Perry L. Adkisson

1929–2020

BIOGRAPHICAL *Memoirs*

A Biographical Memoir by Perry Lee Adkisson and Lynn M. Riddiford

NATIONAL ACADEMY OF SCIENCES

PERRY LEE **ADKISSON**

March 11, 1929–June 25, 2020

Elected to the NAS, 1979

Photography by James Lyle of Texas A&M Photographic Service

By Perry Lee Adkisson and Lynn M. Riddiford

I first met Perry Adkisson during his sabbatical year at Harvard in 1963-64. I had done undergraduate research under Dr. Carroll Williams in 1957-58, then went back to the Harvard Biological Laboratories as a postdoctoral from 1961-63, followed by teaching at nearby Wellesley College from 1963-65. During that time, I often frequented teas that Williams held from 5 to 6 p.m. for his graduate students, postdocs, visiting scientists, and anyone else who wanted to come. There were always fascinating discussions of the latest findings in the lab and in insect physiology and endocrinology in general, as well as of the current hot topics in biology. Perry was a good addition to this mix and added insights from his expertise in working with insect pests in the field. During his time at Harvard, Perry discovered Williams' passion for hot jalapeno peppers, just to eat by themselves or on the submarine sandwiches that were the Saturday lunch tradition in the lab. Therefore, whenever Perry would come back to visit the lab, he would bring at least one gallon can of jalapenos (Figure 1).

I was honored by Perry to be invited to speak at the minisymposium held in celebration of his career achievements in the basic and applied sciences at Texas A&M University on April 6, 1998. He met me when I arrived and took me to dinner, where we talked about the times at Harvard and about the tobacco hornworm, *Manduca sexta*.

This memoir is a composite of an autobiographical memoir that Perry wrote, which his wife was to send to the National Academy upon his death, as well as additional notes and pictures that I have collected. I subdivided his text into sections and added relevant references and pictures. His text is then followed by my notes.

Figure 1: Perry buying jalapenos for Carroll Williams in Texas, March, 1968. (Photo by Carroll M. Williams, given to Lynn M. Riddiford.)

Perry Lee Adkisson was one of the world's pioneers in the realm of protecting large-scale agricultural production against devastating destruction by crop pests. Beginning his work from an entomological viewpoint, he made close studies of the life cycles and behavior of several of the most harmful of these insects, discovering key details of how they functioned as pupae, when they often were most damaging to crops. From these findings he and colleagues developed a multifaceted process by which farmers could overcome the threat of crop pests through largely natural means by using a process called integrated pest management (IPM). Not only was the program successful, but it dramatically reduced the use of insecticides. He did much to spread the adoption of IPM in countries around the world, especially in Asia, Africa, and South America. Adkisson attended the University of Arkansas, receiving a B.S. in agriculture in 1950, and, after a stint in the Army, an M.S. in agronomy in 1954. He then earned a Ph.D. in entomology from Kansas State University in 1956. That year he accepted a position as an assistant professor of entomology at the University of Missouri. In 1958 he was offered a position in the Department of Entomology at Texas A&M University-College Station (TAMU) as an associate professor and project leader for research on the biology and control of the pink bollworm. He remained at TAMU for the rest of his career, retiring in 1994 as a Distinguished Professor.

Perry Adkisson was born on March 11, 1929, in the Hickman community of Mississippi County, Arkansas. His parents, Robert L. "Luby" and Imogene Perry Adkisson, owned a small cotton-and-soybean farm located about 1.5 miles west of the Mississippi River and 3 miles south of the Missouri state line. Although the farm was small, it produced high-yielding crops on its fertile alluvial soil and made a living for his parents, Perry, and his older brother, Jack, during the Great Depression and after World War II.

Perry grew up on this farm and at an early age began working in the fields hoeing weeds and picking cotton. But it was not all field work. The summers were filled with baseball, swimming, and fishing for big catfish in the mighty Mississippi River. In the winter

months Perry could be found in his spare time hunting ducks along the river or reading through every book in the school library.

His aunt Margueritte enrolled him, at age 5, in the first grade of the "40 & 8" school where she taught the first three grades. Every day during the school year Perry and Margueritte walked the half mile from home to school and back. The school consisted of two rooms with two teachers who taught reading, writing, and arithmetic to grades one through six.

