-sea experience in 1999.

My work at UMES inspires and convinces students that they can and should pursue careers in science. My research involves designing and conducting research on zoonotic diseases, fish and wildlife population biology, histopathology of parasite infestations, crop insects, household pests, garden pests, arthropod disease vectors, aquatic invertebrates, stream ecology, and other areas of interest to me. It has been very rewarding and truly amazing to see students change and grow in a positive manner since starting their college experience. Many former students from Canada, Washington, California, Arkansas, and Maryland write to update me on their progress and families.

Key advice to students:

1. Get passionate about your life and live it as if it is the only one, because it is.
2. Try to stay focused and positive about your life—and where you want to go.
3. Make plans for each stage of your life. Those that fail, fail to plan.

By Jeurel Singleton

Select representative publications:

Singleton, J. 2010. Coming to Delmarvaland and ode to a tick. *In* T. Taylor and A. Foley (eds.), Eastern Shore life and lure: an anthology of the writers bloc. Cambridge Books, Cambridge, MD.

Singleton, J. 2007. Ole Dave the mustang mule. *In* T. Taylor and A. Foley (eds.), Mules, motorcycles, and memories: an anthology of the writers bloc. Cambridge Books, Cambridge, MD.

Singleton, J., D. Richardson, and J. M. Lockhart. 1993. Severe moniliformiasis in a gray squirrel, *Sciurus carolinensis* from Arkansas, USA. Journal of Wildlife Diseases 29: 165-168.

McAllister, C. T., J. E. Cordes, D. B Conn, **J. Singleton,** and J. W. Walker. 1991. Helminth parasites of unisexual and bisexual whiptail lizards (Teiidae) in North America. V. *Mesocestoides* sp. Tetrathridia (Cestoidea: Cyclophyllidae) from four species of *Cnemidophorus*. Journal of Wildlife Diseases 27: 494-497.

Singleton, J. 1987. Final rule to list the California freshwater shrimp, *Syncaris pacifica* as an endangered species. Federal Register 52 (77): 13254-13257. Proposed Rules.

Singleton-Smith, J., and B. J. B. Philogene. 1982. Structure and organization of the stemmata in the larvae of five species of Lepidoptera. Reviews in Canadian Biology 40: 331-341.

Singleton-Smith, **J.,** J. F. Chang, and B. J. B. Philogene. 1978. Morphological differences between nymphal instars and descriptions of the antennal sensory structures of the nymphs and adults of *Psylla pyricola* Foerster (Homoptera: Psyllidae). Canadian Journal of Zoology 56: 1576-1584.

Elzie McCord, Jr.

"I vividly remember removing tobacco hornworm larvae from tobacco leaves as I picked tobacco for various farmers in the summer."

Elzie McCord, Jr.

Vidalia, Georgia, is my birthplace and hometown. I became interested in insects as a child growing up in rural Georgia. My friends and I caught fireflies and kept them in jars to watch their abdomens "glow" in the dark. I also recall collecting catalpa caterpillars from catalpa trees and using them for fish bait and even selling some of them to local anglers. I vividly remember removing tobacco hornworm larvae from tobacco leaves as I picked tobacco for various farmers in the summer. While in middle school and high school, I did not have any inkling that I would pursue a career in entomology. I wanted to become an auto mechanic and marry my high school sweetheart after graduation. However, my science teacher and mother had other plans for my life. They convinced me to try college for one quarter and if I did not like it, I could always go to the local trade school and train to be an auto mechanic. So I enrolled in Savannah State College (now Savannah State University), which was near my parents' home, and signed up for the biology/chemistry program. While at Savannah State, I had the good fortune of meeting Dr. J. B. Villeli, a biologist with a keen interest in insect biology. He took me under his wing and gladly served as a mentor, and introduced me to the intricacies of insects, their unique behaviors, and their scientific names. He also told me that careers were available for people like me, interested in insects and willing to dedicate the time to receive adequate training.

After graduating with a bachelor's degree, I eventually decided to follow the advice of Dr. Villeli, and several others whom I trusted, and enrolled in an M.S. program in the Department of Entomology and Nematology at the University of Florida (UF) in Gainesville. I was committed to obtaining a degree in entomology. Dr. J. E. Lloyd was my mentor for the M.S. degree; he taught me insect behavior and insect systematics, as well as other non-entomological subjects, such as how to paddle a canoe and sail a boat.

Education:

- B.S. 1971, Biology/Chemistry, Savannah State College, Savannah, Georgia
- M.S. 1974, Entomology, University of Florida, Gainesville, Florida
- Ph.D. 1985, Entomology (Insect Toxicology emphasis), University of Florida, Gainesville, Florida

After completing my M.S. degree, I took an 18-month interim position as an assistant in extension entomology in Gainesville. One memorable aspect of my job was working with low-income farmers in five North Florida counties to develop a control strategy for the sweetpotato weevil (*Cylas formicarius elegantulus*), a major pest of sweet potatoes. I saw how Florida farmers lost money to Georgia and Alabama farmers. They could bring sweet potatoes into a weevil-quarantined state and receive financial compensations. In addition, I witnessed economic disparities between white and black farmers in Florida, which further galvanized my resolve to help discover an equitable solution to this pest problem. Although I developed best management practices (with insecticides) for the sweetpotato weevil, I was unable to increase the economic conditions of the black farmers that I worked with during the time that I served in this interim position.

Soon after the end of my 18-month interim position, I accepted a scientist position with the Agricultural Division of E. I. DuPont de Nemours & Co. (in 1976). I began in the Insect Control Section where I pioneered new rearing techniques for the fall armyworm (*Spodoptera frugiperda*), improved rearing techniques and conditions for the two-spotted spider mite (*Tetranychus urticae*) and the potato tuberworm (*Phthorimaea operculella*), and designed the apparatus to test the effects of insecticides on each species, based on their feeding preferences and behaviors. It was during this job that I developed an interest in insect toxicology and pondered whether I should pursue a Ph.D. in the subject.

In 1980, I learned that Dr. S. J. Yu, an insect toxicologist, had moved to UF and was a faculty member in the Department of Entomology and Nematology. Since I had followed his career for several years, I called him, introduced myself, and asked for a position in his laboratory. He listened and promptly said no! This conversation was late on a Friday afternoon. This prompted me to ask what time he arrived at work on Monday. I was standing outside of his UF office at 7:45 a.m. the following Monday morning. After our second meeting, Dr. Yu agreed to accept me into his lab, if I enrolled in the Ph.D. program at UF. I took a leave of absence from DuPont and became a UF student again. Under Dr. Yu's guidance, I learned how to integrate analytical techniques and biochemistry to answer questions relating to resistance development in economically important insects. Our relationship blossomed such that we conducted research and developed collaborations with other scientists, resulting in the discovery of insecticide resistance mechanisms in the fall armyworm.

After completing my dissertation research and being awarded the Ph.D. in 1985, I returned to DuPont. I had a productive career at DuPont and held distinguished positions such as senior research biologist, senior research chemist, and senior product development representative. Unfortunately, some good things must end. I was downsized (i.e., given a layoff notice) along with nearly 800 other employees in September 1999. After 11 months of job hunting, I was hired by UF to work as a scientist at the university's Gulf Coast Research and Education Center in Bradenton, Florida, in July 2000. Interestingly, just two weeks after beginning at UF, I received an invitation to teach entomology at a public honors college, New College of Florida, in Sarasota. I submitted my resignation to UF and began teaching at New College in fall 2000.

At New College, I was given the freedom to develop an entomology program, which involved teaching undergraduates botany, insect-plant interactions, entomology, and entomology laboratory. After receiving a grant of $200,000 from the Environmental Protection Agency in 2005 to develop a toxicology program, I taught general toxicology, advanced toxicology, and advanced toxicology laboratory. This grant also supported the purchase of a gas chromatograph with mass selective and electron capture detectors. After the purchase of this equipment, I became more successful at garnering additional grants to support my insect toxicological research with undergraduates. I now have a complete complement of analytical instruments and many research projects. I am very proud to mention that one of my grants ($176,000) from the National Science Foundation (co-principal investigators Drs. M. D. Lowman and Randy Miller) supported the travel of several students to Peru and India.

My mission at the New College of Florida is to introduce students to laboratory and field research that will captivate their imaginations to study more and succeed. I know that human beings learn differently; therefore, adding audio and visual components to lectures and allowing students to use laboratory instruments serve these purposes. I currently serve as emeritus professor of biology at New College.

Key advice to students:

Students should find that one thing or career that interests them. Interest provides an avenue into passion and compassion, both of which create the motivation necessary to explore a new experience or field of study. Students should seek mentors then cultivate relationships with them. Developing interpersonal skills and fostering active relationships with mentors and peers can lead to life-long friendships and successful careers.

By Elzie McCord Jr.

Select peer-reviewed publications:

Miller, W. R., M. D. Lowman, and **E. McCord Jr.** 2013. In the canopy with wheel chairs: a model for teaching field biology, Chapter 33, pp. 331-339. *In* M. Lowman, S. Devy, and T. Ganesh (eds.), Treetops at risk: challenges of global canopy ecology and conservation. Springer Verlag, New York, NY.

McCord Jr., E., J. F. Price, and C. Nagle. 2010. Biological control of the two spotted spider mite on landscape plant beds using *Phytoseiulus persimilis* (Acari: Phytoseiidae) predatory mite. Acta Horticulturae 881: 591-594.

Yu, S. J., and **E. McCord Jr.** 2007. Lack of cross-resistance to indoxacarb in insecticide-resistant fall armyworms (Lepidoptera: Noctuidae) and diamondback moth (Lepidoptera: Yponomeutidae). Pest Management Science 63: 63-67.

Price, J. F., C. A. Nagle, and **E. McCord Jr.** 2003. New miticides and programs of application for control of two spotted spider mite (*Tetranychus urticae* Koch) (Acari: Tetranychidae) on strawberry (*Fragaria* x *Ananassa* Duch). Proceedings of the Florida State Horticultural Society 116: 168-171.

McCord Jr., E., J. F. Price, and C. A. Nagle. 2002. Pesticide mode of action codes to aid ornamental growers in developing control programs to manage pest resistance. Proceedings of the Florida State Horticultural Society 115: 130-133.

Price, J. F., **E. McCord Jr.,** D. E. Legard, and C. K. Chandler. 2002. Survival of stored and shipped *Phytoseiulus persimilis* predators for two-spotted spider mite control in strawberry (*Fragaria x Ananassa* Duch.). Proceedings of the Florida State Horticultural Society 115: 176-177.

McCord Jr., E., and S. J. Yu. 1987. The mechanisms of carbaryl resistance in the fall armyworm, *Spodoptera frugiperda* (J. E. Smith). Pesticide Biochemistry and Physiology 27: 114-122.

Touré G. Thompson

"My vision as an insect behaviorist is to increase awareness (among scientists and laypersons) that insects and other arthropods are not just dumb instinct boxes."

Touré G. Thompson

I was born in Charleston, South Carolina, and had the blessing of growing up in one neighborhood in one house. I recall developing an interest in animals, at about eight or nine years of age, while watching nature programs on television. This interest was nurtured by grade-school science teachers (especially Ms. Nordlund, Mr. Pfaff, and Mr. Gwynette), as I listened to their inspiring lectures and participated in their hands-on laboratory activities. My favorite activity was what we students called "swamp-tromping" in which Mr. Gwynette would take the students to the marshland that surrounded the school to observe animals, plants, and other critters. I did not really get in the habit of collecting animals during those grade-school days, but I did read a tremendous number of books and articles about them. A few books written by the French entomologist J. Henri Fabre were especially interesting and ushered me into the world of insects and arachnids.

Like many young African-American kids who showed proficiency in the biological sciences, I was highly encouraged by my family, especially my maternal grandmother, to become a medical doctor or at least work in some health-related field. As my biological interests became more acutely focused

on insects in my senior year of high school, and I told my family that I wanted to study insects in college, they were quite puzzled and disappointed, at least initially. Gradually, as my parents became more knowledgeable of entomology and its usefulness to human society, especially in agriculture, they grew to respect my decision. The rest of my family also grew to accept my unorthodox major.

Education:

- B.S. 1985, Biology (Entomology Conc.), Clemson University, Clemson, South Carolina
- M.S. 1987, Entomology, Clemson University, Clemson, South Carolina
- Ph.D. 1995, Entomology, University of Georgia, Athens, Georgia
  - Dissertation title: Laboratory studies of physical and biological factors affecting geotaxis and other locomotory behavior in a stored-product insect, *Tenebrio molitor* L. (Coleoptera: Tenebrionidae)

My days as an undergraduate were some of the most pleasant and satisfying times of my life. In 1981, Clemson University still had an undergraduate program in entomology and I was one of only three undergraduate students (and the only black student) in the 1985 graduating class of the program. My two colleagues were Tim Drake and Alan Wilson, and the three of us looked out for each other. Our advisor, Dr. Thomas E. Skelton, was very effective and gave us individualized attention.

At Clemson, I decided to focus my attention on insect behavior, especially after taking an insect behavior course taught by Dr. Peter Adler, and settled on a master's project on the foraging behavior of fire ants, under the mentorship of Dr. Sidney B. Hays. With a master's degree in hand, I decided to build upon my interests in insect behavior by entering into a Ph.D. program in the Department of Entomology at the University of Georgia (UGA), under the mentorship of Dr. Robert Matthews. A minority fellowship paid for the first three years of my study for the Ph.D., and then I supported myself by teaching assistantships. I chose not to become involved in Dr. Matthews' work with parasitic wasps or any of his pre-existent projects. Instead, I devised my own project on the movement and distribution of tenebrionid beetles in stored products. Initially, my progress was slow. I took classes for at least two years before I got deeply into my experiments, but my teaching assistant responsibilities tended to occupy too much of my time, such that my research was going too slowly and my writing was too minimal. Toward the end of my

fourth year, Dr. Matthews decided not to recommend me for a teaching assistantship. He knew that teaching was interfering with my ability to focus on my research and writing. Unfortunately, this left me with no income. Initially, I was not pleased with Dr. Matthew's decision. I had to humble myself and depend on my mother for almost three years of financial assistance. Nevertheless, Dr. Matthews' strategy worked because it freed me to attack my research with full fury and vigor and complete my dissertation.

Luckily, within three months after being awarded the Ph.D. in 1985, I accepted a visiting professorship in the Department of Biology at Valdosta State University (VSU), in Valdosta, Georgia. This faculty position involved teaching basic biology classes, entomology, human anatomy/physiology, and animal behavior. VSU was a small but growing university of less than 4,000 students at the time and a perfect place for me to start a career without feeling overwhelmed by the environment. In 1997, I participated in the School College Outreach Program of Enrichment, a six-week set of noncredit, weekend short courses taught by VSU faculty and other invited teachers. I taught an entomology course to middle-school students. After struggling with the high energy and short attention spans of middle-school kids, who could not listen to my laboratory lectures without being distracted by every stuffed animal or vertebrate skeleton in the room for the first three weeks, I changed my strategy to a more field-oriented approach for the last three weeks. The students found the field-oriented approach more engaging and stimulating. It wore me out. I always knew that I did not want to be a middle-school teacher like my mother, and this experience confirmed what I knew.

Toward the end of my time at VSU, a faculty member, Dr. Linda Chamberlin, encouraged me to apply for a project counselor position with the Space Life Sciences Training Program, a six-week program to engage high-achieving high school students in scientific training with researchers of the National Aeronautics and Space Administration (NASA). This was a collaborative effort between the College of Pharmacy and Pharmaceutical Sciences (Dr. Carl B. Goodman, project director) of Florida A&M University (FAMU) and NASA. I was selected to be one of four project counselors, and the counselors were assigned about 10 students for their respective emphasis groups. The other three counselors were Drs. Audrey Cramer, Gerry Garwood, and Hugh McLean. My group was the Ecological Emphasis Group (principal investigators: Ron Schaub, Carlton Hall, Jan Rebmann, John Drese, Mario Mota, and Dr. Paul Schmalzer), which focused on fieldwork rather than laboratory work. The counselors served as mentors and facilitators to the students and participated in the research. The

students gave a presentation of their work at the end of the training workshop in July 1997.

Toward the end of this program, Dr. Goodman convinced me to consider applying to FAMU for a job. I had no familiarity with the institution. Nevertheless, my ignorance was not held against me, and the university hired me. In my time at FAMU, one of the initiatives to which I contributed was successful in getting funding. This was the FAMU-ARS (Agricultural Research Service) Science Center project, in which several scientists proposed research in various scientific disciplines. My contribution was a project on intercolonial competition and territoriality in red imported fire ants. The U.S. Department of Agriculture (USDA) funded this project. One of the most pleasant experiences that I had at FAMU was my involvement with the Science Exploration and Enhancement Center (SEEC), a program in which FAMU students worked with professors on scientific research for eight weeks and gave a PowerPoint presentation of their work at the end of the summer in a closing banquet. I was a participant during the summers of 2004 and 2005. Two SEEC students, Keturah Hayes and Marc Mahabir, as well as Katrenna Washington, non-SEEC biology major, made helpful contributions to my fire ant project. This combination of research with mentorship was an educational experience for me as well as for the students. In the summer of 2005, I left FAMU to take a faculty position at Alabama A&M University (AAMU), which is a historically black university located in Normal, Alabama. I am currently an assistant professor in the Department of Biological and Environmental Sciences at AAMU.

Career events in which I take great pride include the following. From 2001 to 2003, I received funding from the USDA as one of several principal investigators contributing to the FAMU-ARS Science Center Project, in which I studied territorial competition in the red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera: Formicidae). I received the Outstanding Professional Presentation Award at the 51st Annual Meeting of the South Carolina Entomological Society, held at the USDA-ARS U.S. Vegetable Laboratory in my hometown of Charleston, South Carolina, in October 2005. I was a Biological Science Directorate invitee to the National Science Foundation Joint Annual Meeting in Washington, D.C., in June 2010.

I would describe my scientific mission as one in which I seek to systematically describe the behaviors of insects with the goal of understanding the utility of their behaviors at the proximate level and perhaps even ultimate level of causation. My vision as an insect behaviorist is to increase awareness (among scientists and laypersons) that insects and other arthropods are not just dumb

instinct boxes, but are evolved animals capable of acquiring and processing information, and then making appropriate decisions and adjusting to stimuli.

Key advice to students:

I advise students of entomology and other sciences to engage in enough self-examination to decide on what is the most appropriate career path to take. You should ask yourself some tough questions early in your education and be very honest about your strengths, weaknesses, and aspirations. Do you like to apply knowledge to practical matters, or do you like the intellectual pursuit of knowledge as a means to its own end? Do you function best as part of a team, or do you prefer to work alone? How concerned are you for monetary income or for prestige? Do you enjoy engaging in outreach/recruitment activities or not? Do you wish to become a teacher who engages in research or a researcher who engages in teaching? There is a difference. Such self-examinations should help you build a career channeled in a clear direction and minimize passively floating about from job to job. An ideal, fulfilling career in entomology or any other science should match your nature and should not be antithetical to it.

By Touré G. Thompson

Select representative publications and presentations:

Thompson, T. G. 2012 (Submitted). Influence of colony-specific olfactory cues on territorial zone discrimination by workers of the red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera: Formicidae). Journal of Insect Behavior.

Thompson, **T. G.** Olfactory influences on territorial zone discrimination in the red imported fire ant, *Solenopsis invicta Buren* (Hymenoptera: Formicidae). 93rd Annual Meeting of the Florida Entomological Society, July 2010, Jupiter Beach, FL.

Thompson, **T. G.** Influence of colony-specific olfactory cues on territorial zone discrimination by workers of the red imported fire ant, *Solenopsis invicta Buren* (Hymenoptera: Formicidae). 51st Annual Meeting of the South Carolina Entomological Society, October 2005, Charleston, SC.

Thompson, **T. G.** Effect of column inversion stimulus on geotaxic response of adult female *Tenebrio molitor L*. (Coleoptera: Tenebrionidae). 87th Annual Meeting of the Florida Entomological Society, July 2003, Stuart, FL.

Thompson, **T. G.** Assessment of geotaxis in individuals and small populations of adult female *Tenebrio molitor L*. 40th Annual Meeting of the Entomological Society of America, December 1993, Indianapolis, IN.

Thompson, **T. G.** Influence of some physical factors on the geotaxic response of virgin adult female yellow mealworm beetles, *Tenebrio molitor* (Coleoptera: Tenebrionidae). 56th Annual Meeting of the Georgia Entomological Society, March 1992, Jekyll Island, GA.

Thompson, T. G. Foraging behavior of the red imported fire ant, *Solenopsis invicta Buren*, in relation to temporal and weather effects. 52nd Annual Meeting of the Georgia Entomological Society, March 1988, Statesboro, GA.

Vernard Richard Lewis

"There are two types of students: those who are born to be insect people and those who are not."

Vernard Richard Lewis

I was born in Minneapolis, Minnesota, in 1951. I did not know it at the time, but I would become the eldest of 10. I also spent some of my childhood in Fresno, California. However, since 1969, I have considered the San Francisco Bay Area my home. My first memories of insects go back to 1956 in Fresno, California. I was living with my grandparents and I remember chasing grasshoppers and red ants in the backyard at Our Lady of Mount Carmel Grammar School. My grandfather was supportive of my interests in insects and outdoor activities. My grandmother was not as excited, especially after I dumped a jar full of ants or a lizard or two on her kitchen floor.

I completed middle and high schools in Minneapolis. Living in Minnesota during these years was challenging because of the heavy snowfall and bitter cold, both not conducive for chasing or collecting bugs. My activities during these years included playing big brother, participating in competitive sports, and getting involved in the Civil Rights Movement and anti-Vietnam War activities. An epiphany occurred for me while in high school in the late 1960s. Admittedly, I was not one of the best students in my high school class. I probably spent too much time being a jock and playing cards in the lunchroom. However, I do remember taking the SAT test for college admission during my

junior year. Sometime during my senior year, I got around to asking a high school counselor about my test results because I wanted to know what colleges would take me. I was surprised at the counselor's comment; he said that I was not smart enough to get accepted into any reputable university. Angered by his response, I demanded to know the best university in America at that time. The counselor said University of California at Berkeley (UC Berkeley) was the best university. I do not think I could have found Berkeley on the map back then, but I told him I would go there. Defiant, ready to change the world, and with only $300 in my wallet, I left for California on the last day of August in 1969.

Fortunately, I had a relative, Aunt Ethel, living in Oakland, California. My aunt took me into her one-bedroom apartment until I could sort things out. I slept on the living room couch for two years. I still wanted to go to UC Berkeley, but I came to the realization that my grades were not good enough. At around that time I decided to attend Laney Community College (in Oakland) to strengthen my science background, improve my grades, and then apply to Berkeley as a transfer student.

I did not connect with insects until arriving at Laney Community College and studying there from 1970 to 1972. I remember going on several excursions into Death Valley and the Mojave Desert with my biology instructor, Dr. Clyde Wilson. Both were great places to view and collect insects. Under his mentorship, I became motivated to improve my grades in science and math courses. He also was generous enough to introduce me to several professors at UC Berkeley who would later become my mentors. Finally, my hard work paid off. I received an academic scholarship from the College of Natural Resources at UC Berkeley. My dream had materialized.

Education:

- B.S. 1975, Agricultural Sciences, University of California, Berkeley, California
- M.S. 1979, Entomology, University of California, Berkeley, California
- Ph.D. 1989, Entomology, University of California, Berkeley, California
  - Dissertation title: Host-insect interactions in the California oakworm/coast live oak ecosystem. University of California, Berkeley, California

Obtaining my bachelor's and master's degrees at UC Berkeley was straightforward and smooth sailing. I took a bunch of entomology courses and wrote my master's thesis without any major glitches. But as I worked on my Ph.D. degree, a number of significant events occurred that would shape the next

20 years of my life. First, my original Ph.D. advisor did not receive tenure. Consequently, he had to change his career trajectory and I had to find a new advisor. I did find one, but this disruption resulted in my having to take several additional years to complete my degree. If this wasn't enough disturbance, I decided to establish a pest control business, get married, have a beautiful daughter, and purchase a house. Additionally, I took a permanent job running the pest control program at San Quentin State Prison in 1986. As you can imagine, I experienced considerable displacement behavior, which slowed my progress in completing the Ph.D. My progress on writing the dissertation slowed to a snail's pace.

A single phone call to my office at San Quentin during the fall of 1987 changed my career. An assistant to the chair of the Department of Entomology at UC Berkeley contacted me to see if I would be interested in receiving a postdoctoral fellowship on campus. In order to accept this fellowship, I had to terminate my permanent position as a state employee with the Department of Corrections and complete my Ph.D. dissertation beforehand. The start date for the postdoctoral position was fall 1988. I had less than a year to finish the dissertation, obtain three UC faculty signatures, and submit the signed document to the Graduate Division. When I received the phone call, I had zero pages of the dissertation completed. After much gut wrenching and nerve jarring, I resigned my position as a state employee and feverishly began writing my dissertation. Fortunately, I completed the dissertation, was awarded the Ph.D. degree, and then served as a postdoctoral fellow on the Berkeley campus. In retrospect, the only thing that I would have done differently would have been to talk with my wife about my plans prior to making a final decision on that eventful day in fall 1987.

My mission at the University of California has included research, outreach, and service pertaining to insects common to structures and urban areas. Simply stated, my vision is to have impact with the many stakeholder groups with whom I interact inside and outside the state of California. My official title at the university is cooperative extension specialist. I also hold a faculty appointment in the College of Natural Resources. Although assigned to the Berkeley campus, I have statewide responsibility for research and outreach for household and structural pests, including termites, ants, and bed bugs.

I have accomplished much during my professional career. I was told that I was the first black graduate student to receive a Ph.D. in entomology at UC Berkeley. I was a member of the United Nations Global Termite Expert Group (and served as the chairperson), and have traveled to more than 30 countries for

work-related presentations and research. Some additional highlights include traveling to six different continents, attending a pope's funeral, searching for termites on the Pakistan/Afghanistan border, and surviving earthquakes and tsunamis in Japan. I am proudest of the accomplishments of my "lab children." My children, as I affectionately describe them, are the students and staff who have shared my laboratory over the years. Some of my lab children have become successful businesspersons. Others have become faculty members at universities. I have helped to mentor minorities, nonminorities, and disabled students.

Key advice to students:

From my experiences in entomology, there are two types of students: those who are born to be insect people and those who are not. It is easier to spot those born to be entomologists; they will display a photo of an insect or hold an insect in their hand or in a jar. Even today, I encounter these individuals at university fairs or open houses. I have seen little totters, both boys and girls, pull an insect out of a backpack or small container and proudly tell me its name, sometimes in Latin. Clearly, these special individuals have a passion for insects. They tend to gravitate to entomological schools and programs. Sadly, there are fewer and fewer academic institutions offering entomology courses and degrees. Nevertheless, because these individuals have a passion and love for insects, they will find a way. With the global human population increasing, there will be many jobs and careers focusing on protecting crops from insect pests, and domesticated animals and humans from insect vectors of disease.

My advice to students interested in an entomological career includes acquiring a solid and fundamental understanding of reading, writing, mathematics, and public speaking. These are all good tools to have in your skills toolkit that will serve you well, especially during times when critical thinking is necessary. I realize that, during our collegiate training, time is too preciously short to learn and master all subjects presented to us. Nevertheless, strive to become an expert in at least one subject, topic, or technique. Work hard at finding your special niche, be it skilled with computers, writing, or drawing. Lastly, do not forget about having balance in life. It is not all about work. Balance brings happiness and when you are happy in life, you are happy in your career.

By Vernard R. Lewis

Select peer-reviewed publications:

Lewis, V., and B. Forschler. 2014. Management of drywood termites: past practices, present situation, and future prospects, pp. 130-153. *In* R. Dhang (ed.), Urban insect pests: sustainable management strategies. CABI, Oxfordshire, UK.

Lewis, V. R., S. Moore, R. Tabuchi, A. M. Sutherland, D.-H. Choe, and N. D. Tsutsui. 2013. Researchers combat resurgence of bed bug in behavioral studies and monitor traps. California Agriculture 67: 172-178.

Lewis, V. R., S. E. Leighton, R. M. Tabuchi, and M. I. Haverty. 2011. Seasonal and daily patterns in activity of the western drywood termite, *Incisitermes minor* (Hagen). Insects 2: 555-563.

Lewis, V. R., L. J. Nelson, M. I. Haverty, and J. A. Baldwin. 2010. Quantitative changes in hydrocarbons in fecal pellets of *Incisitermes minor* over time may predict the active or inactive status of colonies. Journal of Chemical Ecology 103: 770-780.

Haverty, M. I., R. L. Tabuchi, E. L. Vargo, D. L. Cox, L. J. Nelson, and **V. R. Lewis**. 2010. Response of *Reticulitermes hesperus* (Isoptera: Rhinotermitidae) colonies to baiting with lufenuron in northern California. Journal of Economic Entomology 103: 791-798.

Lewis, V. R. 2008. Isoptera, pp. 531-534. *In* V.H. Resh and R.T. Cardé (eds.), Encyclopedia of insects, 2nd ed Academic Press, New York, NY.

Lewis, V. R. 2003. IPM for drywood termites (Isoptera: Kalotermitidae). Journal of Entomological Sciences 38: 181-199.

Cabrera, B. J., P. M. Marsh, **V. R. Lewis,** and S. J. Seybold. 2002. A new species of *Heterospilus* (Hymenoptera: Braconidae) associated with the deathwatch beetle, *Hemicoelus gibbicollis* (LeConte) (Coleoptera: Anobiidae). Pan-Pacific Entomologist 78: 7-16.

Lewis, V. R., M. I. Haverty, G. M. Getty, K. A. Copren, and C. Fouche. 1997. Monitoring station for studying populations of *Reticulitermes* (Isoptera: Rhinotermitidae) in California. Pan-Pacific Entomologist 74: 121-133.

Lewis, V. R., and M. I. Haverty. 1996. Evaluation of six techniques for control of the western drywood termite (Isoptera: Kalotermitidae) in structures. Journal of Economic Entomology 89: 922-934.

Leslie E. Casher

"Discover your strengths in and passion for some branch of science."

Leslie E. Casher

I was born in Chicago, Illinois, but my mother moved to southern California within a year of my birth. We lived in the "projects" next to the Alameda Naval Air Station. When I was a child, I often observed, collected, and tried to raise insects (and their relatives) near my home. Outside of the house, puddles of water below dripping faucets contained wrigglers (mosquito larvae). There were earwigs and pill bugs under rocks. Patches of clover, in lawns, attracted bumble bees and skippers (butterflies). Inside of the house, small, black-colored ants and tiny, amber-colored "sugar" ants were sometimes in the kitchen. Occasionally, a buzzing fly would enter an open window and dance against a transparent windowpane. These seasonal visitors captured my attention. My mother fostered these early interests in insects and related arthropods. My interests were reinforced by summer trips back to Chicago to visit my older cousins. In the suburbs of Chicago, I watched fireflies blink like Christmas lights in the dark, night sky. Although my cousins often teased me for my fondness for fireflies and making "night-lights," my mother always encouraged my interests.

By the time I was in high school, I often visited the Los Angeles County Museum of Natural History. There, I viewed collections of exotic insects and other animals, frozen in time. At home, I made my own insect collection and built

my own science lab in a tool shed, which I called my "greenhouse." I maintained equipment, cages, and aquariums in my greenhouse for red ant farms, tadpoles, alligator lizards, fence swifts, mice, gopher snakes, and rattlesnakes. Unbelievably, I collected these animals in the alleys of Los Angeles or at local parks.

Since I do not remember ever receiving any substantial career counseling during my senior year in high school (as to whether I should go to college or what college I should go to), I decided to attend a local community college because it was affordable and close. I also needed to convince myself that I could do college-level work. My mother supported my decision but was unable to provide any financial support. This meant that I had to work odd jobs to help support my education. At the community college, I took several science courses, but little of this classwork had much to do with insects.

After receiving an associate of arts degree at the community college, and thereby convincing myself that I could in fact do college-level work, I decided to pursue a bachelor of science degree at California State University (Cal State) in Los Angeles. There were courses related to entomology at this university. In fact, I met an entomologist for the very first time at Cal State. I remember my first entomology course with Dr. Donald C. Lowrie, an expert on spiders—close cousins to insects. I also remember meeting an African-American scientist for the first time, Dr. Lloyd N. Ferguson, a professor of organic chemistry from Howard University.

I was very happy to complete the bachelor of science degree at Cal State. Upon receiving my degree, I had a desire to travel to Africa and serve in the U.S. Peace Corps as a Peace Corps volunteer in education for Liberia, in West Africa. My time in Africa was very productive and provided me with the opportunity to develop teaching skills. During two extended tours in the Corps, I taught science and math courses (biology, physics, general science, and algebra) in several high schools. I also obtained a secondary teaching credential from the state of California, earned a master of education degree, became a lecturer, then became an assistant professor of biology at Cuttington University in West Africa. At Cuttington, I conducted research on the dotted-border butterfly, *Mylothris chloris,* in addition to teaching general biology, genetics, plant morphology, and animal physiology.

Education:

- A.A. 1962, Composite courses (Botany, Chemistry, Physics, and Zoology), Los Angeles City College, Los Angeles, California
- B.Sc. 1967, Zoology, California State University at Los Angeles, Los Angeles, California
- M.Ed. 1974, Secondary Education, Texas Southern University, Texas and the University of Liberia, Monrovia, West Africa
- Ph.D. 1991, Entomology, University of California at Berkeley, Berkeley, California
  - Dissertation title: Herbivory and toughness: morphological and behavioral characteristics of *Phryganidia californica* Packard (Lep.: Dioptidae) for feeding on mature leaves of *Quercus agrifolia* Neé (Fagaceae), University of California, Berkeley, California

Eventually, I felt the need for a more formal "cutting-edge" education—with greater access to the latest scientific (research) literature—leading to a doctoral degree. Therefore, I returned to the United States to pursue this level of training. I applied to universities with entomology programs such as Imperial College of Science and Technology (London), Cornell University (New York), University of Illinois at Urbana-Champaign, University of Kansas, Pennsylvania State University, and University of California, Berkeley (UCB). I was accepted at all of these universities, but I decided to attend Berkeley and soon began study toward the Ph.D. in the Department of Entomology. During my first year at UCB, I was not offered any financial support, not even minimum wage employment. This was a big blow to my ego, considering my extensive teaching experience and credentials. A few years later, I was hired as a research assistant at UCB to work with entomologists on various species. For example, I worked on the mosquito *Culex tarsalis* with Dr. Monica Asman, parasites of the tree-hole mosquito *Aedes sierrensis* with Dr. John R. Anderson, *Ips* spp. bark beetles with Dr. David L. Wood, and ticks, vertebrates, and *Borrelia burgdorferi* (spirochetes) with Dr. Robert S. Lane.

During my final year in the Ph.D. program at Berkeley, my colleague Jorge A. Santiago-Blay suggested that I apply for a UCB President's Postdoctoral Fellowship. I did not have any permanent job offers, so I did not have anything to lose in applying. Gratefully, I received the award and worked with Robert Lane on Lyme disease. I began this program as project leader of a team of students and staff assigned to determine vertebrate host density of ticks in northern California. We trapped the western fence lizard *Sceloporus occidentalis*, rodents *Peromyscus spp.* and parasite, and the western black-legged tick

Ixodes pacificus, and examined tissues for *B. burgdorferi* spirochetes. Upon completion of the fellowship, I was hired as a staff research assistant to continue the Lyme disease research with Lane. Later, when the funding for this project ended, I had to find a job.

Thankfully, I was offered a faculty position as instructor of biology and ecology at Vista Community College in Berkeley. Although I was teaching at this community college, I continued to take science courses to satisfy my hunger for knowledge and then share this information with my students. This additional work culminated in being awarded an associate of science degree in biotechnology in 2007. Currently, I teach biology and physics at Mills College in Oakland, California, and biology at UCB in the Upward Bound Math and Science Program. Throughout the year, Upward Bound instructors give workshops of academic, career, and social/cultural significance to motivate and encourage students from disadvantaged backgrounds and neighborhoods. My vision as an instructor in this program is to provide students with high-quality experiences in biology, through field excursions (to museums and zoos), laboratory presentations (e.g., studying macromolecule models–structures/functions), and dissections of vertebrate tissues (frog and human).

Several of my accomplishments in science education are worth mentioning. In 1977, I received a certificate of appreciation from the Liberian Ministry of Education acknowledging six years of service as a biology teacher in Liberia. The Liberian and U.S. governments hired me, periodically, to train new American Peace Corps volunteers destined to become science teachers. In 1981, I was selected to attend the Third International Course on Applied Taxonomy of Insects and Mites of Agricultural Importance, sponsored by the Commonwealth Institute of Entomology, London. During the same time, I was nominated as a Fellow into the prestigious Royal Entomological Society of London.

Key advice to students:

Take time to remember your childhood interests and the activities you enjoyed doing in relation to nature study or life science. Discover your strengths in and passion for some branch of science. Read books to develop imagination, creativity, and analytical skills. Get to know your instructors/professors and ask them what aspect of science really excites them.

By Leslie E. Casher

Select peer-reviewed publications:

Padgett, K. A, **L. Casher**, S. Stephens, and R. S. Lane. 2009. Use of prescribed burn for tick control in California chaparral. Journal of Medical Entomology 46: 1138-1145.

Casher, L. E., R. S. Lane, R. H. Barrett, and L. Eisen. 2002. Relative importance of lizards and mammals as hosts for ixodid ticks in northern California. Experimental and Applied Acarology 26: 127-143.

Lane, R. S., **L. E. Casher**, C. A. Peavey, and J. Piesman. 1998. Modified bait tube controls disease-carrying ticks and fleas. California Agriculture 52: 43-48.

Casher, L. E. 1996. Leaf toughness in *Quercus agrifolia* and its effects on tissue selection by first instars of *Phryganidia californica* (Lepidoptera: Dioptidae) and *Bucculatrix albertiella* (Lepidoptera: Lyonetiidae). Annals of the Entomological Society of America 89: 109-121.

Lane, R. S., D. M. P. Berger, **L. E. Casher**, and W. Burgdorfer. 1994. Experimental infection of Columbian black-tailed deer with the Lyme disease spirochete. Journal of Wildlife Disease 30: 20-28.

Casher, L. E. 1984. Parasitoids and predators of *Mylothris chloris* (Fab.) (Lep.: Pieridae) and their effects on host development. Cuttington Research Journal, Liberia, 3: 27-79.

Casher, L. E. 1982. Taxonomic review of *Mylothris chloris* (Fab.) with reference to Liberian forms. Cuttington Research Journal, Liberia, 1: 26-37.

Eric W. Riddick

"Entomology jobs in private industry or federal government can provide lucrative and rewarding careers."

Eric W. Riddick

I was born in Boston, Massachusetts, but lived in several states (Kansas, Oklahoma, New York, Delaware, and Virginia) during my childhood because my father moved us (my two brothers and my mother) around a lot due to his stint in the military and his career as an accountant for a few large corporations. I consider Virginia my home state and Chesapeake, Virginia, my home city because I attended high school there and have fond memories of catching fish in the brackish-water creek and frogs, salamanders, and turtles in the woods and open fields near our house in the suburbs. I do remember collecting insects such as passalids (Betsy beetles) and carabids (ground beetles) under logs, and tiger beetles, which scurried under streetlights at night. At the time, my primary scientific passion was for turtles and frogs; insects were only a food source for my frogs. My mother was supportive of these activities; my father tolerated them. During my senior year in high school, I decided that I wanted to attend a historically black college/university and major in something related to animals. I decided upon Howard University, located in Washington, D.C., because it was highly respected by my circle of relatives and African-American peers and the university catalog listed a full range of zoology courses (such as parasitology, protozoology, animal behavior, endocrinology, and comparative anatomy). Without knowing any professional entomologists or zoologists before attending college, I arrived at Howard

thinking that I would obtain a bachelor's degree in zoology, and then look for a job working with animals under field conditions. In my senior year, I enrolled in an undergraduate research course, offered by an entomologist (Dr. Richard M. Duffield), and studied the natural history of yellow jacket wasps. The following summer after graduating, Dr. Duffield offered me a job assisting him in lab and field research on the identification of volatile components of the venom and Dufour's glands of yellow jackets, bald-faced hornets, bumble bees, and ground-nesting solitary bees. Much of this work involved collecting bees and wasps on wildflowers in open fields in suburban and rural Virginia and Maryland, then returning the specimens to the lab and dissecting out their glands in preparation for gas chromatography-mass spectroscopy analysis, by a chemist (Dr. James Wheeler) in the Chemistry Department at Howard. Due to my excellent performance as a research assistant that summer, Drs. Duffield and Wheeler offered me a graduate research assistantship, if I stayed at Howard for a master's degree in zoology and worked in Dr. Duffield's lab. This offer was rather attractive since none of the three universities to which I had applied had accepted me into their graduate programs. Also, the waiver of my tuition and fees by Howard Graduate School was attractive.

Education:

- B.S. 1982, Zoology, Howard University, Washington, D.C.
- M.S. 1988, Zoology, Howard University, Washington, D.C.
- Ph.D. 1993, Entomology, University of California, Berkeley, California
  - Dissertation title: Carabid beetles in orchard ecosystems, University of California, Berkeley, California

For my master's thesis research, I conducted a study on the biology of a soil-nesting solitary bee (*Andrena macra*, family Andrenidae) and their brood parasites on the U.S. Marine Corps Training Facility in Quantico, Virginia. The purpose of this study was to determine if bee nests were randomly distributed within nesting sites, determine the architecture of nests, determine the overwintering stages of development, and assess the rate of parasitism of nests by a cuckoo bee (*Nomada annulata*, Family Anthophoridae) and a velvet ant (*Pseudomethoca simillima*, Family Mutillidae).

After completing my master's degree, one of my professors, Dr. George Middendorf, informed me of a few openings for biological museum technicians at the National Museum of Natural History at the Smithsonian Institution. The next day or so, I caught the bus downtown and turned in my application. In a few weeks, I was asked to come to work for the Department of Entomology and

help curate the national collection of adult mosquitoes, under the supervision of entomologists Dr. Wayne Mathis, Dr. Ralph Harbach, and Mr. E. L. Peyton, at the Walter Reed Biosystematics Unit, in Suitland, Maryland. Although this was a temporary Trust Fund appointment, it was a pivotal job for me because I got the chance to meet and work with a number of professional entomologists and discovered that I had a knack for solitary, independent research. I also decided that I should go back to graduate school and pursue a Ph.D. in entomology or animal ecology. I remember a conversation that I had with Dr. Geraldine Twitty, a zoologist, during one of my visits back on the Howard campus. She said, "What are you going to do about your Ph.D.?" In other words, she expected me to "keep going" and get that final degree, despite the odds.

During the same year that I worked at the Smithsonian, I had the good fortune of meeting my wife-to-be, and we got married in June 1989. In August 1989, we were on a plane headed to northern California. I had been accepted into the Ph.D. program in the Department of Entomology at the University of California at Berkeley in the fall of 1989. Berkeley was an eye-opening experience. I met professors and graduate students with a passion for insects and related arthropods. It was amazing! Most of my classes were on campus in Wellman Hall, which had its own library devoted to insects (and related arthropods) and an entomology museum (Essig Museum). I spent most of my time between classes in the library devouring as many of the books, journals, and papers as possible. I worked off campus at the infamous Gill Tract in Albany, California, approximately 20 minutes (by foot) away from the Berkeley campus, to conduct the biological control/applied ecology research that led to my Ph.D. dissertation. Professors Dr. Louis Falcon and Dr. Nicholas Mills were very influential to my success in completing the Ph.D. program within four years. They gave me the flexibility to pursue research that I was passionate about doing. I studied the ecology of ground beetles (Family Carabidae) in orchard ecosystems in northern California. The purpose of this work was to determine the diversity and abundance of carabid species in commercial apple orchards, under organic versus traditional pest management, and to assess the potential of the dominant carabid species as predators of codling moth larvae wandering on the orchard floor, prior to pupation.