After completing the third grade, Perry was transferred to a larger school in Armorel, Arkansas, a village of about 100 people located some five miles from the Adkisson farm. Perry remained in the Armorel School, completing the 12th grade and graduating in 1946 as valedictorian of a class of six.

While a student at the Armorel School, Perry joined the 4-H Club as soon as he was eligible. Soon after becoming a member Perry became acquainted with County Agent Keith Bilbrey, who would have a profound influence on his life. Under Bilbrey's tutelage, Perry became a county champion 4-H boy in the 9th and 10th grades, and state champion in the 11th and 12th grades. To become a champion, he had to compete with other 4-H'ers in developing and completing projects, maintaining records, and making oral and visual presentations of his work. All these activities provided training that would be useful to Perry the remainder of his life.

As county and state champion, Perry was able to attend the annual 4-H Club rallies held for a week each summer on the campus of the University of Arkansas at Fayetteville. During these rallies the 4-H'ers attended lectures and demonstrations presented by the faculty of the College of Agriculture. Perry became acquainted with several faculty members and began to develop an interest in attending the University of Arkansas. Bilbrey encouraged Perry in that idea. He also encouraged the boy's parents to provide the financial support needed for college, although as Perry would be the first member of his family to achieve higher education, they needed little encouragement. In the winter of 1946, Bilbrey drove Perry to Fayetteville, enrolling him in the College of Agriculture for the spring semester 1947. Perry was a good student, earning a B.S. in agriculture in three years, in the spring of 1950.

On graduation, Perry returned to the family farm, but in July he accepted a job as a vocational agriculture instructor in the Blytheville, Arkansas High School to teach in a program being offered to World War II veterans. He would not hold this job for long,

however, as the United States became engaged in the Korean conflict and Perry was drafted into the Army. He entered the service in March 1951 and was sent to Ft. Stewart, Georgia, for basic training. In the late summer he was transferred to Ft. Benning, Georgia, where he served as an enlisted man in the Medical Corps until he was discharged in January 1953 (Figure 2).

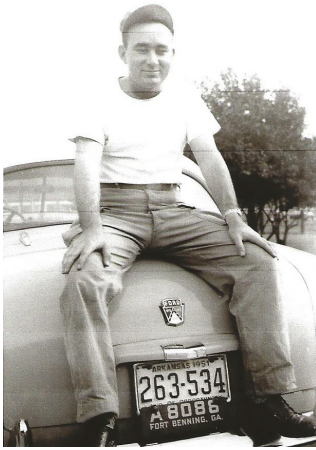

Figure 2: Perry in the army at Fort Benning, GA, 1951. (Photo from Gloria Adkisson.)

Immediately after his discharge, Perry returned to Arkansas to study for an M.S.in plant breeding with a minor in entomology. He completed his M.S., in agronomy, in the spring of 1954.[1] While studying for the M.S., Perry discovered a liking for entomology and was particularly influenced by two of his entomology professors, Dwight Iseley and Charles Lincoln, who encouraged him to study for the Ph.D. After considerable thought, Perry gave up his plan to return to the family farm, deciding instead to become a research scientist and college professor.

Dr. Lincoln found a research assistantship for Perry at Kansas State University. Perry enrolled there in the fall of 1954 to study for the Ph.D. in entomology under the guidance of Professor Donald A. Wilbur. Perry wasted no time at Kansas State, completing all requirements for the Ph.D. in early 1956.[2] Perry told Marlin Rice[3] that

> *...I worked like a slave. I was single, and it really did affect my social life....I'd get up to the lab about 7:30 in the morning and I'd leave about 9:30 or so at night...meet (a friend who was also a veteran) at the Blue Goose and eat an onion sandwich and drink a beer.*[4]

The day he completed his doctorate, he drove straight to Columbia, Missouri, where he joined the faculty of the University of Missouri as an assistant professor of entomology, with responsibilities for developing a new research program on cotton insects. Within a few days he moved to the city of Sikeston in the "Bootheel" of Missouri to join a small team of other researchers in the newly formed Southeastern Missouri Branch Agricultural Experiment Station. Perry immediately initiated research to identify the key pest insects of cotton in the Missouri delta and to develop improved methods for their control.