Although my wife and I really enjoyed the weather in northern California, we silently decided to venture back to the East Coast as soon as I submitted my dissertation to the graduate school. During my final year, I met Dr. Pedro Barbosa (a black, Hispanic entomologist) at an Entomological Society of America national convention. This serendipitous encounter eventually led to him calling

me and inviting me to work in his lab at the Department of Entomology at the University of Maryland via a graduate school two-year postdoctoral fellowship, on the College Park campus. As expected, my wife was overjoyed to be heading back East.

In the second year of this postdoctorate, I received additional research funding from another postdoctorate award, from the U.S. Department of Agriculture (USDA), Cooperative States Research Service, to conduct research on experimental farms under the supervision of Dr. Galen Dively, which allowed me to remain at the University of Maryland for an additional year. My research involved a study of the impact of transgenic plants on predatory arthropods. Specifically, I worked with the transgenic (genetically engineered) potato, the Colorado potato beetle (*Leptinotarsa decemlineata*), and predators of *L. decemlineata* found on several experimental farms in Maryland. I was one of the first scientists to show that the deployment of transgenic potato, containing Cry3A endotoxins toxic to *L. decemlineata*, had little or no toxic effect on predators, which consumed intoxicated prey (*L. decemlineata*). However, specialized predators, e.g., the carabid beetle *Lebia grandis*, were rarely in fields of pure transgenic potato, because the larval stages rely on *L. decemlineata* prepupae and pupae as a food source. A lack of prey equates to a lack of specialized predators in fields of transgenic potato!

My mission as a scientist in my current position with the USDA Agricultural Research Service (USDA-ARS) is to investigate the behavioral, chemical, and nutritional ecology of natural enemies in the context of biological control. My vision is the wise management, conservation, and utilization of natural enemies. I am also involved in activities that serve the broader scientific community. I often serve on grant review panels. For example, I was a review panelist for the Capacity Building Grants Program, Cooperative State Research, Extension, and Education Service, USDA, Washington D.C. I have been an active member of the Entomological Society of America since 1991, and I occasionally organize symposiums/conferences at entomology meetings. For example, I organized the conference entitled “A Tribute to Margaret Collins, a Biologist with a Passion for Termites,” at the Entomological Society of America National Meeting, Nashville, Tennessee, in 1997. I also co-organized (along with Karen Kester and Raul Medina) the symposium entitled “Celebrating the Career of Pedro Barbosa: A Passion for Insects and Plants,” Entomological Society of America National Meeting, Reno, Nevada, in 2011. In addition, I am a member of the editorial board for the *Bulletin of Insectology*, Bologna University, Bologna, Italy. Editors of various entomology/ecology journals often invite me to peer review manuscripts.

Select awards and honors:

- Powers S. Messenger Memorial Award, Entomology Department (Division of Biological Control), UC Berkeley, California
- Elected into Sigma Xi Scientific Research Society
- Sigma Xi Grant-in-Aid of Research, UC Berkeley Chapter, California
- Graduate Research Fellowship, Graduate Division, UC Berkeley, California
- Mentored Research Fellowship, Graduate Division, UC Berkeley, California
- Postdoctoral Fellowship, Graduate Studies and Research, University of Maryland, College Park, Maryland
- Postdoctoral Grant, USDA, Cooperative States Research Service, National Research Initiative
- Adjunct Assistant Professor of Entomology, Department of Entomology and Plant Pathology, Mississippi State University, Mississippi State, Mississippi, 1999-2003
- President, International Association of Black Entomologists, 2010-2011

Key advice to students:

Sample a broad range of courses so you can discover which subjects excite you the most. Consider alternative career options early on because there are not many academic posts available these days. Entomology jobs in private industry or federal government can provide lucrative and rewarding careers for some people. Leave time for outside (non-science) activities, and develop social skills.

By Eric W. Riddick

Select peer-reviewed publications:

Riddick, E. W., Z. Wu, and M. G. Rojas. 2014. Potential utilization of *Artemia franciscana* eggs as food for *Coleomegilla maculata*. BioControl 59: 575-583.

Riddick, E. W., and A. E. Simmons. 2014. Do plant trichomes cause more harm than good to predatory insects? Pest Management Science 70: 1655-1665.

Riddick, E. W., and Z. Wu. 2012. Mother–offspring relations: prey quality and maternal size affect egg size of an acariphagous lady beetle in culture. Psyche, Article ID 764350, 7 pages. DOI: 10.1155/2012/764350.

Riddick, E. W., M. G. Rojas, and Z. Wu. 2011. Lima bean–lady beetle interactions: spider mite mediates sublethal effects of its host plant on growth and development of its predator. Arthropod-Plant Interactions 5: 287-296.

Riddick, E. W. 2010. Ectoparasitic mite and fungus on an invasive lady beetle: parasite coexistence and influence on host survival. Bulletin of Insectology 63: 13-20.

Riddick, E. W., T. E. Cottrell, and K. A. Kidd. 2009. Natural enemies of the Coccinellidae: parasites, pathogens, and parasitoids. Biological Control 51: 306-312.

Riddick, E. W. 2009. Benefits and limitations of factitious prey and artificial diets on life parameters of predatory beetles, bugs, and lacewings: a mini-review. BioControl 54: 325-339.

Riddick, E. W., A. E. Brown, and K. Chauhan. 2008. *Harmonia axyridis* adults avoid catnip and grapefruit-derived terpenoids in laboratory bioassays. Bulletin of Insectology 61: 81-90.

Riddick, E. W., and P. W. Schaefer. 2005. Occurrence, density, and distribution of parasitic fungus *Hesperomyces virescens* Thaxter (Laboulbeniales: Laboulbeniaceae) on multicolored Asian lady beetle (Coleoptera: Coccinellidae). Annals of the Entomological Society of America 98: 615-624.

Riddick, E. W., G. Dively, and P. Barbosa. 1998. Effect of a seed-mix deployment of Cry3A-transgenic and nontransgenic potato on the abundance of *Lebia grandis* (Coleoptera: Carabidae) and *Coleomegilla maculata* (Coleoptera: Coccinellidae). Annals of the Entomological Society of America 91: 647-653.

Alvin M. Simmons

"My co-advisors... helped me to understand that my hands-on farm experiences were valuable assets."

Alvin M. Simmons

I was born in New Bern, North Carolina. Growing up on a small family farm provided plentiful opportunities to interact with science on a daily basis. In a sense, the experience was like continually being on a "year-round internship." Our farm also contained woodland, which was overflowing with entomological and general science stimuli. I found species diversity, biology, and behavior to be fascinating. Receiving stings from paper wasps was unpleasant, yet it was educational; the stinging events were many. I would run when wasps chased me after I accidentally or intentionally disturbed their nests, but I was not afraid. In fact, I took pleasure in detaching their nests using a long pole, running away, then returning to retrieve and examine their nests. Likewise, I found it to be quite amusing to hold a live female paper wasp across its thorax so that its stinger could only touch my impermeable fingernail.

In primary school, I especially enjoyed science and history, but a career was far from my mind. My parents, eight siblings (I was the fifth of nine), and grandparents were all close to me, and they were supportive of my education and my interests in the life sciences from my youth and thereafter. During my first year of high school, my biology teacher, Mr. Punte, commended me on my outstanding performance in his class. This greatly reinforced my interest in

the life sciences and I decided to pursue my biological interests in college. I decided to attend East Carolina University (ECU) in Greenville, North Carolina, because it was a good school and it was not that far away from New Bern. While studying at ECU, I worked for a few semesters in three laboratories, focusing on ecology, microbiology, and aquatic biology. It was particularly fun sorting through samples and making drawings of different species of copepods from the ocean. At the end of my junior year, I was selected, along with 13 other students, to conduct research on the ecology of woodlands in Canada with Dr. Vincent Bellis and two other scientists. This was a valuable experience for me. My plan before college was to complete the B.S. degree at East Carolina then look for a good job. However, I changed my plans, because of the research experiences in Canada, and other positive experiences I had in my senior year, and decided to continue my quest for knowledge by matriculating into a graduate program for study toward an M.S. degree. I inquired at three schools, and I was delighted that the late Dr. Bobby Pass at the University of Kentucky (UK) expressed interest in having me in his department. Two weeks after graduating from ECU in May 1980, I took a 650-mile bus trip to Kentucky to visit the UK Department of Entomology. Although my travel was at their expense, I decided to go by bus so that I could see the countryside along the way. My return home was by air; it was my first time on an airplane.

Education:

- B.S. 1980, Department of Biology, East Carolina University, Greenville, North Carolina
- M.S. 1983, Department of Entomology, University of Kentucky, Lexington, Kentucky
- Ph.D. 1987, Department of Entomology, University of Kentucky, Lexington, Kentucky
  - Dissertation title: Combined infestation of the green stink bug (*Acrosternum hilare* (Say)) and simulated defoliation by the green cloverworm, (*Plathypena scabra* (Say)) on soybean, and selected aspects of the bionomics of the green stink bug, University of Kentucky, Lexington, Kentucky

Unlike most of my classmates who started with me in graduate school at UK, I did not have any formal training in entomology. However, my co-advisors (Dr. Bobby Pass and Dr. Kenneth Yeargan) helped me to understand that my hands-on farm experiences were valuable assets. For my M.S. and Ph.D. studies, I was offered a research assistantship that was open to my selection of

both entomological topic and advisor. Dr. Ken Yeargan agreed to continue as my advisor and mentor for my Ph.D. studies. At UK, I also had opportunities to participate in social and cultural events, such as becoming a member of the UK Linnaean Games Team in 1985 and 1987. The Linnaean Games is an entomological college bowl-like game in the United States. In 1985, our team received first place at the annual meeting of the North Central Branch of the Entomological Society of America. Because of our victory, my team members and I traveled in a private airplane to visit the American Cyanamid Chemical Company in New Jersey. The trip was an outstanding experience and it opened my mind to the possibility of a career with industry.

During my final year at UK, I applied for a job with industry and I received what I still think is the greatest rejection letter. The letter was exceedingly uplifting and it helped me recognize the importance of how to say no, respectfully. Afterwards, I applied for two postdoctoral positions; I never received a reply from either one. With graduation approaching and no job offer, Ken Yeargan and I prepared and submitted a grant proposal that was funded; this assured that I would not be immediately unemployed after graduation. Doors continued to open. Just before my graduation, the late Dr. Charlie Rogers gave a seminar at UK and he mentioned that he had a postdoctoral position available in his USDA laboratory. We talked, I applied, and I received the job!

I first began working with the U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS) as a postdoctoral research associate in Tifton, Georgia, in 1987. A few years later, I applied for and was offered a career-track position as a research entomologist in the same research unit. At about the same time, Dr. Pass called me and stated that he wanted me to rejoin the Department of Entomology at Kentucky as a faculty member. After much contemplation, I decided to go with the USDA-ARS job and remain in Tifton. In Tifton, I studied an ectoparasitic nematode on adult moths, which was novel for nematodes. This resulted in excellent domestic and international collaborations, numerous publications, and enjoyable work-related travel. In 1992, I transferred to Charleston, South Carolina, to fill a new congressionally mandated position and develop a research program on the management of whiteflies in vegetable crops.

Throughout my career, I have been invited to speak at assorted high schools and elementary schools. It is personally fulfilling to reach out to help inspire the youth. I mentor between two and five college students each year. I was selected as the subject of a chapter in a nonfiction children's book, *Bug*

Business, by Ann Weil, in 2002. I also enjoy spending time with my wife Edith and our daughter Princess. As with other youths, I am trying to expose Princess to the wonderful world of science. She seems to enjoy it. At three months of age, Princess traveled with us to Puerto Rico for her first of several domestic entomology conferences. Her first international conference (to South Korea) occurred at 18 months of age. Her second international conference was to Greece. Whether Princess retains an interest in science beyond the toddler stage remains to be seen. Regardless, I believe the exposure is good and I suspect that like me, she will continue to enjoy travel opportunities.

My mission as a scientist is to be as productive as I can and to make a difference in the lives of others. My vision is to move the science of entomology forward through teamwork. I am a research entomologist for the USDA-ARS, U.S. Vegetable Laboratory, in Charleston, South Carolina. My research program is on host plant resistance, biological control, and other alternative insect pest management strategies. I have documented detailed knowledge of insect behavior, biology, interaction of insects and plants in cropping systems, insecticide application technology, and potential natural sources of biopesticides. I serve as lead scientist for a project supporting the national IR-4 pesticide program, and serve as the USDA-ARS IR-4 liaison representative for the Southern Region in Entomology. My IR-4 work has led to the registration of numerous critical pesticides for growers to manage important pest problems for which they would otherwise have little or no viable control options. I enjoy building coalitions with researchers nationally and internationally to solve entomological problems. I have published 87 research papers in referred journals and have presented over 140 papers around the world. In 2011, I served a five-week detail as acting research leader for the USDA-ARS, J. Phil Campbell Natural Resource Conservation Center, in Watkinsville, Georgia. One of my highest honors is my appointment as co-chair of the organizing committee for the 2016 International Congress of Entomology. A few of my awards and honors are listed below.

Awards and honors:

- IR-4 Meritorious Award, 1999
- Adjunct Professor, Clemson University, 2002–present; College of Charleston, 2012-present
- Distinguished Alumni Award (the first recipient), Department of Entomology, University of Kentucky, for outstanding career achievement of alumnus of the graduate program of the Department of Entomology, University of Kentucky, 2006

- President of the Southeastern Branch-Entomological Society of America, 2008-2009
- Community Service Award in Agricultural Research & Education, Gamma Zeta Chapter of Zeta Phi Beta Sorority Inc., 2010
- Award for Excellence in Integrated Pest Management, Southeastern Branch-Entomological Society of America, 2011
- Co-chair, 2016 International Congress of Entomology Organizing Committee, 2012-present

Key advice to students:

Regardless of career path, you must have passion for what you are doing. If you are going to spend many hours a day doing something, you might as well enjoy it. There are countless exciting options in entomology because: 1) there will always be insect pests, a need for beneficial organisms, and a need to maintain biodiversity, 2) many nontraditional life science jobs involve arthropods, and 3) one can become an expert in any of the numerous subdisciplines of entomology.

By Alvin M. Simmons

Select peer-reviewed publications:

Coffey, J., **A. M. Simmons,** B. M. Shepard, Y. Tadmor, and A. Levi. 2015. Potential sources of whitefly (Hemiptera: Aleyrodidae) resistance in desert watermelon (*Citrullus colocynthis*) germplasm. HortScience 50: 13-17.

Curnutte, L. B., **A. M. Simmons,** and S. Abd-Rabou. 2014. Climate change and *Bemisia tabaci* (Hemiptera: Aleyrodidae): impacts of temperature and carbon dioxide on life history. Annals of the Entomological Society of America 107: 933-943.

Simmons, A. M., J. C. Legaspi, and B. C. Legaspi Jr. 2012. Adult survival of *Delphastus catalinae* (Coleoptera: Coccinellidae), a predator of whiteflies (Hemiptera: Aleyrodidae), on diets of whiteflies, honeydew, and honey. Environmental Entomology 41: 669-675.

Simmons, A. M., and R. M. Mahroof. 2011. Response of *Bemisia tabaci* (Hemiptera: Aleyrodidae) to vapor pressure deficit: oviposition, immature survival and body size. Annals of the Entomological Society of America 104: 928-934.

Levi, A., J. A. Thies, **A. M. Simmons,** H. F. Harrison Jr., R. Hassell, and A. Keinath. 2011. USVL-220, a novel watermelon breeding line. HortScience 46: 135-138.

Simmons, A. M., and S. Abd-Rabou. 2009. Population of the sweetpotato whitefly in response to different rates of three sulfur fertilizers on 10 vegetable crops. International Journal of Vegetable Science 15: 57-70.

Simmons, A. M., K.-S. Ling, H. F. Harrison, and D. M. Jackson. 2009. Sweet potato leaf curl virus: Efficiency of acquisition, retention, and transmission by *Bemisia tabaci* (Hemiptera: Aleyrodidae). Crop Protection 28: 1007-1011.

Simmons, A. M., H. F. Harrison, and K.-S. Ling. 2008. Forty-nine new host plant species for *Bemisia tabaci* (Hemiptera: Aleyrodidae). Entomological Science 11: 385-390.

Simmons, A. M., J. C. Legaspi, and B. C. Legaspi Jr. 2008. Responses of *Delphastus catalinae* (Coleoptera: Coccinellidae), a predator of whiteflies (Hemiptera: Aleyrodidae), to relative humidity: oviposition, hatch and immature survival. Annals of the Entomological Society of America 101: 378-383.

Ernest J. Harris

"I was recruited to work on the Mariana Islands to support the Mariana Island Pilot Test to eradicate the melon fly and the oriental fruit fly."

Ernest J. Harris

I was born in North Little Rock, Arkansas, as the first of six children of Dorothy and James Harris, farmers who owned and worked a 45-acre farm. During intermediate and high school, I became interested in insects from helping my mother in her garden. She showed me the damage insects did to her cabbage and tomato plants. Then she dug in the ground under some of the plants and found worms, which she put in a can. The worms could not escape from the can and died from starvation. In a similar way, she killed any other insects she found damaging her plants in the garden.

Mr. A. E. Woods, my agriculture teacher (at Pulaski County Training School, now known as Harris Elementary School), encouraged me to go to college. I always intended to follow his advice. I decided to enlist in the U.S. Marine Corps so that I could attend college on the GI bill. I attended the University of Arkansas in Pine Bluff, Arkansas. At that time (from 1947-1951) it was called Agricultural, Mechanical, and Normal College. My oldest sister was in college with me and I had to support her and myself with my little GI bill funds. The second year I was in college, I took botany and zoology courses taught by Dr. Rufus Caine, chairman of the Science Department at the University of

Arkansas at Pine Bluff. I liked him as a person and appreciated the clarity by which he taught science. His teaching and illustrating of biological principles motivated me to become a science major.

While studying zoology at Marquette University in Milwaukee, Wisconsin, I found out that the Forest Service hired forestry aides to work with Mr. Arnold Drooz, a forest entomologist. I applied for one of these positions and ended up working with Mr. Drooz for three months in the summer of 1955 in the Chippewa National Forest in Cass Lake, Minnesota. While working with Mr. Drooz, I met Dr. Lawrence Cutkomp, a toxicologist at the University of Minnesota. I talked with him and shared my desire to become an entomologist. I asked him to help me get into the Department of Entomology at the University of Minnesota. He agreed to help me, but he told me that students who had a stronger scholastic record than mine would have priority. I began work at the University of Minnesota, Cloquet Forest, in March 1957, recording insect damage to forest trees. In the fall of 1957, I began my studies as a graduate assistant in the Department of Entomology at the University of Minnesota, Saint Paul, Minnesota. One challenge I faced in graduate school at the University of Minnesota was passing the insect physiology and toxicology courses. I had difficulty completing course tests; I could express myself verbally, but I had difficulty finishing written tests in the allotted time. Nevertheless, I was awarded the M.S. degree in entomology in August 1959.

My most important postgraduate experience was joining the staff of the U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS) Fruit Fly Research Laboratory in Honolulu, Hawaii. I was very excited and happy to be part of the Fruit Fly Laboratory. After two weeks of orientation in Hawaii, including a visit to Maui and the big island of Hawaii, my family and I were sent to Agana, Guam. I was recruited to work on the Mariana Islands to support the Mariana Island Pilot Test to eradicate the melon fly and the oriental fruit fly from Rota, Mariana Islands. My job was to receive the sterile fly pupae (reared in Honolulu) shipped to Guam via Pan Am Airlines. With assistance from Joe Quan, we loaded sterile melon fly pupae into drop boxes. After emergence in drop boxes, Navy personnel transported the flies to Rota, Mariana Islands. Then, Joe Quan and I released the flies. In addition, we prepared fiberboard wafers (two-inch square) by saturating them with methyl eugenol with toxicant (Dibrom). U.S. Navy pilots transported the sterile melon flies and methyl eugenol wafers in a twin-engine Gruman amphibian airplane and dropped them on Rota. The U.S. Air Force provided transportation of Hawaiian fruit fly personnel from Honolulu to Guam on Military Air Transport.

This was a high-priority project of interest to USDA, Army, Navy, and Air Force pest control personnel. Since no one had done eradication before, there was keen interest in finding out if the pilot test in Rota, Mariana Islands, would be successful. In addition to releasing flies and making methyl eugenol lure drops on Rota, we set up and serviced Oriental fruit fly and melon fly traps on Guam to monitor populations of these two species on the island. When Typhoon Karen struck Guam during one of our experiments, we discovered that populations of both fly species were isolated in the Tarague beach area of Guam. We successfully eradicated the melon fly with sterile insect releases and the Oriental fruit fly with methyl eugenol wafers. After these experiences, I felt that my true calling was conducting research related to the biological control of fruit flies in Hawaii.

Plate 2: Dr. Ernest J. Harris (left) and colleagues study fruit flies and their parasitoids in field cages in Hawaii. (Photo courtesy of E. J. Harris)

In 1965, I decided to pursue coursework and research at the University of Hawaii to obtain a Ph.D. Mr. Taylor, the chief of the ARS Fruit Insect Branch, selected me as leader/coordinator of the North Africa Regional Mediterranean Fruit Fly Suppression Program, in the U.S. Agency for International Development. The goal of this program was to reduce the damage caused by this insect on export citrus crops in Tunis, Tunisia, and Marrakech, Morocco. I talked to members of my Ph.D. committee and they agreed that I could use part of the work I was doing in these North African countries for my Ph.D. dissertation. Although my academic progress was slow, I completed my doctorate in 1975.