By Perry's second year his work had begun to attract the attention of other cotton entomologists. Before long he was offered a position in the Department of Entomology

at Texas A&M University-College Station (TAMU). Perry joined the TAMU faculty February 1, 1958, as an associate professor and project leader for research on the biology and control of the pink bollworm. He remained at TAMU for the rest of his career, retiring in 1994 as a Distinguished Professor.

Basic Research

Pink bollworm physiology

During his first five years at TAMU Perry's research was focused primarily on the pink bollworm, initiating studies on the phenology and control of the pest. He and colleagues from the U.S. Department of Agriculture were able to develop an effective integrated control program for the pink bollworm that soon relegated it to the status of a minor pest.

In his research with the pink bollworm, Perry and Dr. Erma S. Vanderzant developed one of the first successful artificial diets for rearing phytophagous insects for study.[5] The Vanderzant-Adkisson wheat germ diet (and derivatives thereof) is used in nearly every laboratory in the world where phytophagous insects are being reared. The paper describing this diet is the most cited publication in its field.

Sabbatical at Harvard University

Perry and his students published many important contributions on the basic mechanisms involved in the photoperiodic control of insect diapause (dormancy),[6-8] and he became well known for this work. His research on diapause caught the attention of Carroll Williams of Harvard in the early 1960s. After hearing a paper Perry presented on the photoperiodic control of diapause of the pink bollworm at a meeting of the Entomological Society of America, Williams came to TAMU to learn more about this research. He then invited Perry to come to his laboratory at Harvard to work with him in his research on the oak silkworm, *Antheraea pernyi*. During this period, Perry was promoted to full professor, made head of the cotton insect laboratory, and given broader responsibilities for research on all cotton insects. Despite his increased responsibilities Perry was able to take a sabbatical leave from TAMU during the academic year 1963-64. He went to Harvard to work with Williams, the preeminent insect physiologist of his era. Perry and Williams initiated research to identify the target organ of silkworm pupae, which were responding to the duration of the light and dark portions of each day. In a classical series of experiments, they excised the brains of the diapausing pupae and reimplanted them in their "tails." They then exposed each end of the pupae to a different photoperiod (Figure 3). Using this technique, they demonstrated that only the end of the

pupae having a brain responded to the photoperiod. They concluded that the action of the photoperiod was exerted on the insect brain by regulating the flow of hormones that control growth and development.[9] [The *A. pernyi* pupa has a transparent cuticular "window" overlying the brain (Figure 3), and they were able to show that the cocoon acted as a light-integrating sphere to focus the light on this window.[10] These were the first experiments to prove that photoperiodic information was captured by the insect brain and integrated there to regulate release of the tropic hormone that initiated adult development.][4]

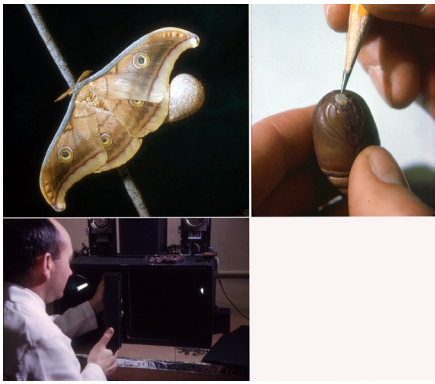

Figure 3: Top left: *Antheraea pernyi* moth. Top right: *A. pernyi* pupa. The pencil points to the transparent window over the brain of the pupa. Bottom: Perry in Carroll Williams's laboratory in 1964 placing operated *A. pernyi* pupae in a partition between two light-controlled chambers where the two ends of the pupa were exposed to different photoperiods. (Photos by Muriel V. Williams, given to Lynn M. Riddiford.)