Education:

- B.S. 1951, Biology, Agricultural Mechanical and Normal College (University of Arkansas at Pine Bluff), Pine Bluff, Arkansas
- M.S. 1959, Entomology, University of Minnesota, St. Paul, Minnesota
- Ph.D. 1975, Entomology, University of Hawaii, Honolulu, Hawaii

For many years, the best parasitoid for control of fruit flies was the braconid wasp, *Fopius* (*Biosteres*) *arisanus*. Up to this point, no one was able to rear this egg parasitoid in the laboratory. This got my attention. With the help of technicians Richard Okamoto and Clifford Lee, we successfully established a colony of *F. arisanus* in my laboratory in 1983. Entomologists and other scientists often called this laboratory strain the Harris strain. I received the Certificate of Merit Award from USDA-ARS in 1997 for this accomplishment. I was inducted into the Hall of Fame for African Americans by the state of Arkansas in 1999.

In looking back over my career, my mission as an entomologist was to observe the biology and ecology of fruit flies in Hawaii to gain insights on how to suppress populations using biological control methods. My vision was to develop a method to rear the egg parasitoid *F. arisanus* in the laboratory and make this strain available to other scientists. I worked on tropical fruit flies for USDA-ARS for 43 years. I retired in February 2006.

Key advice to students:

I believe that students interested in pursuing a career in entomology should study the basic courses in entomology including systematics, morphology, physiology, and ecology. In addition, they should study and become versed in understanding and applying the techniques of biochemistry and genetic engineering to control insects. The application of genetic engineering technology is a high priority for insect control. They should join ESA, keep their membership current, attend meetings, and present their work. Thereby, they can keep their skills current and learn from others by viewing posters and listening to talks. They can meet other scientists and establish beneficial collaborations.

By Ernest J. Harris

Select peer-reviewed publications:

Vargas, R. I., L. Leblanc, **E. J. Harris**, and N. C. Manouki. 2012. Regional suppression of *Bactrocera* fruit flies (Diptera: Tephritidae) in the Pacific through biological control and prospects for future introductions into other areas of the world. Insects 3: 727-742.

Harris, E. J., and R. Y. Okamoto. 1991. A method for rearing *Biosteres arisanus* (Hymenoptera: Braconidae) in the laboratory. Journal of Economic Entomology 84: 417-422.

Harris, E. J., and G. Olalquiaga. 1991. Mediterranean fruit fly (Wiedemann) (Diptera: Tephritidae) occurrence and distribution in desert areas in Chile and Peru. Environmental Entomology 20: 174-178.

Harris, E. J. 1990. Pest status: Hawaiian islands and North America. *In* G. Hooper and W. Robinson (eds.), Fruit flies, their biology, natural enemies, and control. Elsevier, New York.

Harris, E. J., and C. Y. L. Lee. 1986. Seasonal and annual occurrence of Mediterranean fruit flies (Diptera: Tephritidae) in Makaha and Waianae valleys, Oahu, Hawaii. Environmental Entomology 15: 507-513.

Harris, E. J., J. M. Takahara, and T. Nishida. 1986. Distribution of the melon fly, *Dacus cucurbitae* (Diptera: Tephritidae), and host plants on Kauai. Environmental Entomology 15: 488-494.

Harris, E. J., R. T. Cunningham, N. Tanaka, K. Ohinata, and W. J. Shroeder. 1986. Development of the sterile-insect technique on the island of Lanai, Hawaii for suppression of the Mediterranean fruit fly. Proceedings of the Hawaii Entomological Society 26: 77-98.

Willye White Bryan

"Stay committed, keep your passions, and work hard to build your career and keep entomology alive and well in the real world."

Willye White Bryan

I was born in Leland, Mississippi, a small Mississippi Delta town on Highway 61, sometimes called the "blues corridor." The town is 10 miles west of Greenville, which is a port city on the Mississippi River. When I was 10 years old, my family became a part of one of the great migrations of African Americans in the United States, moving from the southern part of the country to the North, East, and West to escape segregation and oppression from Jim Crow laws in the South. My family moved to Chicago. I attended middle school in Chicago during a period when most people believed that educational systems in the South were inferior to those in the North. As a result, students from the South were placed one grade level below their status when they entered the schools in the North. Consequently, I was a sixth grader when I arrived in Chicago, but was placed back in the fifth grade. Fortunately for me, I excelled with fifth-grade material (been there, done that) and was given what was referred to as a "double" at the end of the semester and went directly to sixth grade. During that sixth-grade year, I was assigned advanced reading and this was the year that my interest in entomology blossomed. I remember reading a paper on mayflies (Ephemeroptera) and becoming so fascinated with their life cycles that I read everything I could find on the different species in this insect order. I decided right away that I would definitely study biology/insects when I attended college. My parents were always supportive of my interests, goals, and ambitions.

Education:

- B.S. 1966, Social Science, Alcorn State University, Lorman, Mississippi
- M.Ed. 1973, History, Delta State University, Cleveland, Mississippi
- M.S. 1981, Entomology, Delta State University, Cleveland, Mississippi
  - Master's thesis title: Development of *Trichogramma exiguum* and *T. pretiosum* at five temperature regimes
- Postgraduate Studies, 1991-1995, Entomology, Virginia Tech, Blacksburg, Virginia
  - Research: *Microplitis croceipes* for control of *Helicoverpa zea* in soybeans and cotton: Investigations for enhanced rearing practices, and opportunities for conservation and augmentation

For some reason, my early interest in entomology waned after I moved (with my parents) back to Mississippi and entered college. Although I received degrees in social science and history, and did not study entomology, at least not initially, I still maintained an interest in the subject. I taught history for about four years in the public school system in Bolivar County, Mississippi. At the end of that period, I decided that I had had enough of history as a profession, and that it was time to pursue my entomological interests. I took a job with the U.S. Department of Agriculture's Agricultural Research Service (USDA-ARS) in Stoneville, Mississippi, and began the process of training myself for work as a researcher. While working with ARS, I did training in entomology that led to a master of science degree. It took several years with many long hours of studying and working a regular schedule as a research technician. It was very busy for awhile, working and finishing a graduate degree.

I began research in biological control of cotton insects before completing the degree. I was working on the biological control of noctuid moths *Heliothis* spp. using the egg parasitoid *Trichogramma pretiosum* (family Trichogrammatidae). During that period, I collaborated on a project to evaluate the feasibility of controlling noctuids, *Heliothis and Helicoverpa* spp., by augmentative releases of *T. pretiosum*. The project concentrated on aerial releases of *T. pretiosum* on cooperator fields in a central Mississippi Delta town, Shaw, Mississippi.

I was able to work with many premier research scientists in the field of biological control such as Drs. Ed King, Janine Powell, and Walker Jones, who were all research scientists at Stoneville and very supportive and helpful in my continued growth in entomology. A principle influence for me was Dr. Gloria McCutcheon. I met Dr. McCutcheon while we were both technicians. At the time,

she was studying insects and working at Clemson University. Dr. McCutcheon was the only other African-American woman I knew in the field of entomology. I attended an ESA meeting in 1984 and was gratified to meet other African-American scientists. At that time, there were about 12 to 15 African Americans who were members. I remember at that time that I urged the group to start a Black Entomologists Society. Happily, it did become a reality years later.

I worked for 23 years doing research on the biological control of cotton insect pests in the Mississippi Delta. I advanced from a biological aide to a Category III entomologist. I operated and managed the Stoneville Research Quarantine Facility (SRQF), USDA-ARS, Southern Insect Management Laboratory, Stoneville, Mississippi, an insect quarantine facility, which operated as a national and regional quarantine facility in support of classical biological control. This included importation from foreign countries, evaluation, and clearing of biological organisms for research, release, and establishment by me and other scientists throughout the United States. I handled more than 600 shipments during my tenure. Management included supervising personnel, budgetary alignments, planning and developing reports, and maintaining computer programs and files for quarantine activities. This job meant that I interacted closely with USDA, Animal and Plant Health Inspection Service (APHIS), on both the state and federal levels, to secure permission to import organisms into the SRQF. Once we received permission, the quarantine facility was responsible for containing the foreign organisms. Strict protocol was imperative at all times to prevent accidental introductions of any unwanted phytophagous insects, hyperparasites, weed pests, or plant diseases.

In 1991, while at USDA-ARS, Stoneville, Mississippi, I decided to pursue a Ph.D. in entomology. I received information from my friend, Dr. McCutcheon, about a Patricia Roberts Harris Fellowship at the Virginia Polytechnic Institute and State University, Blacksburg, Virginia. I applied and received the fellowship. I worked out an arrangement with ARS to spend six months pursuing the degree in Blacksburg and the remainder of the year working for ARS in Stoneville. This worked out very well; I was able to do the classwork and research required for the program. My research while in the program was on "*Microplitis croceipes* for control of *Helicoverpa zea* in soybeans and cotton: investigations for enhanced rearing practices, and opportunities for conservation and augmentation." This was an excellent program and I ended up completing all requirements. By 1996, I only needed to finish the writing of my dissertation. In 1996, I married my partner Michael, who lived in Michigan and worked for USDA. We had a commuter marriage for four years while I was at Virginia Tech

and working at Stoneville. After five years of studying, conducting my research, working at Stoneville, helping to take care of other family (my father became ill and passed away during this period), and traveling as much as possible to be with Michael, I had a pretty full plate. To reduce some stress, Michael and I decided collocating should happen sooner rather than later!

Fortunately, in early 1997, ARS offered one of its rare early retirement options. I immediately accepted the early retirement from ARS and moved to Niles, Michigan, where Michael was working at the USDA-Animal and Plant Health Inspection Service (APHIS) Biological Control Laboratory. After moving to Michigan, I worked at Bethel College in Mishawaka, Indiana, for a year as an adjunct professor of multicultural education and race and ethnicity. Following this year in academia, I went back to entomology and worked for private industry. I worked for a diagnostics company, which made test kits for identifying pathogens in the plant industry. While there, I coordinated the testing and marketing of insect diagnostic products for the company. I established the insect diagnostics department and marketed the first insect diagnostic test the company produced in its 20-year history. The test definitively identified two cotton insect pests, the cotton bollworm (*Helicoverpa zea*) and the tobacco budworm (*Heliothis virescens*) in the egg stage. I believe the move, new work, and starting life in a new location contributed to a shift in focus for me.

I decided to leave private industry and accept a position (my current position) as manager of the Pesticide Alternatives Laboratory, Department of Entomology, at Michigan State University (Dr. Mark Whalon, laboratory director). The laboratory discovers alternatives to chemical pesticides such as fungi, insect growth regulators, and other biopesticides to control insect pests in tree fruits (e.g., apple, cherry). To see some of the current research projects of the Pesticide Alternatives Laboratory, go to the lab's website at http://whalonlab.msu.edu.

Key advice to students:

Stay committed, keep your passions, and work hard to build your career and keep entomology alive and well in the real world. I think it is important to nurture minority students and foster interest in entomology and the sciences in grammar schools.

By Willye W. Bryan

Select peer-reviewed publications:

Gokce, A., L. Stelinski, D. R. Nortman, **W. W. Bryan**, and M. E. Whalon. 2014. Behavioral and electroantennogram response of plum curculio, *Conotrachelus nenuphar*, to selected noxious plant extracts and insecticides. Journal of Insect Science 14 (90). Available online: http://www.insectsciencce.org/14.90.

Bliss, W., B. Schoedel, M. Bandla, **W. Bryan**, and D. Steinkraus. 2003. Development of antibodies for detection of the cotton aphid fungus, *Neozygites fresenii*, pp. 1611-1614. *In* Proceedings of Beltwide Cotton Production Conference.

Bryan, W. W., C. L. Sutula, J. J. Adamczyk, Jr., L. C. Adams, D. D. Hardee, R. L. Brown, F. M. Davis, A. F. Harris, J. T. Robbins, B. Price Jr., M. Edwards, T. Miller, T. LaMasters, and J. Kimbrough. 2000. Incidence of the granulate cutworm, *Feltia subterranea* (F.) (Lepidoptera: Noctuidae) in early season Mississippi cotton: an example of the utility of a heliothine egg identification system (*Hel*-ID) in IPM, pp. 1004-1006. *In* Proceedings of the Beltwide Cotton Production Conference.

Sutula, C. L., **W. W. Bryan**, and J. Xia. 1999. Hel-ID: A tool for bollworm and budworm management, pp. 77-78. *In* Proceedings of the Beltwide Cotton Production Conference.

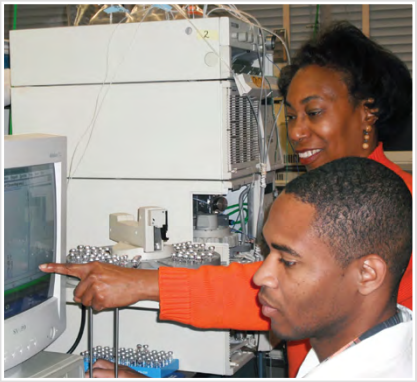
Hardee, D. D., and **W. W. Bryan**. 1997. Influence of *Bacillus thuringiensis*-transgenic and nectariless cotton on insect populations with emphasis on the tarnished plant bug (Heteroptera: Miridae). Journal of Economic Entomology 90: 663-668.

Harrison, W. W., D. A. Herbert, and D. D. Hardee. 1993. Effect of parasitoid and host age on oviposition and emergence of *Microplitis* croceipes (Hymenoptera: Braconidae) an endoparasitoid of *Helicoverpa zea* (Lepidoptera: Noctuidae). Journal of Entomological Science 28: 343-349.

Rose, M., and **W. Harrison**. 1990. Quarantine laboratory procedures, pp. 7-9. *In* D. H. Habeck, F. D. Bennett, and J. H. Frank (eds.), Classical biological control in the southern United States. Southern Cooperative Service Bulletin 355.

McCutcheon, G. S., and **W. Harrison**. 1987. Host range and development of *Microplitis rufiventris* (Hymenoptera: Braconidae), an imported parasitoid of several lepidopterous pests. Environmental Entomology 16: 855-858.

Harrison, W. W., E. G. King, and J. D. Ouzts. 1985. Development of *Trichogramma exiguum* and *T. pretiosum* at five temperature regimes. Environmental Entomology 4: 118-121.



Gloria Sanders McCutcheon

"In 1987, [when] I was awarded the Ph.D. in environmental entomology, I was the first African American in this major at the University of Georgia."

Gloria Sanders McCutcheon

I was born and raised on a small farm in Denmark, South Carolina. I became interested in science as a young child who was always fascinated by plants and animals, then insects once I discovered the tremendous role that some species play in the environment, and how other species affect public health. My mother, an avid gardener, answered many of my insect questions from preschool onward. She even stayed up long hours at night helping me, while in graduate school, prepare parasitic Hymenoptera to send off for identification by experts at the Smithsonian Institution, National Museum of Natural History, in Washington, D.C. My parents, brother, teachers, husband, and children have been supportive throughout my tenure in graduate school and as faculty member. However, it was difficult for some African Americans outside of my immediate family to understand why I was interested in insects and agriculture.

I entered Clemson University in August 1969, not long after graduating from Voorhees High School in Denmark, South Carolina. I was attracted to Clemson because of the 4-H Youth Development Program that provided enriching experiences and exposure to various careers. My major at Clemson was zoology, and I was the first African American at Clemson to earn a degree in this major.

I was active in the humanities, where I participated in the play, "In White America," and served as secretary of the Student League for Black Identity. Both organizations provided opportunities to enhance social consciousness on a campus that was transitioning from being all white to sparsely integrated, but made better under the leadership of President R. C. Edwards. He took some stands, such as halting the use of the Confederate flag at official university events during the early 1970s, and his approach helped improve race relations at Clemson University.

After graduation from Clemson University with a degree in zoology, I focused on environmental entomology. This became my passion as it provided the opportunity to address major agricultural and public health concerns. For my graduate studies, I investigated the seasonal abundance, occurrence, and distribution of insect parasitoids of lepidopterous pests in soybean fields across South Carolina. Along with taxonomists at the Smithsonian, I identified 33 species that helped regulate populations of corn earworm (*Helicoverpa zea*), velvetbean caterpillar (*Anticarsia gemmatalis*), green cloverworm (*Hypena scabra*), and soybean looper (*Pseudoplusia includens*), a new host record for *Cotesia marginiventris,* the most prevalent braconid parasitoid in the soybean ecosystem. Publications from this work set the groundwork for research to enhance and conserve populations of these often very inconspicuous insects. After earning the M.S. degree from Clemson in 1978, I was invited to serve on the research faculty, at the instructor level, and continue my research, which was just beginning to grab the attention of those who depended totally on chemical insecticides to control pests. I submitted a grant proposal to the National Science Foundation (NSF) and it was with great excitement that I received funding to support my work on the ecology and population dynamics of *C. marginiventris.* The NSF placed my work on the cover of its publication, "Models of Excellence," to reveal the research projects of minority scientists. In 1987, at the completion of my dissertation research entitled "Potential of the parasitoid *C. marginiventris* as a biocontrol agent of lepidopterous larvae in soybean," I was awarded the Ph.D. in environmental entomology; I was the first African American in this major at the University of Georgia. I continued my research on biological alternatives to chemical pesticides at the Clemson Agricultural Experiment Station, Blackville, South Carolina.

Education:

- B.S. 1973, Zoology, Clemson University, Clemson, South Carolina
- M.S. 1978, Entomology, Clemson University, Clemson, South Carolina
- Ph.D. 1987, Environmental Entomology, University of Georgia, Athens, Georgia

I served at three research and education centers (RECs) around South Carolina (Edisto, Pee Dee, and Coastal RECs), and I chose to remain in South Carolina because of my commitment to improving the quality of life for people in the state and because of my family ties. My faculty position at Clemson University gave me the flexibility to conduct outreach projects with farmers and youth throughout the state. Again, my work would not have been successful without the support of professors and mentors who believed in my abilities. Two of those mentors were Dr. Tommy Skelton and Dr. Sam Turnipseed. Dr. Skelton shared his passion of entomology in an introductory class where he included many firsthand experiences to illustrate the impact of insects on human society. Dr. Turnipseed was a dedicated researcher who worked tirelessly toward developing environmentally friendly strategies to regulate insect pests in agronomic crops.

My mission statement as a scientist is to make this world a better place by training young people. Because of that, I was willing to face challenges that sometimes seemed insurmountable. As a wife of a Methodist pastor, I moved to keep our family together, but at the same time, I was able to continue my research in environmental entomology. Administrators at Clemson supported the moves, but they were not able to provide technical support and, as a result, I secured funding through various granting agencies to provide support for my research programs. My colleagues were generally supportive, and our working relationships were very good. Because I was rated by the same criteria as those who had support, I had to work extra hard to gain tenure and promotion.

I can say that the results of my research and those of my graduate students have made it all worthwhile. This research resulted in over 100 publications in scientific journals, magazines, and book chapters. Both the U.S. Department of Agriculture and the National Science Foundation have recognized and funded my research. My most treasured accomplishments include making major contributions to decreasing the use of chemical pesticides in South Carolina crops, and securing support for former graduate student Walter Manyangarirwa (Ph.D. in 2009) to study at Clemson and conduct research in Zimbabwe to help fight food insecurity. Now, he teaches students from more than 20 African nations at Africa University in the area of integrated pest management.

My work to encourage women to enter the sciences started when I initiated a "Girls in Science" Camp at the Edisto Experiment Station in collaboration with the American Association of University Women (AAUW) during the 1980s. The camp attracted young girls from four rural counties to science and received

recognition at the White House and national media attention from television, *The Washington Post*, and the AAUW magazine. My interest in women's education led to serving on the Columbia College Board of Trustees for 12 years. I also advised and mentored the first female African-American medical entomologist (U.S. Naval officer), J. Shani Gourdine.

Currently, I hold the honor of emerita professor at Clemson University, while serving as a professor of biology at Claflin University, where I teach and train graduate and undergraduate students in biotechnology and public health. As a member of the inaugural class of the Kellogg Foundation Food and Community Policy Fellows, I have travelled extensively in Europe, Africa, South America, and Central America to study food systems and global health. Today, I enjoy participating in Farm-to-Table discussions, emphasizing the importance of knowing where our food comes from, and supporting local small farmers. I also enjoy writing children's books on the topic of food systems and insects.

Plate 3: Dr. Gloria McCutcheon with display case in front of her greenhouse on campus, Claflin University. (Photo courtesy of G. McCutcheon and C. Williams)

Key advice to students:

Find your passion and follow your dream, even if it is the road less travelled.

By Gloria S. McCutcheon

Select peer-reviewed publications:

Ogbuji, K., **G. S. McCutcheon**, A. M. Simmons, M. E. Snook, H. F. Harrison, and A. Levi. 2012. Partial leaf chemical profiles of a desert watermelon species (*Citrullus colocynthis*) and heirloom watermelon cultivars (*Citrullus lanatus* var. *lanatus*). HortScience 47: 1-5.

Manyangarirwa, W., G. W. Zehnder, **G. S. McCutcheon**, P. H. Adler, J. P. Smith, and A. N. Mphuru. 2011. The *in vitro* efficacy of a Zimbabwean isolate of *Zoophthora radicans* Brefeld (Batko) in control of Lepidoptera larvae infesting *Brassica* spp. African Journal of Microbiology Research 4(14): 1717-1722.

Manyangarirwa, W., G. W. Zehnder, **G. S. McCutcheon**, J. P. Smith, P. H. Adler, and M. N. Mphuru. 2009. Parasitoids of the diamondback moth on brassicas in Zimbabwe. African Crop Science Conference Proceedings 9: 565-570.

McCutcheon, G. S., A. M. Simmons, and J. K. Norsworthy. 2009. Effect of wild radish on preimaginal development of *Diabrotica balteata* and *Agrotis ipsilon*. Journal of Sustainable Agriculture 33: 119-127.

Manyangarirwa, W., M. Turnbull, **G. S. McCutcheon**, and J. P. Smith. 2006. Gene pyramiding as a *Bt* resistance management strategy: how sustainable is this strategy? African Journal of Biotechnology 5: 781-785.

Gourdine, J. S., A. M. Simmons, **G. S. McCutcheon**, and G. L. Leibee. 2005. Floral nectars and honey enhance survival of *Diadegma insulare* (Hymenoptera: Ichneumonidae), a parasitoid of the diamondback moth (Lepidoptera: Plutellidae). Journal of Entomological Science 40: 97-100.

McCutcheon, G. S., A. M. Simmons, and J. S. Gourdine. 2004. Parasitism by *Diadegma insulare* (Hymenoptera: Ichneumonidae) in collard in South Carolina. Journal of Entomological Science 39: 673-676.

Gourdine, J. S., **G. S. McCutcheon**, A. M. Simmons, and G. L. Leibee. 2003. Kale floral nectar and honey as food sources for *Diadegma insulare (*Hymenoptera: Ichneumonidae), a parasitoid of the diamondback moth, *Plutella xylostella (*Lepidoptera: Plutellidae). Journal of Agricultural and Urban Entomology 20: 1-6.

Simmons, A. M., S. Abd-Rabou, and **G. S. McCutcheon.** 2002. Incidence of parasitoids and parasitism of *Bemisia tabac*i (Homoptera: Aleyrodidae) in numerous crops. Environmental Entomology 31: 1030-1036.

Pedro Barbosa

"I remember in particular those professors who absolutely loved nature and the animals and plants that lived in natural settings."

Pedro Barbosa

I was born in Guayama, Puerto Rico. However, I consider Spanish Harlem, New York City, to be my hometown because I spent most of my early years there, beginning at the age of three. I started my college career as a pre-med student and took almost every biology course taught in the department. Interestingly enough, several of the faculty were entomologists (teaching other courses), and being around them raised my interest in insects and piqued my fascination with these wonders of nature! It helped that my parents were supportive of my going to college. In my family at that point in time, no one before me had attended a university; in fact, both my parents had only a third-grade education. Their support and encouragement certainly made my journey easier, and—to be honest—I am not so sure that they were particularly concerned about my area of study. They were just proud of my accomplishments and I knew they would support my decision to pursue entomology as a career.

Education:

- B.S. 1966, Biology, City College of New York, Manhattan, New York
- M.S. 1969, Entomology, University of Massachusetts, Amherst, Massachusetts
- Ph.D. 1971, Entomology, University of Massachusetts, Amherst, Massachusetts

I attended City College of New York, which by design is/was a commuter college. This meant that I was not able to take advantage of the typical college experience. By far, one of the biggest challenges to my early education was that I did not take school seriously. Summertime meant that I had to work long hours and, in my mind, college was a better option than going to work full time. Despite this realization, I only worked at what I liked, and in terms of my classes, this meant biology only. (I earned and have the A's and B's to prove it!) My performance in my science classes was, unfortunately, not enough to compensate for my inattention to my other classes, and I graduated with an overall C- average.

Among my most important early influences were my biology teachers at City College of New York. I remember in particular those professors who absolutely loved nature and the animals and plants that lived in natural settings. They were instrumental in helping me channel my curiosity and enthusiasm for learning about insects and their place in the natural world.

As noted above, finishing my undergraduate career with a C- average translated into graduate schools generally not being open to having me on their rosters. Luckily, I was accepted by three universities. In making my decision concerning where to attend, the University of Massachusetts in Amherst (UMass) stood out for me, as I was interested in the entomology program offered there. Being from the North, Texas Tech University did not seem like a good fit at the time. I knew I would do no work at the University of Hawaii because there would be too many distractions. Therefore, I accepted the generous offer at UMass. I was awarded M.S. and Ph.D. degrees in entomology at UMass.

My first faculty position was at Rutgers University (in New Brunswick, New Jersey), and later I was asked to join the faculty at UMass. From UMass, I moved to the University of Maryland (College Park, Maryland) in 1979, where I remained until I retired in 2010. I am now an emeritus professor of entomology at the University of Maryland, and I look forward to continuing to mentor students and finishing a number of writing projects.

I have been a humble recipient of several honors and awards throughout my career. I served as president of the Eastern Branch of the ESA (1987) and as president of the Association for Puerto Ricans in Science and Engineering (1987–1989). I was a Ford Foundation Fellow (1984), a University of Maryland Distinguished Research Faculty (awarded in 1991), a Fellow of the American Association for the Advancement of Science (in 1991), a Fellow of the Entomological Society of America (in 1997), and an Honorary Member of

ESA (in 2006). I also received a Bussart Memorial Award for Excellence in Research (1986, 1987), Science Award from the Institute of Puerto Rico of New York (1989), and a Ciba-Geigy Recognition Award from the ESA Eastern Branch (1993).

Key advice to students:

Do what you love; do it as well as you possibly can. Do more than you think you can; you may be surprised at the results.

By Pedro Barbosa

Select peer-reviewed publications:

Barbosa, P., D. L. Berry, and C. K. Kary. 2014. Insect histology: practical laboratory techniques, 2nd ed. Wiley-Blackwell, Oxford, United Kingdom.

Barbosa, P., D. K. Letourneau, and A. Agrawal. 2012. Insect outbreaks revisited. Wiley-Blackwell, Oxford, United Kingdom.

Lind, E. M., and **P. Barbosa.** 2010. Life history traits predict relative abundance in an assemblage of forest caterpillars. Ecology 91: 3274-3283. [Selected by the Faculty of 1000 (F1000) service (which identifies and evaluates the most important articles in biology and medical research publications).]

Barbosa, P., J. Hines, I. Kaplan, H. Martinson, A. Szczepaniec, and Z. Szendrei. 2009. Associational resistance and associational susceptibility: having right or wrong neighbors. Annual Review of Ecology, Evolution, and Systematics 40: 1-20.

Barbosa, P., A. Caldas, and H. C. J. Godfray. 2007. Comparative food web structure of larval macrolepidoptera and their parasitoids on two riparian tree species. Ecological Research 22: 756-766.

Barbosa, P., and L. Alexander. 2004. Science inquiry in the CORI framework, pp. 113-141. *In* J. T. Guthrie, A. Wigfield, and K. E. Perencevich (eds.), Motivating reading comprehension. concept-oriented reading instruction. Lawrence Erlbaum Associates Inc., Mahwah, NJ.

Barbosa, P., and M. Wagner. 1989. Introduction to forest and shade tree entomology. Academic Press, New York, NY.

Barbosa, P., and D. K. Letourneau. 1988. Novel aspects of insect-plant interactions. John Wiley & Sons, New York, NY.

Elmer Arthur Clarke Hagley

"Choose carefully and make sure the branch or branches of study you select will allow you to achieve your goals."

Elmer Arthur Clarke Hagley

I was born on the island of Grenada in the West Indies. I attended primary and secondary schools in Grenada and graduated from Grenada Boys Secondary School in 1948. I attended the Imperial College of Tropical Agriculture, Trinidad, on a Grenada government scholarship in 1949, and successfully completed the diploma course in 1952. I was accepted at Macdonald College of McGill University, Quebec, Canada, later that year to study toward obtaining a B.Sc. degree in agriculture. I spent five years at McGill obtaining a B.Sc. degree in agriculture and M.Sc. and Ph.D. degrees in entomology. My main professor was Dr. F. O. Morrison, who was an economic entomologist. To obtain my Ph.D., attendance at all courses given in the department was required and I was privileged to attend lectures given by Dr. E. M. DuPorte, the head of the Department of Entomology and a scholar of international repute.

Education:

- B.Sc. 1954, Agriculture, McGill University, Quebec, Canada
- M.Sc. 1955, Entomology, McGill University, Quebec, Canada
- Ph.D. 1957, Entomology, McGill University, Quebec, Canada

After completion of the Ph.D., I decided to go to England—as a visiting scientist at the Pest Infestation Laboratory at Slough—to study pests of stored products and work on booklice (psocids) in flourmills on the London docks. In 1958, I secured a senior research fellowship at Nottingham University, where I gave lectures on aspects of economic entomology to undergraduates and conducted research on pyrethrum insecticides for the control of pests in glasshouses. The African Pyrethrum Board, in Kenya, funded my studies, and Dr. C. Potter, at the Rothamsted Experimental Station in the United Kingdom, supervised my work.

Later, I joined the Department of Agriculture in Trinidad and worked on the transmission of coconut diseases by insects while serving as adviser on plant quarantine practices. I also supervised graduate students at the University of the West Indies. I developed and taught a course in zoology at the Trinidad and Tobago Polytechnic Institute from 1959 to 1964. In 1962, I visited the University of California at Berkeley and the University of Wisconsin at Madison to discuss some of my research, and also visited the director of plant quarantine services at the U.S. Department of Agriculture in Washington, D.C., to discuss plant quarantine practices, in general. In 1965, I joined the Caroni Research Station in Trinidad as a research entomologist to work on froghopper blight of sugarcane and serve as director of the station for a period of nine months. I was a founding member of the Trinidad and Tobago Sugar Technologists Association.

The founders of the Tate and Lyle Research Station in Trinidad were repatriating the senior staff to England, so I decided to return to Canada and join the Federal Department of Agriculture at the Vineland Research Station in Ontario. I worked on the control of pests of pome fruits (apples and pears) and led a team of scientists, which developed a management program for apple pests that enabled farmers to reduce their pesticide costs by approximately 40% without reduction of fruit quality. Subsequently, I was appointed head of the Entomology Section and chairman of the Ontario Fruit Research Committee. Later, I was elected president of the Entomological Society of Ontario. I was also a member of the associate staff of the University of Brock and the University of Guelph and supervised graduate students at both universities.

In 1974, I visited laboratories in England, France, the Netherlands, and Switzerland, presenting findings of the research conducted at Vineland and observing the research in the countries visited. I attended many national and international scientific meetings at which I presented the findings of my

research. I published 72 scientific papers in refereed journals. In 1977, I was awarded the Queen's Silver Jubilee Medal for my contributions to Canadian agriculture. In 1980, I obtained a transfer of work to the University of California at Berkeley, where I served as a research associate with Dr. Ken Hagen, learning rearing techniques for beneficial species.

Key advice to students:

We have come a long way from descriptive entomology and there are now many specialized branches. Choose carefully and make sure the branch or branches of study you select will allow you to achieve your goals.

By Elmer A. C. Hagley

Select peer-reviewed publications:

Hagley, E. A. C., A. R. Biggs, G. E. Timbers, and J. Coutu-Sundy. 1993. Effect of age of the puparium of the apple maggot, *Rhagoletis pomonella* (Walsh) (Diptera: Tephritidae), on parasitism by *Phygadeuon wiesmanni* Sachtl. (Hymenoptera: Ichneumonidae). Canadian Entomologist 125: 721-72.

Hagley, E .A. C., and D. R. Barber. 1991. Mortality, fecundity, and longevity of parasitoids of the spotted tentiform leafminer, *Phyllonorycter blancardella* (Lepidoptera: Gracillariidae) at constant temperatures in the laboratory. Entomophaga 36: 409-415.

Hagley, E. A. C., and A. R. Biggs. 1989. The effects of three fungicides on populations of a phytophagous and several predacious mites (Acarina) on apple. Experimental and Applied Acarology 6: 253-256.

Hagley, E. A. C., and W. R. Allen. 1988. Ground beetles (Coleoptera: Carabidae) as predators of the codling moth, *Cydia pomonella* (L.) (Lepidoptera: Tortricidae). Canadian Entomologist 120: 917-925.

Hagley, E. A. C., D. J. Pree, and N. J. Holliday. 1980. Toxicity of insecticides to some orchard carabids (Coleoptera: Carabidae). Canadian Entomologist 112: 457-462.

Hagley, E. A. C. 1967. Artificial diet for the adult froghopper. Nature 213: 414-415.

Hagley, E. A. C. 1965. The mechanism of transmission of *Rhadinaphelenchus cocophilus* by the palm weevil *Rhynchophorus palmarum*. Phytopathology 55: 117-118.

Hagley, E. A. C. 1963. The role of the palm weevil, *Rhynchophorus palmarum,* as a vector of red ring disease of coconuts. I. Results of preliminary investigations. Journal of Economic Entomology 56: 375-380.

Jorge Eliecer Peña

"Insects always managed to do the unexpected and always surprised me."

Jorge Eliecer Peña

I was born in Cali, Colombia. My father used to say that I was born there by accident, as the family had roots in Choco on the Pacific Coast, which is one of the areas in Colombia where 90% of the population is descended from slaves. I was raised and educated in Cali but spent my summers with my aunts and a multitude of cousins in Choco. As it was their tradition, my family believed that an education was the key to a productive life. After graduating from high school in 1967, I competed with hundreds of other students to gain access to the National University (Universidad Nacional de Colombia). I was thrilled that National University selected me!

At National University, I pursued the degree of engineer of agronomy and liked most of the courses that I was required to take, but I became very enthusiastic about two subjects: entomology and plant physiology. I began to work during the summers at the Department of Entomology of the International Center for Tropical Agriculture (CIAT). At CIAT, I discovered that the experience was like "living an adventure," because insects always managed to do the unexpected and always surprised me while plant physiology was, in my opinion, never exciting. Beginning at that time, I started having a love-and-hate relationship with insects.

Education:

- B.S. 1973, Agronomy, Universidad Nacional de Colombia, Palmira, Colombia
- M.S. 1979, Entomology, University of Florida, Gainesville, Florida
- Ph.D. 1983, Entomology, University of Florida, Gainesville, Florida
  - Dissertation title: Tomato pinworm, *Keiferia lycopersicella*. University of Florida, Gainesville, Florida

After graduating from National University, CIAT hired me as a research assistant in entomology to work with pests of cassava. After five years, I was awarded a scholarship to pursue the M.S. degree in entomology at the University of Florida. After finishing the M.S. degree, my major professor V. H. Waddill offered me a University of Florida graduate assistantship to pursue a Ph.D. in entomology. I was very much influenced by several of my teachers, Dale Habeck, Thomas Walker, Jerry Stimac, and James Nation, who always challenged me and other students to discover and find the truth about insects. I became more passionate about insect-plant relationships. I did not picture myself working in any other discipline, although the study of mites continues to challenge me.

I consider it my good fortune that the University of Florida hired me, in 1983, to serve as a postdoctoral fellow at the Tropical Research and Education Center in Homestead, Florida. This was perhaps my most challenging period, as I had to work with a new scale *Philephedra tuberculosa,* which was affecting papaya (*Carica papaya*), develop an integrated pest management program for broad mites, *Polyphagotarsonemus latus* in lime (*Citrus aurantifolia*), and do research with lepidopterous pests of cucurbits. Moreover, I was expected to respond to several requests for information from the public. For instance, there were questions regarding insects and mite pests from homeowners, the media, and growers. This was completely new to me, but I learned fast. Unexpectedly, Dr. Richard (Dick) Baranowski, who was holding a position as tropical fruit entomologist, became an administrator. When the University of Florida advertised his former position, I competed with other entomologists and again I had the good fortune in 1986 to be hired as a tenure-accruing faculty member to work on insects and mites of tropical fruit at this Center.

Perhaps because of my Hispanic background, I do not categorize entomologists as black entomologists or white entomologists. To me, entomologists are just entomologists. However, if I were to be asked whom do I truly admire as an entomologist, who happens to be black, it would be Dr. Pauline Lawrence.

Although Dr. Lawrence was not my professor, while I was a graduate student, I frequently witnessed her "lively discussions" with other colleagues during meetings. Yes, it could be because she is black that I feel this way. I also think it is because we both believe that one must work hard to achieve respect from colleagues.

Plate 4: Dr. Jorge Peña examining fruit in experimental orchard in Florida. (Photo courtesy of J. Peña)

My mission as an entomologist is to study basic biology and develop integrated pest management tactics for insects and mites that affect tropical fruit. My vision is to leave a legacy or a foundation of knowledge on some of these pests. I am a professor in the Department of Entomology at the University of Florida, Tropical Research and Education Center, Homestead, Florida. I also serve as the acting director of the Center for Tropical Agriculture.

I believe that I have been blessed to work with insects and mites, some of these species previously unknown to science. I have specialized in tactics and systems as well as strategies for integrated pest management of insects affecting tropical fruit species and of mites affecting crops such as lime (*Citrus aurantifolia*), avocado (*Persea americana*), mango (*Mangifera indica*), papaya (*Carica papaya)*, banana (*Musa*), litchi (*Litchi chinensis*), longan (*Dimocarpus longan*), guava (*Psidium guajava*), passion fruit (*Passiflora edulis*), and others. Specific examples of important scientific discoveries include the discovery of the eriophyid mite *Tegolophus perseaflorae* as the cause of leaf and fruit damage on avocado. I pioneered work with the vector of laurel wilt, the red bay ambrosia beetle (*Xyleborus glabratus*), determining the relative susceptibility of

23 cultivars of avocado and the effectiveness of insecticides against this vector. I collaborated with fellow entomologists (U.S. Department of Agriculture, University of Florida) to conduct research on attractants and repellents for this pest, and initiated the only survey for biological control agents of this pest in Florida and in Taiwan. To date, I have shown that only two insecticides and the repellent beetle-block show promise for effective vector control. I have determined that *Persea flocossa* is the only species within the Lauraceae family that is not attacked by *X. glabratus*. This research shows promise as this species might hold the clue for future studies on host plant resistance.

My work with mango led to the discovery that *Aceria mangiferae* (mango bud mite) and other mango pests, such as armored scales, are major contributors to mango decline. I determined that green, mature mangoes in Florida are not susceptible to attack by the Caribbean fruit fly, *Anastrepha suspensa*. This study allowed mango growers in Florida to sell their fruit within the United States and to remain competitive with foreign imports.

The first book that I edited was *Tropical Fruit Pests and Pollinators*. Entomologists from Australia, Brazil, South Africa, Puerto Rico, Israel, Thailand, and China were involved in this project. Currently, I am the editor of two additional books. *Potential Invasive Pests* summarizes current knowledge on pests in the orders Coleoptera, Hemiptera, Lepidoptera, and Diptera with input from scientists from North America (United States and Mexico), Jamaica, South America (Colombia, Brazil, Peru, and Ecuador), Europe (Spain, the Netherlands, France, and Hungary) and Asia (China, India, and Saudi Arabia). The invasive pests in this treatise have high potential to affect Florida's agriculture. Moreover, I am also the co-editor of a book on the red palm mite (*Raoiella indica*) that covers in detail the host plants, taxonomy, dispersion, and sampling techniques, classical biological control, natural enemies, and chemical control of this mite species. This has involved 21 experts of *R. indica* and should fill the gaps in our knowledge of this pest, providing a basis for more rational control strategies and identify research needs. In addition to my books, I have co-authored 17 book chapters, 38 refereed publications, and 28 nonrefereed publications in the last seven years.

Key advice to students:

If you decide on a career in entomology or in another science, you should love what you do and put your heart into it.

By Jorge E. Peña

Select peer-reviewed publications:

Carillo, D., R. E. Duncan, J. N. Ploetz, A. F. Campbell, R. C. Ploetz, and **J. E. Peña**. 2014. Lateral transfer of a phytopathogenic symbiont among native and exotic ambrosia beetles. Plant Pathology 63: 54-62.

Peña, J. E. 2013. Potential invasive pests of agricultural crops. CABI Invasive Series 3, Wallingford, Oxfordshire.

Castaneda-Vildozola, A., C. Nava-Diaz, D. Franco-Mora, J. Lomeli-Flores, and **J. E. Peña.** 2012. *Diospyros digyna* Jacq (Ebenaceae) a new host record for *Bephratelloides ablusus* Grissell & Foster (Hymenoptera: Eurytomidae) in Mexico. Florida Entomologist 94: 1071-1072.

Carrillo, D., D. Navia, F. Ferragut, and **J. E. Peña.** 2011. First report of *Raoiella indica* Hirst (Acari: Tenuipalpidae) in Colombia. Florida Entomologist 94: 370-371.

Kendra, P. E., J. Sanchez, W. Montgomery, K. Okins, J. Niogret, **J. E. Peña**, N. Epsky, and R. Heath. 2011. Diversity of Scolytinae (Coleoptera: Curculionidae) attracted to avocado, lychee, and essential oil lures. Florida Entomologist 94: 123-130.

Carrillo, D., M. de Coss, M. A. Hoy, and **J. E. Peña.** 2011. Variability in response of four populations of *Amblyseius largoensis* (Acari: Phytoseiidae) to *Raoiella indica* (Acari: Tenuipalpidae) and *Tetranychus gloveri* (Acari: Tetranychidae) eggs and larvae. Biological Control 60: 39-45.

Jacas, J., B. Ulmer, R. E. Duncan, and **J. E. Peña**. 2010. The role of *Brachyufens osborni* (Hymenoptera: Trichogrammatidae) in the classical control program against *Diaprepes abbreviatus* (Coleoptera: Curculionidae) in Florida. Biological Control 54: 213-220.

Carrillo, D., **J. E. Peña**, M. A. Hoy, and F. Howard. 2010. Development and reproduction of *Amblyseius largoensis* (Acari: Phytoseiidae) feeding on pollen, *Raoiella indica* (Acari: Tenuipalpidae), and other microarthropods inhabiting coconuts in Florida, USA. Experimental and Applied Acarology 52: 119-129.

Carrillo, D., **J. E. Peña**, and M. E. Rogers. 2009. Relative susceptibility of *Haeckeliania sperata* (Hymenoptera: Trichogrammatidae) to pesticides used in citrus and ornamental systems in Florida. Journal of Economic Entomology 102: 905-912.

Peña, **J. E.,** J. C. Rodrigues, L. Osborne, and A. Roda. 2009. The red palm mite, *Raoiella indica*: effect of resident and commercially produced predators against a recently introduced pest in Florida, USA, pp. 8-13. *In* Proceedings of the 3rd International Symposium on Biological Control of Arthropods, Christchurch, New Zealand.