During this research Perry learned that Williams used the oak silkworm in his research because it has a photoperiodic-induced diapause in the pupal stage. The pupae are comparatively large, so Williams could perform microsurgery on them with relative ease. A downside to using these pupae, however, is that they are difficult to obtain. For years, Williams had been purchasing them from Japanese suppliers who raised them on oak trees. Williams and students also were able to rear a small number on oak trees near Cambridge. Both sources of supply were uncertain and unsatisfactory, as numbers were low and the physical condition of the pupae was often poor. Perry suggested to Williams that he should search for a different experimental animal, one that could be reared in the laboratory on an artificial diet in controlled conditions. Williams believed this was a good idea and suggested to Perry that he take on this challenge on his return to Texas.

When Perry returned to TAMU in May 1964, he was immediately faced with a large agricultural crisis—namely, that the boll weevil had been found for the first time in the cotton fields of the Texas High Plains. This is the most important and largest cotton-growing area in Texas, annually producing four to five million bales. The Plains farmers were clamoring for TAMU, and the USDA, to do something to avert this threat. As a result, Perry became deeply involved in trying to resolve this problem and was heavily engaged in field research some 400 miles from College Station. Work on the boll weevil soon consumed most of his time and energy.[11,12]

Nevertheless, he did not forget his promise to Williams. In the summer of 1964, he began the search for an experimental insect to replace the oak silkworm. The first species Perry selected for this research was the tobacco hornworm, *Manduca sexta*. The adult is a large moth which can be caught in large numbers in light traps. The pupae are almost as large as those of the oak silkworm, and they are the overwintering or dormant stage of the insect. This was a lucky choice, as the larvae could be easily reared on the wheat-germ diet and, as Perry was able to demonstrate, they may undergo a photoperiodic controlled diapause in the pupal stage. He worked out a photoperiodic response curve for the species, identifying the day lengths that induce diapause and those that prevent it.

During a repeat visit by Williams to TAMU, Perry told him about this research, providing him with copies of his data and demonstrating the rearing techniques he had developed. He encouraged Williams to try using *Manduca* as an experimental animal for his research. Williams was excited by the promise offered by *Manduca*. On his return to Harvard, he and I (at the time I was an assistant professor of biology at Harvard),[4] refined the methods used for rearing *Manduca* and popularized its use as an experimental animal for research in developmental biology. *Manduca* soon became widely used in laboratories across the world and has been important to the advancement of knowledge in this field. (See references 13-17 for a summary of the work on *Manduca* endocrinology.)[4]

Perry has never received credit for his role in discovering the potential of *Manduca*, because he never published the results of his research with this species. This happened as a result of the heavy pressures imposed on his time by his involvement in developing a control program to stop the western spread of the boll weevil. Thus, to now, few know of Perry's seminal contributions to this research, which has been important in advancing developmental biology.

Figure 4: Perry in a Texas cotton field, 1991.
(Photo taken by James Lyle of Texas A&M Photographic Service, used with his permission.)

Integrated Pest Management

Perry and his students used the fundamental knowledge they gained in studies of diapause and the seasonal phenology of the pink bollworm, boll weevil, bollworm, and tobacco budworm to develop integrated control programs for these pests of cotton (Figure 4). These programs were designed to better utilize cultural and chemical methods for more effective, economical, and environmentally friendly insect control.

[Perry worked with USDA scientists to establish what became known as the "boll weevil diapause control program." Using basic knowledge of the boll weevil's ability to leave cotton in the fall, seek shelter in leaf litter, and then overwinter in a quiescent state of diapause, the researchers deployed a program of areawide insecticide applications to prevent the boll weevil from leaving cotton in the fall and entering diapause.][18] Out of this research came the refinements to a program that successfully prevented the westward spread of the boll weevil into millions of acres of cotton in the Texas High Plains, saving farmers millions of dollars and preventing the release of hundreds of tons of insecticides into the environment. [The diapause control program was a fundamental tactic in the U. S. and Mexico boll weevil eradication programs. The work started in the early 1980s and is currently finishing up in south Texas and northeastern Mexico. This program has eliminated the boll weevil from 99 percent of the U.S. cotton crop, resulting in billions of dollars of increased income to the cotton industry while keeping millions of pounds of insecticide from entering the environment.][18]