Oscar E. Liburd

"All of my mentors and advisors played a very influential role in my overall development. They provided opportunities for me to become successful."

Oscar E. Liburd

I was born and raised in Stoney Grove, Charlestown, Nevis, West Indies. I had an excellent agricultural science teacher, Mr. Samuel Powell (in high school), who changed the way I viewed agriculture and insects in general. My teacher encouraged me to start a garden and to get involved in community events. My interest in agriculture was advanced by my curiosity and love for nature and the environment. My grandparents were cotton growers and interesting role models for me. I sincerely admired their perseverance and hard work in those cotton fields. My father was not very supportive of my agricultural interests, primarily because he was unsure I could support myself (and a family) with a career in agriculture. However, my mother was supportive and encouraged me to pursue my dreams.

I initially attended Guyana School of Agriculture in Guyana, South America, where I did a two-year associate degree in agriculture. Later, I attended Florida A&M University (FAMU) and obtained a B.S. in entomology and structural pest control and an M.S. in agricultural science—entomology. Finally, I received my Ph.D. from the University of Rhode Island (URI). After graduating, I did a postdoctorate in the Department of Entomology at Michigan State University (MSU).

Some of the challenges that I faced were from "people of color" who did not understand the concept of agricultural entomology. They questioned my potential to be successful in this area and questioned whether I could obtain a permanent job upon graduation. In many instances, I was the only minority in many of my classes despite attending a historically black university (FAMU) for my bachelor's and master's degrees. While I was pursuing my Ph.D. at URI, I was the only African American in my classes. These experiences propelled me to work harder and obtain very good grades. I graduated at the top of my class for both B.S. and Ph.D. degrees.

Education:

- B.S. 1991, Entomology, Florida A&M University, Tallahassee, Florida
- M.S. 1993, Agricultural Science—Entomology, Florida A&M University, Tallahassee, Florida
- Ph.D. 1997, Entomology, University of Rhode Island, Kingston, Rhode Island

My mentors/advisors at FAMU were all entomologists, Drs. William Peters, Joseph Funderburk, and Mr. Jerome Jones. At the Ph.D. level, my mentors were Drs. Richard Casagrande and Steven Alm. Mr. Jones was the only African-American entomologist throughout my graduate training. Nevertheless, all of my mentors and advisors played a very influential role in my overall development. They were all very encouraging and helpful, and provided opportunities for me to become successful. In several instances, they provided funding (scholarships) for me to attend professional meetings. They also encouraged my participation in scientific societies, which provided opportunities to give presentations at national and regional meetings.

Some of my most important postgraduate experiences include providing opportunities to train minority students from the United States and developing countries. I have also worked with a few of the U.S. Department of Agriculture's (USDA's) largest granting programs to identify research proposals that warrant funding. In addition, I have travelled to developing countries in Africa and the Caribbean and worked with nongovernmental organizations (NGOs), government agencies, and independent scientists in identifying alternatives to toxic pesticides for agriculture. I have provided technical advice to some of the largest organizations in the world, including the Food and Agriculture Organization of the United Nations and the U.S. Agency for International Development. These opportunities have had a positive impact on my career.

My mission as a scientist is to use my training, knowledge, and experiences to address key problems that are fundamentally important to society and the public. Addressing key issues will provide opportunities for safe and sustainable food sources, which are compatible with increasing food security, a USDA long-term goal for the United States and other developing countries. My expertise is in integrated pest management (IPM), which reduces the reliance on pesticides and highlights cultural and biological control strategies that conserve beneficial organisms and protect the environment. My experiences in academia have led me to appreciate that people have unique challenges and varied learning styles. Therefore, strategic planning is necessary when developing scientific research programs to address key problems. I believe that research and teaching are interwoven, and that high-quality research and teaching are involved in building a strong scientific program. I believe that successful teaching involves a systematic approach to summarizing research findings and presenting them in a logical sequence so that students as well as lay people can comprehend the information. My philosophy for research and teaching has been shaped by positive learning experiences, a passion for research, and a natural curiosity.

Currently, I am a professor of agricultural entomology in the Department of Entomology and Nematology at the University of Florida, Gainesville, Florida. I was promoted through the ranks of assistant professor (2000) to associate professor with tenure (2005), and finally to professor (2011). I have published over 133 scientific papers, including 75 refereed journal articles. Throughout my tenure, I have secured more than $4 million in external funds to support my research and extension programs. I have graduated over 30 graduate students including Ph.D., D.P.M. (doctor of plant medicine), and M.S. students, and have mentored and trained over 20 undergraduate students mainly through summer internship programs. I have also trained several postdocs and international scholars.

I have received several distinguished awards including Horticultural Entomologist (Southeastern Branch, Entomological Society of America, 2013), Excellence in Integrated Pest Management (Southeastern Branch, Entomological Society of America, 2008), Entomologist of the Year (Florida Entomological Society, 2008), Achievement Award for Research (Florida Entomological Society, 2007), and Distinguished Young Alumnus Award for Contributions to Life Sciences (Florida A&M University). I was also the first African-American president of the Florida Entomological Society. I have been fortunate to travel to Africa, South East Asia, Europe, and the Caribbean, giving presentations on

my research. Currently, I am an associate editor of *Florida Entomologist* and the *International Journal of Fruit Science*.

Key advice to students:

Work hard, do not get discouraged, and seek help and advice when needed. Your hard work will pay dividends later.

By Oscar E. Liburd

Select peer-reviewed publications:

Iglesias L. E., T. W. Nyoike, and **O. E. Liburd**. 2014. Effect of trap design, bait type, and age on captures of *Drosophila suzukii* (Diptera: Drosophilidae) in berry crops. Journal of Economic Entomology 107: 1508-1518.

Nyoike, T. W., and **O. E. Liburd**. 2013. Effect of *Tetranychus urticae* Koch (Acari: Tetranychidae), on marketable yields of field-grown strawberries in north-central Florida. Journal of Economic Entomology 106: 1757-1766.

McNeill, C. A., **O. E. Liburd**, C. A. Chase. 2012. Effect of cover crops on aphids, whiteflies, and their associated natural enemies in organic squash. Journal of Sustainable Agriculture 36: 382-403.

Nyoike, T. W., T. Mekete, R. McSorley, E. Weibezahl-Kakarigi, and **O. E. Liburd.** 2012. Confirmation of *Meloidogyne hapla* on strawberry in Florida using molecular and morphological techniques. Nematropica 42: 253-259.

Francis, A. W., K. K. Moses, A. L. Roda, and **O. E. Liburd**. 2012. The passionvine mealybug, *Planococcus minor* (Maskell) (Hemiptera: Pseudococcidae), and its natural enemies in the cocoa agroecosystem in Trinidad. Biological Control 60: 290-296.

Rhodes, E. A., **O. E. Liburd**, and S. Grunwald. 2011. Examining the spatial distribution of flower thrips in southern highbush blueberries utilizing geostatistical methods. Environmental Entomology 40: 893-903.

Sanders W. R., **O. E. Liburd**, R. W. Mankin, W. L. Meyer, and L. L. Stelinski. 2011. Applications and mechanisms of wax-based semiochemical dispenser technology for disruption of grape root borer mating. Journal of Economic Entomology 104: 939-946.

Roubos, C. R., and **O. E. Liburd**. 2010. Evaluation of emergence traps for monitoring blueberry gall midge (Diptera: Cecidomyiidae) adults and within field distribution of midge infestation. Journal of Economic Entomology 103: 1258-1267.

Nyoike, T. W., and **O. E. Liburd**. 2010. Effect of living (buckwheat) and UV reflective mulches with and without imidacloprid on whiteflies, aphids and marketable yields of zucchini squash. International Journal of Pest Management 56: 31-39.

Michelle Samuel-Foo

"I feel a sense of pride in knowing that the work that I do plays a role in making healthy food choices available to families across the United States."

Michelle Samuel-Foo

I was born on the Caribbean island of Trinidad and Tobago, in Sangre Grande, a small rural town on the Northeast part of Trinidad. My parents were cash crop growers for many years, and early memories of my childhood include carrying bucket pails of water from the neighboring river to hand water our lettuce, tomatoes, and okra crops. We sold these as fresh vegetables in the community market on weekends.

Growing up in rural Trinidad meant that I was exposed to the beauty and many challenges of agriculture from quite an early age. I entered college bent on pursuing a career as a traditional biologist, but taking classes in entomology and plant sciences brought me back to my roots. I was thrilled to have an opportunity to combine my curiosity about insects with my love of plants. My family was supportive of my decision to become an entomologist inasmuch as they were able to be, although by their own admission, they were not sure what I would be doing once I graduated. I still have friends back home in Trinidad who cannot believe that I grew a career out of plants and bugs!

Education:

- B.A. 2000, Biology (*Summa Cum Laude*), Brewton-Parker College, Mt. Vernon, Georgia
- M.S. 2003, Agronomy, University of Georgia, Athens, Georgia
- Ph.D. 2008, Entomology, University of Georgia, Athens, Georgia
  - Dissertation title: A risk-averse evaluation of value-added traits in elite soybean germplasm and confirmation of linkage group (LG) B2 and LG E soybean insect resistance quantitative trait loci, University of Georgia, Athens, Georgia

I attended Brewton-Parker College (BPC) in Mt. Vernon, Georgia, on an academic scholarship and majored in biology. As an international student travelling to the United States for the first time, I did not know much about small towns in the southern United States. I secretly expected to be greeted by the bright lights and towering structures of the likes of New York City. Looking back, I can easily see the advantages of being at a smaller college like BPC, as I was able to focus on my studies and graduated with my bachelor's degree in just over two-and-a-half years. In my last year at BPC, as I turned in my botany final exam, Dr. David McMillin, who had recently been hired as the Science Department chair, asked what my plans were postgraduation. At the time, I was only considering returning to Trinidad, happy to have earned a B.A. in biology. Dr. McMillin encouraged me to consider graduate school to continue my education. Financially, I would not have been able to afford graduate school as my family had very limited means and traditional loans were not available to me as an international student. Dr. McMillin introduced me to Dr. Jerry Johnson, a wheat breeder at the University of Georgia (UGA) in Griffin, Georgia, with whom he had collaborated in the past. After a visit to Griffin to interview with Dr. Johnson, I was thrilled to be offered a graduate research assistantship as an M.S. student in his program. Dr. Johnson was a welcoming mentor with an open door policy, which made my transition into graduate school seamless. As a student in the agronomy department at UGA, I had the opportunity to take entomology courses. After my second class with Dr. John N. All, I was so fascinated with the information I was learning that I approached him to discuss the possibility of pursuing a degree in entomology. After completing my master's degree, I became a Ph.D. student in Dr. All's laboratory. At the time, I was one of only two minority students in the department, but I took advantage of the resources made available to me and continued my resolve to earn a well-rounded education. In the end, that was exactly what I did. It helped that Dr. All was a huge proponent, and I credit him for helping

me achieve a solid foundation and appreciation for applied entomology. Dr. H. Roger Boerma in the Crop and Soil Sciences Department at UGA co-chaired my dissertation committee. I worked as part of his Soybean Improvement Program, which provided endless opportunities for exposure and training, and it was under his guidance that the world of DNA sequencing and molecular breeding was demystified for me. I consider myself most fortunate to have had the chance to work with these outstanding scientists.

Plate 5. Dr. Michelle Samuel-Foo conducting a Coffee Magnitude of Residue GLP Trial, Adjuntas, Puerto Rico, 2012. (Photo courtesy of M. Samuel-Foo)

In my final year of graduate school, as I was considering career options, the IR-4 Project was searching for a regional coordinator for its field program. I immediately applied after seeing the posting, knowing that my background in agricultural entomology, integrated pest management, and pesticides would provide a solid foundation for this position. I have served as the IR-4 Southern Region field coordinator for the past four years, and this has uniquely positioned me to be involved in determining pest management priorities and securing chemical control options for specialty crop growers and other stakeholders in the entire Southern United States and Puerto Rico. I have the opportunity to be involved in not only insect pest management, but also plant disease and weed management programs, as part of an extensive network of talented faculty and extension personnel.

Seeing evidence of the fruits of my labor drives me. For instance, when I walk into the produce department of the local grocery store and see a variety of fruits and vegetables available to me, I feel a sense of pride in knowing that the

work that I do plays a role in making healthy food choices available to families across the United States. My personal mission statement is to never give up, even when the odds appear stacked against me.

Officially, I am an associate research scientist, a faculty title at the University of Florida (UF) in the Department of Food Science and Human Nutrition. In my role as coordinator of the IR-4 Southern Region field program, I focus on carrying out the IR-4 project's mission of "securing sustainable pest management solutions for growers of specialty crops and minor uses." I also have the opportunity to be involved in teaching in the Institute of Food And Agricultural Sciences at UF, in addition to having outreach and extension responsibilities. Several of my accomplishments to date are listed below:

- Grant: Maurice R. Marshall, Michelle Samuel Foo, Jau W. Yoh, and Wlodzimierz Borejsza-Wysocki (2009-2013). IR-4 "Southern Region program to clear pest control agents for minor use." ~$2 million U.S. per year.
- Recognition for Achievement in Natural Sciences, by the Consulate General of the Republic of Trinidad and Tobago, Miami, Florida, November 2012.
- Current certification in the conduct of IR-4 Magnitude of Residue studies under EPA GLP (Good Laboratory Guidelines). University of Georgia Graduate School Future Leaders Program: Selected participant after a university-wide search to a two-day leadership retreat and workshop, 2007.
- Outstanding Ph.D. Student Award for Outreach and Service, Department of Entomology, University of Georgia, 2008.
- University of Georgia NAACP Chapter, Outstanding Academic Image Award, 2008.
- University of Georgia Outstanding Graduate Student Teaching Award, 2008.

Key advice to students:

I encourage students to take a broad approach to the study of entomology and increase their marketability and skillsets. You never know when your internship at that chemical company or that summer you spent scouting soybeans in south Georgia will come in handy. Always give 100%, arrive early, and stay late as often as you can. As a black entomologist and scientist in general, the world will expect uncommon things of you.

By Michelle Samuel–Foo

Select peer-reviewed publications and representative presentations:

Chen, Y., R. Story, and **M. Samuel-Foo**. 2014. Effects of nitrogen and phosphorous fertilization on western flower thrips population level and quality of susceptible and resistant *Impatiens*. Advances in Crop Science and Technology 2: 145. DOI: 10.4172/2329-8863.1000145.

Marble, S., C. Gilliam, G. Wehtje, and **M. Samuel-Foo**. 2013. Early postemergence control of yellow woodsorrel (*Oaxalis stricta L.*) with residual herbicides. Weed Technology 27: 347-351.

Samuel-Foo, M., J. N. All, and H. R. Boerma. 2013. Evaluation of pest vulnerability of "Benning" soybean value added and insect resistant near isogenic lines. Journal of Economic Entomology 106: 830-836.

Chong, J. H., G. S. Hodges, and **M. Samuel-Foo**. 2009. First record and management of the armored scale, *Melanaspis deklei* Dietz & Davidson, in South Carolina. Journal of Agricultural and Urban Entomology 26: 63–75.

LeRoy, B., A. Painter, H. Sheppard, L. Popiolek, **M. Samuel-Foo**, and T. Andacht. 2007. Protein expression profiling of normal and neoplastic canine prostate and bladder tissue. Veterinary and Comparative Oncology 5: 119-130.

Lance, J. K, J. N. All, and **M. Samuel-Foo.** 2005. Evaluation of selected insecticides for control of corn earworm and fall armyworm in sweet corn. Arthropod Management Tests 2005 (30).

Lance, J. K, J. N. All, C. W. Warrington, **M. Samuel-Foo**, and P. H. Jost. 2005. Evaluation of selected insecticides for control of bollworm (BW) and tobacco budworm (TBW) in Georgia on cotton, 2004. Arthropod Management Tests 2005 (30).

Samuel-Foo, M. March 2013. Navigating the IR-4 regulatory process: how the program accomplishes its mission of securing sustainable pest management tools for minor crops. Southeastern Branch Meeting of the Entomological Society of America, Baton Rouge, LA.

Samuel-Foo, M., and M. Marshall. August 2011. The critical role of IR-4 in specialty crop pest management in the U.S. Second Annual PGPR Conference. Beijing, China.

Samuel-Foo, M., and M. S. Robinette. April 2008. International service learning in Costa Rica: insect natural history. UGA Educational Forum for Globalization on Culture, Research, and Teaching. University of Georgia. Athens, GA. (Honors for Best Poster).

Samuel-Foo, M. March 2008. Angiosperms and gymnosperms: a look at plant growth and development. Department of Natural Sciences, Shorter College. Rome, GA.

Lambert H. B. Kanga

"Neither Illinois nor North Dakota has the beautiful tropical climate of the Ivory Coast. I had to adapt to the language, the food, and a new cultural enviroment."

Lambert H. B. Kanga

I was born and grew up in Abidjan, Côte d'Ivoire (Ivory Coast). My father had a large plantation of coffee and cocoa and, as I was growing up, I enjoyed very much spending entire days working there with him. Insects were the main pests that damaged coffee and cocoa products at harvest. My father always tried to find better ways to control insect pests, but he was not quite successful; thus, I made a commitment to help him control these insects when I grew up.

After finishing high school, I decided to stay "home" and attend the major university in Abidjan. The National University of Ivory Coast (Abidjan) offered courses in entomology, which I took during my sophomore and senior years. I was very impressed with one of my professors, Dr. Foua Bi Kouahou, because of the passion and enthusiasm he displayed for the discipline of entomology. Upon completion of the B.S. degree, I knew that I wanted to continue my education and focus on entomology. My family and friends all supported this decision. Fortunately, the Ivory Coast government awarded me a scholarship to attend graduate school in the United States and major in entomology. Coming from a French-speaking country (Ivory Coast), it was a great challenge to attend graduate school in the United States because of the language barrier

and because it was my first time away from my family, for a study-abroad experience. I was sent to the Intensive English Institute at the University of Urbana-Champaign, Champaign, Illinois, for about six months to take English courses. This helped me tremendously in successfully passing the Test of English as a Foreign Language and obtaining good scores on the Graduate Record Examination for admission to graduate school. I was interested in the master of science program at North Dakota State University and decided to attend that university. Coming to the United States for the first time, I was unaware of the cold winter weather in Illinois and North Dakota. Neither Illinois nor North Dakota has the beautiful tropical climate of the Ivory Coast. I had a difficult time dealing with the cold temperatures and the snow, and had to adapt to the language, the food, and a new cultural environment. Despite the challenges, I was successful in obtaining the master's degree in entomology at North Dakota State. I did receive a lot of help and encouragement from the faculty, especially from Dr. Rick Meyer.

I returned to my country after finishing at North Dakota State, but traveled back to the United States several years later to pursue a Ph.D. in entomology. I was accepted at Texas A&M University, in College Station, Texas. I was very fortunate to receive help and guidance from a number of faculty members. I vividly remember Dr. Frederick W. Plapp Jr.; he successfully guided my studies until I completed the degree. Afterwards, he was a source of inspiration during my professional career.

Education:

- B.S. 1982, Agriculture/Engineering, National University of Ivory Coast, Abidjan, Côte d'Ivoire
- M.S. 1984, Entomology, North Dakota State University, Fargo, North Dakota
- Doctorate 1988, Entomology, National University of Ivory Coast, Abidjan, Côte d'Ivoire
- Ph.D. 1994, Entomology, Texas A&M University, College Station, Texas
  - Dissertation title: A monitoring technique for resistance to biodegradable insecticides in the tobacco budworm (Lepidoptera: Noctuidae) and the boll weevil (Coleoptera: Curculionidae), and mechanisms of resistance to these insecticides

After receiving my Ph.D. degree, I returned to the Ivory Coast and worked for several years as a research scientist with the Ministry of Research and Education, while serving as an adjunct professor at the National University of Abidjan. While in Abidjan, I applied for and received an international fellowship

from the Canadian government, under the Natural Sciences and Engineering Research Council of Canada, and joined the Agriculture and Agri-Food Canada Research Station in Vineland, Ontario. I remained in Vineland for five years, developing a strategy to manage insecticide resistance in *Grapholita molesta*, the oriental fruit moth (OFM), a serious threat of the tender fruit industry in Ontario, Canada. I devised a novel, rapid, and user-friendly technique to monitor for resistance in OFM in commercial orchards in Ontario and in the northeastern United States. This strategy was widely used by more than 95% of producers and remains a key factor in assuring productivity for the tender fruit industry.

Currently, I am a professor and chair of entomology at Florida A&M University (FAMU), in Tallahassee, Florida, and serve as interim director of the Center for Biological Control. I have always maintained a passion for education and research. Thus, I was pleased to provide scholarly teaching and research opportunities to students at FAMU when the opportunity became available. My desire to serve others has helped me become a highly organized and efficient worker who thrives on the challenges of solving problems, implementing research, and teaching new ideas. I have been successful in establishing productive teamwork relationships with a strong passion for excellence. Successful collaborative grant procurement, varied discipline-related national and international leadership roles, and mentoring of undergraduate and graduate students provide evidence of my service. The Entomology Program has substantially changed since Dr. Margaret Collins, the pioneer entomologist, served here. Dr. Collins was probably the first black female entomologist in the United States and the first entomologist at FAMU, where she served as the chair of biology from 1952 to 1956. The program now includes many nationally and internationally recognized programs with a strong entomological base, especially the Center for Biological Control and the Center for Air and Water Quality. Several outstanding faculty members, undergraduate and graduate students, along with three affiliated research centers, provide the entomology program with academic excellence and a global perspective.

I have received several awards and honors in recognition of my research and teaching activities. Some of these include the John Henry Comstock Award (Entomological Society of America), Researcher of the Year Award (FAMU), Teacher of the Year Award (FAMU), Certificate of Appreciation for Outstanding Research Achievements (USDA-ARS), Outstanding Research Achievement Award (Government of Ivory Coast), and Certificate of Outstanding Achievement Award in Research (Division of Research, FAMU).

My research on control of pests of honey bees has been translated into several languages (Spanish, German, French, Chinese, etc.). These findings are in prestigious journals such as the British journal *Biologist* and in popular outlets such as the French Newspaper *Le Figaro* and the *Tallahassee Democrat*. Unfortunately, the number of honey bee colonies in the United States has declined by more than 40% in the last few years due to infestations of the parasitic Varroa mite. This mite, which reproduces only inside the sealed brood cells within the beehive, has developed resistance to all insecticides currently used for control. In addition, the mite appears to contribute to a destructive honey bee disease called colony collapse disorder. Thus, the Varroa mite seriously threatens the honey bee industry and U.S. agriculture.

I pioneered the use of fungal pathogens (*Metarhizium anisopliae* and *Hirsutella thompsonii*) for the control of Varroa mite. The findings provided new environmentally friendly avenues for managing Varroa mite populations in honey bee colonies worldwide. I have filed for patent rights for three of these discoveries and I am currently working with companies to put commercial fungal products on the market for control of Varroa mite in the near future. I have developed a simple and user-friendly adult vial test technique to monitor for resistance to different classes of insecticides and for the development of a resistance management strategy for the honey bee industry. I have also identified two fungal pathogens (in the genera *Beauveria* and *Metarhizium*) that are highly pathogenic to the small hive beetle, *Aethina tumida*, a new invasive and destructive pest of honey bees.

Concerning professional service, I am a member of the International Advisory Committee for the International Conference on Sustainable Agriculture for Food, Energy, and Industry. I served as an expert consultant for National Public Radio and the American Society for Microbiology on issues related to European and Africanized honey bees. I serve as an expert consultant for the Global Public Sector on issues related to invasive pest species. I serve as chair of the International Affairs Committee of the Entomological Society of America (ESA). I also serve on the Awards Committee of ESA and the Audit Committee of the Southeastern Branch of ESA, a panel reviewer for the U.S. Department of Agriculture (USDA) and the National Science Foundation (NSF), and a manuscript reviewer for several journals. I previously served as president of the International Association of Black Entomologists. I have been highly successful in obtaining funds to conduct research and provide assistantships for undergraduate and graduate students from several funding agencies including the Department of Homeland Security, NSF, USDA, National Institute of Food and

Agriculture (USDA-NIFA), USDA-Cooperative State Research, Education, and Extension Service, and U.S. Environmental Protection Agency.

Key advice to students:

Hard work always pays well. Thus, keep up the good work and stay focused on everything you do, and do it with your heart and soul as if there were no tomorrow. There is always a light at the end of the tunnel in the discipline of entomology.

By Lambert H. B. Kanga

Select peer-reviewed publications:

Kanga, L. H. B., and A. B. Somorin. 2011. Susceptibility of small hive beetle, *Aethina tumida* (Coleoptera: Nitidulidae), a destructive pest of honey bee (*Apis mellifera*) colonies to insecticides and insect growth regulators. Apidologie 43: 95-102.

Kanga, L. H. B., J. Adamczyk, K. Marshall, and R. Cox. 2010. Monitoring for resistance to organophosphorus and pyrethroid insecticides in *Varroa* mite populations. Journal of Economic Entomology 103: 1797-1802.

Kanga, L. H. B., J. Adamczyk, J. Patt, C. Gracia, and J. Cascino, 2010. Development of a user-friendly delivery method for the fungus *Metarhizium anisopliae* to control the ectoparasitic mite *Varroa* destructor in honey bee, *Apis mellifera*, colonies. Experimental and Applied Acarology 52: 327-342.

Legaspi, J. C., **L. H. B. Kanga**, and B. Legaspi, 2010. Fungal pathogens of the cactus moth, *Cactoblatis cactorum.* Subtropical Plant Science 62: 27-33.

Kanga, L. H. B., W. A. Jones, and C. Gracia. 2007. Efficacy of strips coated with *Metarhizium anisopliae* for control of *Varroa destructor* (Acari: Varroidae) in honey bee colonies in Texas and Florida. Experimental and Applied Acarology 40: 249-258.

Kanga, L. H. B., W. A. Jones, and R. R. James. 2005. Enlisting fungi to protect the honey bee. Biologist 53(2): 88-94.

Kanga, L. H. B., W. A. Jones, R. A. Humber, and B. W. Boyd Jr. 2004. Fungal pathogens of the glassy-winged sharpshooter *Homalodisca coagulata* (Homoptera: Cicadellidae). Florida Entomologist 87: 225-228.

Kanga, L. H. B., W. A. Jones, and R. R. James. 2003. Field trials using the fungal pathogen, *Metarhizium anisopliae* (Deuteromycetes: Hyphomycetes) to control the ectoparasitic, *Varroa destructor* (Acari: Varroidae) in honey bee, *Apis mellifera* (Hymenoptera: Apidae) colonies. Journal of Economic Entomology 96: 1091-1099.

Joseph E. Munyaneza

"My ultimate goal is to contribute to global and sustainable food production and security, the reduction of poverty, and the improvement of health."

Joseph E. Munyaneza

I was born and raised on a small farm at Nyabikenke in Gitarama (currently Southern Province), Rwanda. I attended the primary school at Kanyanza, junior high school at Shyogwe, and scientific high school at Byimana in Gitarama. As a young man, I thought I would become an agronomist. I never thought I would be chasing insects during my adult life. My parents were farmers with no basic school education, hence they could not offer much orientation in scientific careers. Although they were very supportive and proud of me trying to excel in school, especially higher education, they would definitely have been disappointed to learn that I was turning into an entomologist (i.e., a bug-chasing guy), a profession or hobby they considered was just appropriate for westerners!

Receiving a good education in Rwanda during my generation was not an easy thing to do. Although basic primary education was public in the country, kids had to walk very long distances (10 to 30 miles one way) on foot each day to reach the nearest school. The classrooms were often primitive, under-equipped, and very crowded. However, most of the local teachers were very motivated and dedicated and, most importantly, served as our role models. Because of the lack of schools, attending high school was for a few lucky ones who had generally scored highest on the national examination. Luckily, I was one of them! The few existing high schools were all boarding institutions and were

located very far from most of the student home villages; the only time we could see our parents and siblings was during the two main school breaks each year (two weeks to two months, one around Christmas and the other during the summer). Once admitted, I was randomly assigned to a scientific high school, about 70 miles from home. The National University of Rwanda was the only institution of higher education in the country and had the maximum capacity of about 1,200 students. Immediately after high school (1981), I was selected to attend the university and assigned to a bachelor's degree program in biology, and then to the first master's program in zoology at Butare (currently Southern Province).

Education:

- B.S. 1984, Biology, National University of Rwanda, Butare, Rwanda
- M.S. 1986, Zoology, National University of Rwanda, Butare, Rwanda
- M.S. 1993, Entomology, Southern Illinois University, Carbondale, Illinois
- Ph.D. 1996, Entomology (minor in Plant Pathology), Iowa State University, Ames, Iowa
  - Dissertation title: Assessment of *Coleomegilla maculata* (Coleoptera: Coccinellidae) predation of the Colorado potato beetle (Coleoptera: Chrysomelidae), Iowa State University, Ames, Iowa

With the help of Dr. Dian Fossey and Jean Claude Nsengimana, one of the first Rwandan entomologists at the then National Institute of Scientific Research (INRS), I was assigned a graduate thesis research project in entomology. The late Dr. Dian Fossey, former director and founder of Karisoke Mountain Gorilla Research Center in Rwanda, received considerable recognition for her work after the appearance of her book and movie *Gorillas in the Mist.* She first offered me an undergraduate research internship in 1982 to work on a project investigating the distribution and abundance of insects on *Hagenia abyssinica* (African redwood or East African Rosewood) in forests, inhabited by mountain gorillas, in the Volcanoes National Park in Rwanda, followed by a graduate research assistantship to work on short-horned grasshoppers (family Acrididae). Dr. Fossey funded my research on the ecological factors influencing the distribution and abundance of short-horned grasshoppers in the rain forest of the Volcanoes National Park. Just after graduation in 1986, I was hired by the Rwandan Ministry of Education to teach biology at the Scientific High School of Nyanza in Butare. Over a period of three years, I trained approximately 200 Rwandan students in the principles of science. Several of my students have become prominent scientists, including medical doctors.

In 1990, I received a research fellowship through the African Graduate Fellowship Program (AFGRAD), funded by the U.S. Agency for International Development and administered by the Africa-America Institute, to work on a master's in entomology at Southern Illinois University, in Carbondale. Under the direction of Dr. John E. McPherson, my thesis project was a comparative study of two economically important phytophagous stinkbugs, *Euschistus servus* and *Euschistus variolarius*. After completing the master's degree, I decided to pursue a Ph.D. degree in entomology.

In 1993, I received a research assistantship to begin work toward the Ph.D. at Iowa State University, in the laboratory of Dr. John J. Obrycki. My doctoral research involved a joint project between Iowa State University and Purdue University (with the late Dr. Robert J. O'Neil) to study the lady beetle *Coleomegilla maculata* (Coccinellidae) and the predatory stink bug *Podisus maculiventris* (Pentatomidae). The goal of this research was to determine and compare the search strategy and life history characteristics of these two predatory insect species. My specific research focused on an assessment of *C. maculata* predation of the Colorado potato beetle in potato ecosystems.

Following the completion of my Ph.D. degree in 1996, I worked as a postdoctoral research associate in the Department of Entomology at Iowa State University with Dr. John J. Obrycki. My assignment was to conduct on-farm integrated pest management (IPM) research on the alfalfa weevil (*Hypera postica*) and the potato leafhopper (*Empoasca fabae*) in alfalfa. The goal of the research was to evaluate (cooperatively with growers) IPM programs that were developed to optimize naturally occurring biological control agents by using cultural control methods and reduced rates of insecticides. The research was in collaboration with Practical Farmers of Iowa (PFI), a nonprofit farmer organization incorporating sustainable production strategies on individual farms.

In 1998, I accepted a postdoctoral research position in the Department of Entomology at the University of Minnesota to work on a potato insect pest management program, under the supervision of Drs. Edward B. Radcliffe and David W. Ragsdale. The focus of the program was on key insect pests and viruses of potatoes, including the Colorado potato beetle (*Leptinotarsa decemlineata*), the potato leafhopper (*Empoasca* fabae), the green peach aphid (*Myzus persicae*), several species of wireworms, and potato viruses (PLRV and PVY). Four years later, the experience and knowledge of potato insect pests and related diseases gained during this position contributed to my success at landing my current post as research entomologist with the U.S.

Department of Agriculture's Agricultural Research Service at the Yakima Agricultural Research Laboratory, near Wapato, Washington.

My mission is to develop integrated pest management strategies for insect pests of potato and other vegetable crops, with emphasis on insects vectoring plant diseases. Current research includes management of aphids, leafhoppers, psyllids, potato viruses, and phytoplasmas, Liberibacter, and zebra chip disease of potato. My ultimate goal is to contribute to global and sustainable food production and security, the reduction of poverty, and the improvement of health.

I am recognized nationally and internationally for my research on insect-transmitted plant diseases, particularly leafhopper and psyllid-transmitted potato phytoplasmas and bacteria. My focus has been on potato purple top disease in the Pacific Northwest of the United States and zebra chip, a new and economically important disease of potato in the Americas and New Zealand. I led the team that discovered the association of zebra chip with the potato psyllid insect vector. I also reported for the first time the bacterium Liberibacter on the European continent. I have authored over 130 scientific publications, including over 70 peer-reviewed journal articles and four book chapters. I gave more than 100 invited presentations at professional conferences, international congresses and symposia, and academic institutions in the United States, Canada, Mexico, Central and South America, Europe, and New Zealand. In 2010, I served as an invited external technical expert for the Central America Plant Protection Organization (OIRSA) and the European and Mediterranean Plant Protection Organization (EPPO) to develop pest risk analyses for the zebra chip pathogen and psyllid vectors in the OIRSA and EPPO regions. I am the recipient of the 2012 Entomological Society of America Integrated Pest Management Team Award for my research on zebra chip and potato psyllid. Furthermore, I served as vice president (2007-2009) and president (2011-2013) of the International Association of Black Entomologists, an affiliate of the Entomological Society of America. I have advised several graduate students in my capacity as an adjunct professor (in the Department of Entomology) at Washington State University.

Key advice to students:

Entomology is a noble science and can provide rewarding careers in government and private sectors. As an adjunct professor in the Department of Entomology at Washington State University, I have advised several graduate students who have landed good jobs after training in my laboratory. I have also

hosted many undergraduates as temporary technicians, especially during the summer, and many of them gradually developed interests in entomology and are considering careers in biological sciences. Writing and publishing scientific papers early in the career is an extremely important step, especially if a job in academia is the target. Hands-on experience is important in both academia and private industry. Furthermore, I think knowledge and applications of modern molecular techniques are essential in securing jobs in both public and private sectors.

By Joseph E. Munyaneza

Select peer-reviewed publications:

Munyaneza, J. E. 2015. Zebra chip disease, *Candidatus* Liberibacter, and potato psyllid: a global threat to the potato industry. American Journal of Potato Research 92: 230-235.

Munyaneza, J. E., V. G. Sengoda, L. Sundheim, and R. Meadow. 2014. Survey of "*Candidatus* Liberibacter solanacearum" in carrot crops affected by the psyllid *Trioza apicalis* (Hemiptera: Triozidae) in Norway. Journal of Plant Pathology 96: 397-402.

Munyaneza, J. E. 2012. Zebra chip disease of potato: biology, epidemiology, and management. American Journal of Potato Research 89: 329-350.

Munyaneza, J. E., V. G. Sengoda, R. Stegmark, A. K. Arvidsson, O. Anderbrant, J. K. Yuvaraj, B. Ramert, and A. Nissinen. 2012. First report of *Candidatus* Liberibacter solanacearum associated with psyllid-affected carrots in Sweden. Plant Disease 96: 453.

Munyaneza, J. E., and D. C. Henne. 2012. Leafhopper and psyllid pests of potato, pp. 65-102. *In* P. Giordanengo, C. Vincent, and A. Alyokhin (eds.), Insect pests of potato: global perspectives on biology and management. Academic Press, San Diego, CA.

Munyaneza, J. E., V. G. Sengoda, L. Sundheim, and R. Meadow. 2012. First report of *Candidatus* Liberibacter solanacearum associated with psyllid-affected carrots in Norway. Plant Disease 96: 454.

Munyaneza, J. E., A. Lemmetty, A. I. Nissinen, V. G. Sengoda, and T. W. Fisher. 2011. Molecular detection of aster yellows phytoplasma and *Candidatus* Liberibacter solanacearum in carrots affected by the psyllid *Trioza apicalis* (Hemiptera: Triozidae) in Finland. Journal of Plant Pathology 93: 697-700.

Munyaneza, J. E., J. M. Crosslin, J. L. Buchman, and V. G. Sengoda. 2010. Susceptibility of different potato plant growth stages to purple top disease. American Journal of Potato Research 87: 60-66.

Munyaneza, J. E., T. W. Fisher, V. G. Sengoda, S. F. Garczynski, A. Nissinen, and A. Lemmetty. 2010. Association of *Candidatus* Liberibacter solanacearum with the psyllid *Trioza apicalis* (Hemiptera: Triozidae) in Europe. Journal of Economic Entomology 103: 1060-1070.

Munyaneza, J. E., J. M. Crosslin, and J. E. Upton. 2007. Association of *Bactericera cockerelli* (Hemiptera: Psyllidae) with zebra chip, a new potato disease in southwestern United States and Mexico. Journal of Economic Entomology 100: 656-663.

Munyaneza, J. E., J. M. Crosslin, and J. E. Upton. 2006. The beet leafhopper (Hemiptera: Cicadellidae) transmits the Columbia Basin potato purple top phytoplasma to potatoes, beets, and weeds. Journal of Economic Entomology 99: 268-272.

George N. Mbata

"Entomology is at the crossroads of Nigeria's development, affecting agriculture and public health."

George N. Mbata

I was born and raised in Owerri, Nigeria. I did not know much about insects until I entered college. My earliest interest in insects was focused entirely on butterflies because of their beautiful coloration. I was also interested in the larvae of moths because of their ability to cause severe defoliation of trees during the rainy season in eastern Nigeria. The plant that was most defoliated by certain moths was the oil bean tree (*Pentaclethra macrophylla*), an economic tree crop in eastern Nigeria. My interest in entomology was further stimulated during my second year at the University of Ibadan, Nigeria. My arthropod professor, Afolabi Toye, gave a layout of professional entomologists in Nigeria. He told us that Nigeria had only one entomologist per 5 million people. He noted that entomology is at the crossroads of Nigeria's development, affecting agriculture and public health.

Upon completion of the bachelor of science degree, I developed an interest in malaria vectors and worked as a malaria entomologist between July 1978 and 1979. However, there was a critical need for scientists to work in the area of postharvest entomology at that time. Consequently, I returned to graduate school in 1979 and focused on postharvest entomology. Between 1979 and 1983, I obtained a Ph.D. in entomology at the same institution. My mentors were Professor F. N. C. Osuji and Professor W. W. D. Mudder. My mentors had considerable, exceptional influence on me. Under their tutelage, I developed research skills that have served me well as a scientist.

Education:

- B.S. 1977, Zoology, University of Ibadan, Nigeria
- Ph.D. 1983, Entomology, University of Ibadan, Nigeria

Postgraduate experiences that helped shape my career as an entomologist include fellowships that took me to the United States and Germany in 1988 and 1991, respectively. I had always wanted to study insect pheromones. My first opportunity came in 1988 when I was offered a six-month fellowship to work in the laboratory of Dr. Sonny Ramaswamy in the Department of Entomology and Plant Pathology at Mississippi State University, in Starkville, Mississippi. I investigated daily cycles of sex pheromone secretion in the noctuid moth, *Heliothis virescens* (tobacco budworm). Near the end of my stay at Mississippi State University, I returned to Nigeria and became motivated to investigate pheromones associated with the bruchid beetle *Callosobruchus spp.* A joint research grant from the U.S. Agency for International Development (USAID), which was awarded to Dr. Ramaswamy and me, allowed me to return to the United States in 1994 to participate in a study of the pheromones of *Callosobruchus maculatus* (cowpea weevil) and *Callosobruchus subinnotatus*. This study was very important because these bruchids were postharvest pests of grain legumes in West Africa. Grain legumes are staples and main sources of protein for the poorest sector of the economy in West Africa.

Another event that advanced my career as an entomologist was receiving an Alexander von Humboldt Fellowship in 1991, which took me to the Republic of Germany, where I worked with Dr. Christoph Reichmuth on the use of controlled atmospheres in the disinfestation of commodities infested with postharvest insects. The duration of my stay in Germany was approximately three years. I finally immigrated to the United States in 1997 and returned to Dr. Ramaswamy's laboratory at Mississippi State University. I participated in the identification of the components of the sex pheromones of *Callosobruchus spp*. I worked out an oviposition ethogram for *C. subinnotatus*. I also explored the reasons why pharate pupae, rather than young pupae, are more susceptible to carbon dioxide.

As a scientist, my mission is to increase food security through research; my vision is to use knowledge-based skills to lift people out of poverty. I am professor and chair of the Department of Biology at Fort Valley State University, Fort Valley, Georgia.

Key advice to students:

If you have an interest in contributing to science, entomology is a gold mine because of the number of insect species and their interactions with humans.

By George N. Mbata

Select peer-reviewed publications:

Mbata, G. N., K. Badji, and C. C. Brewster. 2014. Monitoring populations of *Phthorimaea operculella* in potato fields and in storage in Senegal. International Journal of Pest Management 60: 300-306.

Mbata, G. N., and D. I. Shapiro-Ilan. 2013. The potential for controlling *Pangaeus bilineatus* (Say) (Heteroptera: Cydnidae) using a combination of entomopathogens and an insecticide. Journal of Economic Entomology 106: 2072-2076.

Mbata, **G. N.,** M. J. Pascual-Villalobos, and M. Payton. 2012. Comparative mortality of diapausing and nondiapausing larvae *Plodia interpunctella* (Hübner) (Lepidoptera: Pyralidae) exposed to monoterpenoids and low pressure. Journal of Economic Entomology 105: 679-685.

Mbata, G. N., and C. C. Brewster. 2009. Functional response of *Pteromalus cerealellae* (Hymenoptera: Pteromalidae) on the cowpea weevil, *Callosobruchus maculatus* (Coleoptera: Bruchidae), and interaction between parasitism and cowpea varietal susceptibility. BioControl 54: 751-761.

Shapiro-Ilan, D. I., **G. N. Mbata**, K. B. Nguyen, S. M. Peat, D. Blackburn, and B. J. Adams. 2009. Characterization of biocontrol traits in the entomopathogenic nematode *Heterorhabditis georgiana* (Kesha strain), phylogenetic analysis of the nematode's symbiotic bacteria. Biological Control 51: 377-387.

Mbata, G. N., T. W. Phillips, and M. Payton. 2004. Mortality of eggs of stored-product eggs held under vacuum: effect of pressure, temperature and exposure time. Journal of Economic Entomology 97: 695-702.

Mbata, G. N., S. Shu, and S. B. Ramaswamy. 2000. Sex pheromones of *Callosobruchus maculatus* and *C. subinnotatus* (Coleoptera: Bruchidae): cogeneric responses and role of air movement. Bulletin of Entomological Research 90: 147-154.

Mbata, G. N., S. K. Hetz, C. Reichmuth, and C. Adler. 2000. Tolerance of pupae of *Callosobruchus subinnotatus* Pic (Coleoptera: Bruchidae) to modified atmospheres: a factor of pupal metabolism. Journal of Insect Physiology 46: 145-151.

Shu, S., **G. N. Mbata,** A. Cork, and S. B. Ramaswamy. 1999. The chemistry of the sex pheromone of *Callosobruchus subinnotatus*. Journal of Chemical Ecology 25: 2715-2727.

Henry Y. Fadamiro

"A career as an entomologist is highly rewarding, but requires hard work and diligence."

Henry Y. Fadamiro

I was born in Ondo, Ondo State, Nigeria. When I was growing up around farms, I realized that insects were a major problem for crops such as maize (corn), tomatoes, cowpea, and cocoa, and that is what led me to entomology and integrated pest management (IPM).

I received my B.S. and M.S. degrees at the Federal University of Technology, in Akure (FUTA), Nigeria. I was lucky to have professors in entomology and crop protection that were interested in IPM, and they showed me the importance of IPM programs.

Education:

- B.S. 1989, Biology, Federal University of Technology, Akure, Nigeria
- M.S. 1992, Biology Food Storage Technology, Federal University of Technology, Akure, Nigeria
- Ph.D. 1995, Zoology (Entomology), University of Oxford, England

I graduated from FUTA in 1989 with a First Class degree in biology, the first ever awarded by the department. After graduation, I worked as a research assistant for one year at the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria, on management of insect pests of cowpea and other legumes. From there, I was recruited by my alma mater (FUTA) as a graduate assistant

in the Department of Biology. In that position, I taught introductory biology courses. At the same time, I was enrolled in a master of science degree program.

In 1992, I was selected for the prestigious Rhodes scholarship to study for a Ph.D. degree at the University of Oxford. I had a great and pleasant academic and social experience at Oxford and met many people from the United States and other parts of the world. Some popular fellow Rhodes Scholars during my time at Oxford included Bobby Jindal, the 55th governor of Louisiana, and Rachel Maddow, an American television host (of *The Rachel Maddow Show*) and political commentator. After earning the Ph.D. from Oxford, I moved to Iowa State University in 1996 as a postdoctoral researcher in pest management.

Plate 6: Dr. Henry Fadamiro exhibits his wares at a Field Day, Auburn University. (Photo courtesy of H. Fadamiro)

After finishing this post, I joined the University of Minnesota in 1998 as a research associate in entomology to conduct research on biological methods to control pests in corn and cabbage. Shortly thereafter, I began working for the Minnesota Department of Agriculture and I led the state's apple and strawberry IPM and biological control programs. All of these experiences have shaped and influenced my career as a researcher and teacher. I now serve as a professor at Auburn University in Alabama. I also serve as IPM coordinator for Alabama and associate director of the Southern Region IPM Center.

As a professor at Auburn University, I am involved in teaching, research, and extension activities. My mission is to continue to serve in an academic role and leadership capacity in a higher education setting to advance the land grant mission of research, instruction, and service. My academic philosophy is that all four components of academics (teaching, mentoring, research, and outreach) are intertwined and should be integrated. Whereas research involves discovery and generation of knowledge, teaching and advising provide an opportunity to impact, train, and transmit research knowledge and skills to students, while outreach (extension) provides a vehicle to transfer practical research findings to the end users (public). I believe strongly in the mentoring of the next generation of scientists and entomologists, in particular those from underrepresented minority groups. Toward that end, I recruited students and

scholars from all over the world, and more than half of the dozen or so students and scholars currently in my research program are African Americans.

I have published more than 100 research and outreach articles and received more than $6 million in grants. I have mentored about 40 graduate students and postdoctoral scholars from different parts of the world. My academic accomplishments have been recognized locally, nationally, and globally, with various awards and prizes including the Award for Excellence in IPM by the Entomological Society of America—Southeastern Branch (2011), Alumni Professorship (2011), and the Alabama Agricultural Experiment Station Director's Award for Research (2005). In 2010, I was named Fellow of the Royal Entomological Society and editor for *Physiological Entomology*. I am an active member of the Entomological Society of America and served as pioneer president of the International Association of Black Entomologists from 2004 to 2008.

Key advice to students:

Entomology is a fun subject. A career as an entomologist is highly rewarding, but requires hard work and diligence. My advice is to follow your passion.

By Henry Y. Fadamiro

Select peer-reviewed publications:

Morawo, T., and **H. Y. Fadamiro**. 2014. Attraction of two larval parasitoids with varying degree of host specificity to single components and a binary mixture of host-related plant volatiles. Chemoecology 24: 127-135.

Fadamiro, H. Y., C. Akotsen-Mensah, Y. Xiao, and J. Anikwe. 2013. Field evaluation of predacious mites (Acari: Phytoseiidae) for biological control of citrus red mite, *Panonychus citri* (Trombidiformes: Tetranychidae). Florida Entomologist 96: 80-91.

Balusu, R., and **H. Y. Fadamiro.** 2011. Evaluation of organically acceptable insecticides as standalone treatments and in rotation for managing yellowmargined leaf beetle, *Microtheca ochloroma* (Coleoptera: Chrysomelidae) in organic crucifer production. Pest Management Science 68: 573-579.

Fadamiro, H. Y., L. Chen, C. Akotsen-Mensah, and W. Setzer. 2010. Antennal electrophysiological responses of the giant swallowtail butterfly, *Papilio cresphontes*, to the essential oils of *Zanthoxylum clava-herculis* and related plants. Chemoecology 20: 25-33.

Xiao, Y., and **H. Y. Fadamiro,** 2010. Functional responses and prey-stage preferences of three species of predacious mites (Acari: Phytoseiidae) on citrus red mite, *Panonychus citri* (Acari: Tetranychidae). Biological Control 53: 345-352.

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Baker, T. C., **H. Y. Fadamiro**, and A. A. Cossé. 1998. Moth uses fine tuning for odour resolution. Nature 393: 530.

Remarks and Conclusions

Twenty black entomologists contributed memoirs to this book project, which took the better part of 24 months to finalize. This number of contributors is only a fraction of the number of black entomologists in the profession. Although data are unavailable, we believe that 100 or more black entomologists serve the profession today in some capacity in North America. Many more serve the profession in other countries on the African continent and Caribbean islands. Nevertheless, those represented in this book are from North, Central, and South America, and Africa. Many of them are from primarily rural (agricultural) rather than urban or suburban backgrounds.

Childhood experiences with insects, plants, or other organisms influenced, to some degree, the career choices of the scientists in this book. Some recalled a memorable experience they had with a parent or teacher that sparked their interest in insects. Others did not develop an interest in entomology until attending college or university, where an influential professor exposed them to the subject in the classroom. Most received advanced training in entomology at universities in North America and hold (or held) membership in the Entomological Society of America (ESA). Perhaps many chose to specialize in applied aspects of the profession because of their rural upbringings. On the other hand, choice of specialty might have been due to economics. More jobs and career opportunities might be available in applied rather than basic (fundamental) aspects of entomology. Yet black entomologists have careers in both basic and applied entomology. Furthermore, as science in the 21st century becomes more interdisciplinary, some entomologists conduct entomological work while using a different title in the life sciences, such as biological scientist.

Another noticeable observation is that most black entomologists are currently in academia rather than government service or private industry. Of those working in academia, some serve at mainstream universities (i.e., those historically catering to white student populations), while others serve in historically black colleges and universities (HBCUs). Several of the scientists in this book obtained bachelor's degrees from an HBCU, and then continued their education at one of the mainstream universities, which offered advanced degrees (M.S., Ph.D.) in entomology or related natural sciences. HBCUs do not typically have Ph.D. programs in entomology, but they do provide some training—even if only one general entomology course or experiential learning opportunities with insects. One of the contributors in this book began his

career in private industry, but eventually left this venue to serve in academia. The black entomologists in government service typically work in federal laboratories (e.g., research laboratories at the U.S. Department of Agriculture's Agricultural Research Service). Although not actively involved in traditional teaching (i.e., in a lecture hall or university laboratory), many black entomologists in government service train high school and college students.

Key advice offered to the student considering a career in entomology varied considerably among black entomologists herein. Nevertheless, many advised students to work hard, follow their passion, and never give up. Many believe the profession of entomology can become a worthwhile and lucrative career for the student with a passion for insects, plants, or related organisms.

A major underlying theme in many of the memoirs in this book is that "no one made it on their own." In other words, almost without exception, success was only possible because of capable guidance and support from family, teachers, counselors, advisors, etc. A considerable number of white teachers and faculty advisors played a critical role in encouraging black students as they pursued entomological training at mainstream universities as well as at HBCUs.

In conclusion, we hope the memoirs of black entomologists herein have inspired students to consider a career in entomology as well as encouraged faculty to remain in the profession. As stated in the Introduction, the primary objectives of this book project were to (1) stimulate more interest in entomology as a viable profession for the undecided student and (2) to become a useful reference work for high school, college, and university administrators to recruit and retain students and faculty. We believe we have met our objectives.

By E. W. Riddick, M. Samuel-Foo, W. W. Bryan, and A. M. Simmons
(Editors)

List of Plates

Appendix A: Deceased Black Entomologists

Black scientists have contributed to the profession of entomology in North America since the early 1900s. As mentioned in the first section of this work, Dr. Charles H. Turner was likely the first black scientist to specialize on insects for the dissertation (Ph.D., 1907, Zoology, University of Chicago) in North America. A decade or so later, Ernest DuPorte, from the West Indies, was awarded the Ph.D. in entomology from McGill University in Canada. In a book titled *Blacks in Science and Medicine*, four African Americans are on record as receiving their doctorates from American universities in the mid-1900s (Sammons 1990). They were Vivian Murray Chambers (Ph.D., 1946, Cornell University), Madison Spencer Briscoe (Ph.D., 1950, Catholic University), Leon R. Roddy (Ph.D., 1953, Ohio State University), and Glen Herman Cooke (Ph.D., 1962, University of Wisconsin). Extensive biographies on the careers of these deceased entomologists are not presented in Sammons (1990) or elsewhere, to our knowledge.

In this appendix, we briefly highlight the lifespan, education (universities attended and degrees earned), career employment, major accomplishments, and select publications of five deceased black entomologists. These include Margaret S. Collins, Lonnie N. Standifer, Lincoln M. Moore, Thomas S. Odhiambo, and Ernest M. DuPorte. Extensive biographies on the careers of Dr. Collins and Dr. Odhiambo are available in a book (Warren 1999) and journal article (Meinwald and Nakanishi 2011), respectively. Several black entomologists organized symposia at the Annual Convention of the Entomological Society of America in 1997 and 2006 to recognize the contributions and careers of Dr. Collins and Dr. Odhiambo, respectively. Perhaps extensive biographies on the careers of Drs. DuPorte, Standifer, and Moore will become available in a subsequent work.

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Warren, W. 1999. Black woman scientists in the United States. Indiana University Press, Bloomington, IN.

Sammons, V. O. 1990. Blacks in science and medicine. Hemisphere Publishing Co., New York.

Margaret S. Collins

Margaret Collins (left) and Alex Adams.
(Photo courtesy of Janice Peters, Florida A & M University)

Lifespan: September 1922 – April 1996
Birthplace: Institute, West Virginia

Education:

- B.S., Biology, West Virginia State College, Institute, West Virginia
- Ph.D., Zoology, University of Chicago, Chicago, Illinois
  - Dissertation title: Differences in toleration of drying between species of termites (*Reticulitermes*), University of Chicago

Career employment:

- Professor, Department of Zoology, Howard University, Washington, D.C.
- Professor and Chair, Department of Biology, Florida A&M University, Tallahassee, Florida
- Professor, Federal City College, Washington, D.C.
- Senior Research Associate, Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Select accomplishments:

- First entomologist, Department of Biology, Florida A&M University
- Termite expert and expedition leader, Cayman Islands, Caribbean Islands, Guyana, Suriname

- President of the Entomological Society of Washington (in 1982)
- Established Curatorial Records (1959-1996), National Museum of Natural History (USA), Department of Entomology (Smithsonian Institution Archives, SIA Acc. 01-038)

Select publications:

Collins, M. S., M. I. Haverty, and B. L. Thorne. 1997. The termites (Isoptera: Kalotermitidae, Rhinotermitidae, Termitidae) of the British Virgin Islands: distribution, moisture relations, and cuticular hydrocarbons. Sociobiology 30: 63-76.

Haverty, M. I., **M. S. Collins,** L. J. Nelson, and B. L. Thorne. 1997. Cuticular hydrocarbons of the termites of the British Virgin Islands (Isoptera: Kalotermitidae, Rhinotermitidae, Termitidae). Journal of Chemical Ecology 23: 927-964.

Thorne, B. L., **M. S. Collins**, and K. A. Bjorndal. 1996. Architecture and nutrient analysis of arboreal carton nests of two Neotropical *Nasutitermes* species (Isoptera: Termitidae), with notes on embedded nodules. Florida Entomologist 79: 27-37.

Thorne, B. L., M. I. Haverty, and **M. S. Collins**. 1994. Taxonomy and biogeography of *Nasutitermes acajutlae* and *N. nigriceps* (Isoptera: Termitidae) in the Caribbean and Central America. Annals of the Entomological Society of America 87: 762-770.

Scheffrahn, R. H., J. P. E. C. Darlington, **M. S. Collins**, J. Krecek, and N.-Y. Su. 1994. Termites (Isoptera: Kalotermitidae, Rhinotermitidae, Termitidae) of the West Indies. Sociobiology 24: 213-238.

Collins, M. S. 1991. Physical factors affecting termite distribution. Sociobiology 19: 283-286.

Prestwich, G. D., and **M. S. Collins**. 1981. 3-Oxo-(Z)-9-hexadecenal: an unusual enolic ß – ketoaldehyde from a termite soldier defense secretion. The Journal of Organic Chemistry 46: 2383-2385.

Collins, **M. S.,** I. W. Wainer, and T. A. Bremner (eds.). 1981. Science and the question of human equality. American Association for the Advancement of Science, AAAS Selected Symposium no. 58, Westview Press Inc., Boulder, CO.

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Warren, W. 1999. Black woman scientists in the United States. Indiana University Press, Bloomington, IN.

Lonnie Nathaniel Standifer

Lonnie Nathaniel Standifer.
(Photo courtesy of Dadant & Sons, Inc./*American Bee Journal*)

Lifespan: October 1926 – March 1996
Birthplace: Itasca, Texas

Education:

- B.S., Prairie View A&M University, Prairie View, Texas
- M.S., Kansas State University, Manhattan, Kansas
- Ph.D., Entomology, Cornell University, Ithaca, New York

Career employment:

- Research Entomologist and Director, USDA-Agricultural Research Service, Tucson, Arizona

Select accomplishments:

- Instructor, Tuskegee Institute, Cornell University, Southern University (Louisiana)
- Director, USDA-ARS, Carl Hayden Bee Research Center, Tucson, Arizona

Select publications:

Standifer, L. N., W. F. McCaughey, S. E. Dixon, M. Gilliam, and G. M. Loper. 1980. Biochemistry and microbiology of pollen collected by honey bees (*Apis mellifera* L.) from almond, *Prunus dulcus*. II. Protein, amino acids and enzymes. Apidologie 11: 163-171.

Standifer, L. N., and J. P. Mills. 1977. The effects of worker honey bee diet and age on the vitamin content of larval food. Annals of Entomological Society of America 70: 691-694.

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Erickson, E. H. 1996. Obituaries: Lonnie Nathaniel Standifer. American Entomologist 42 (fall issue): 183-184.

Lincoln Morris Moore

Lincoln Morris Moore.

Lifespan: August 1949 – September 2008
Birthplace: Selma, Alabama

Education:

- B.S., Biology, Alabama A&M University, Huntsville, Alabama
- M.S., Forest Entomology, University of Michigan, Ann Arbor, Michigan
- Ph.D., Forest Entomology, Michigan State University, East Lansing, Michigan
  - Dissertation: The major insects and diseases affecting intensively grown hybrid poplars on Packaging Corporation of America (PCA) lands in central lower Michigan

Career employment and select accomplishments:

- Survey Entomologist for the U.S. Forest Service (1975)
- Research Entomologist and Coordinator of the Black College and University Program (1979 – 1985)
- Staff Assistant to the Deputy Chief of Research, U.S. Forest Service (1985 – 1989)
- Entomologist, USDA, Washington, D.C. (1989 – 1994)
- Participant, U.S. Government Exchange Program, North Carolina A&T State University, Raleigh, North Carolina (1989 – 1994)
- Research Entomologist, USDA and Educator, Southern University, Baton Rouge Louisiana (1996 – 2007)

- Technical Point-of-Contact on issues related to forestry and forest entomology, USDA Natural Resources Conservation Service
- Retired (in 2007) after 32 years of service with the federal government

Select publications:

Feir, D., J. Hilliard-Clark, J. R. Larsen, **L. M. Moore**, E. G. King, and J. L. Hayes. 1990. Bringing human diversity into the mainstream of entomology. American Entomologist 36 (fall issue): 190-205.

Ostry, M. E., L. F. Wilson, H. S. McNabb Jr., and **L. M. Moore**. 1989. A guide to insect, disease, and animal pests of poplars, 118 pp. Agricultural Handbook 677. USDA, Washington, DC.

Moore, L. M., and L. F. Wilson. 1986. Impact of the poplar-gall, *Saperda inornata* (Coleoptera: Cerambycidae) on a hybrid *Populus* plantation in Michigan. The Great Lakes Entomologist 19: 163-167.

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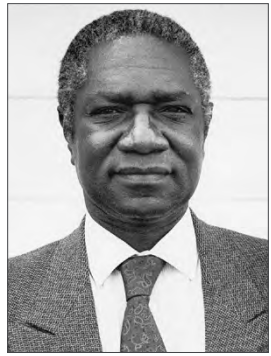
- An Interview with Lincoln Moore, Plant Protection Entomologist. ESA, http://www.entsoc.org/resources/education/moore.
- The Dr. Lincoln N. Moore Foundation, http://www.mooreeducationalfoundation.org/index.html.
- Department of Entomology, Michigan State University, East Lansing MI.

Thomas R. Odhiambo



Thomas R. Odhiambo. (Photo courtesy of *Proceedings of the American Philosophical Society*, volume 155, number 2, 2011, p. 231)

Lifespan: February 1931 – May 2003
Birthplace: Mombasa, Kenya

Education:

- B.S., Botany & Zoology, Makerere University, Kampala, Uganda
- M.A., Natural Science, University of Cambridge, United Kingdom
- Ph.D., Insect Physiology, University of Cambridge, United Kingdom

Career employment:

- Founder & Principal Director, International Centre of Insect Physiology and Ecology (ICIPE), Nairobi, Kenya (1969 – 1994)
- Founder & Chairman, African Academy of Sciences (1987 – 1999)

Select accomplishments:

- Albert Einstein Medal (1979)
- Gold Mercury International Award (1982)
- Gold Medal Award, International Congress of Plant Protection (1983)
- Honorary Doctorate of Science, University of Oslo (1986)
- First Professor & Head, Department of Entomology, University of Nairobi
- President, Association of African Science Editors
- President, Kenya National Academy of Sciences
- Author of six children's books

Select publications:

Mutinga, M. J., **T. R. Odhiambo**, C. C. Kamau, A. Odulaja, F. A. Amimo, and D. W. Wachira. 1995. Choice of resting sites by *Anopheles gambiae* (Diptera: Culicidae) in Mwea rice irrigation scheme, Kirinyaga District, Kenya. East African Medical Journal 72: 170–175.

Hassan, S. M., O. O. Dipeolu, A. O. Amoo, and **T. R. Odhiambo.** 1991. Predation on livestock ticks by chickens. Veterinary Parasitology 38: 199–204.

Odhiambo, T. R., and R. S. Pathak. 1987. Inheritance of resistance to the cowpea aphid in cowpea. Theoretical and Applied Genetics 74: 817–819.

Dhadialla, T. S., **T. R. Odhiambo**, and G. G. Wagner. 1986. Immunochemical ablation of accessory reproductive glands of the male desert locust. Insect Science and Its Application 7: 465–470.

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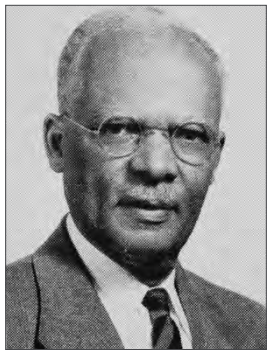
Ernest M. DuPorte



Ernest M. DuPorte.
(Photo courtesy of Clan Macdonald 1958 Yearbook/McGill University Archives)

Lifespan: October 1891 – July 1981
Birthplace: Island of Nevis, West Indies

Education:

- B.S., Entomology, Macdonald College, McGill University, Québec, Canada
- Ph.D., Entomology, Macdonald College, McGill University, Québec, Canada
- Dissertation: The muscular system of *Gryllus assimilis* Fabr. (Penn. Burm.), a thesis

Career employment:

- Department of Entomology, McGill University, Québec, Canada

Select accomplishments:

- First person of African descent to teach at McGill University
- Spearheaded the creation of the Institute of Parasitology, McGill University
- Trained and taught entomology students at Macdonald College (McGill University) for 70 years
- Nominee, "Greatest McGillian of All Time," McGill University
- Recognized for scientific contributions in parasitology and morphology by the Minister of the Environment, Minister for Parks Canada (Honourable Jim Prentice)
- Awarded the Gold Medal, Entomological Society of Canada

- Fellow, Entomological Society of Canada
- Academic scholarship created on his behalf, the E. Melville DuPorte Award, McGill University

Select publications:

DuPorte, E. M. 1967. The morphology of the first and second maxillae of insects. Canadian Journal of Zoology 45: 1269-1273.

DuPorte, E. M. 1962. Origin of the gula in insects. Canadian Journal of Zoology 40: 381-384.

DuPorte, E. M. 1962. The morphology of the insect mandible. Canadian Journal of Zoology 40: 1229-1232.

DuPorte, E. M. 1962. The anterior tentorial arms of insects and their significance in interpreting the morphology of the cranium of the cicada. Canadian Journal of Zoology 40: 137-144.

DuPorte, E. M. 1960. Evolution of cranial structure in adult Coleoptera. Canadian Journal of Zoology 38: 655-675.

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Canada's Universities website, http://www.canadian-universities.net/Scholarships/E/E-Melville-Duporte-Award.html.

Entomological Society of Canada website, http://www.esc-sec.ca/fellows.php.

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