In the late 1960s a second major crisis threatened Texas cotton production when the tobacco budworm became resistant to all insecticides registered for use on cotton. This pest destroyed cotton production in Northern Mexico and inflicted severe yield losses on cotton in areas outside the High Plains of Texas. Fortunately, Perry and coworkers Knox Walker, Alva Niles, Luther Bird, Roy Parker, and others were able to develop and see implemented an integrated control system that was successful in holding this pest in check, saving the cotton industry in South Texas.[19]

In the 1970s Perry became a national leader in the development of integrated pest management (IPM). He was one of the organizers of the USDA-Environmental Protection Agency Integrated Insect Control Research Project, also known as the Huffaker Project, which in 1972 brought nearly 300 scientists from 18 land-grant universities into a centrally managed project whose goal was to develop more effective and environmentally sound systems of pest management on six major crops.[20]

In 1978 Perry led a second national project, entitled "Development of Unified, Comprehensive, Economical and Environmentally Sound Integrated Pest Management Systems for Major Crops," which was funded by EPA and USDA for 6 years at $3 million per year. He and colleague Ray Frisbie directed the project, which involved more than 250 scientists in 17 land-grant universities. Their goal was to develop better systems for managing all the pests, insects, weeds, diseases, and nematodes on alfalfa, apples, cotton, and soybeans. This project was completed in 1985.[21]

These two projects were successful in introducing IPM to American agriculture and were responsible for greatly reducing the amounts of pesticides applied to U.S. crops. The success of these projects reshaped the philosophies of crop protection specialists around the world, directing their efforts toward an ecological, systems oriented approach to pest management rather than unilateral approaches based on a single (usually chemical) technique.

Through his research, administration of research, and service on key international agencies, Perry was instrumental in introducing integrated crop protection methods to the developing world. He visited numerous countries, participating in workshops and seminars and lecturing to inform others of the increased crop yields, reduced production costs, and environmental improvement that may be realized through IPM. He was a member of the United Nations/Food and Agriculture Organization Panel of Experts on Integrated Control from 1968 to 1982, later serving as chairman from 1991 to 1996. He also was a consultant to the International Atomic Agency, the European Organization of Economic Cooperation and Development, the United Nations Development Program and FAO, and the U.S. Agency for International Development.

He and colleague Ray F. Smith of the University of California-Berkeley, under the auspices of the Consortium for International Crop Protection, organized workshops and short courses on IPM throughout the developing world. In these meetings they taught the IPM principles to crop protection specialists of the host countries and helped them organize and develop projects for implementations in their own countries. Through their research and their efforts in teaching others, Perry and Smith were the acknowledged leaders in seeing IPM become accepted across the world as the best way to control insect pests.

Academic Administration

Perry was recognized as a competent academic administrator at TAMU. During his 1967-1978 tenure as its head, the Department of Entomology experienced extraordinary growth, with the faculty and staff expanding from 23 to 66 fulltime professionals in research, extension, and teaching. The Department is now one of the largest in the United States and is recognized as one of the top departments in the country operating internationally recognized programs in IPM, insect behavior, insect physiology, host plant resistance, and biological control.

Not content in leaving his results in the laboratory or literature, Perry took this knowledge to farmers' fields and saw it implemented by them. In 1967, while running the department, he led the development of a statewide pest management plan for cotton and other crops. Working with Dr. Ray Frisbee and commodity organizations, he was able to obtain federal and state appropriations for almost 30 new extension pest management positions. Most of these specialists have exerted tremendous influence on farmers. Evidence of their success may be measured in the fact that in the mid-1960s, Texas farmers were using almost 20 million pounds of insecticides per year on cotton. Within a few years they were using less than 2 million pounds.

Promoted to Vice President for Agriculture and Renewable Resources at A&M in 1978, Perry formed an administrative team of the directors of the agricultural agencies and deans of the colleges of agriculture and veterinary medicine to provide cohesive and integrative leadership within a statewide agricultural complex. During his tenure in this position, budgets were increased for research and extension and several major building projects were initiated.

In 1983 Perry was appointed deputy chancellor for the Texas A&M University System (TAMUS) and given responsibilities for the agricultural and engineering agencies. In that position he worked closely with the Chancellor on all matters affecting TAMUS and led the development of the first strategic plan for the system.

Perry was promoted to Chancellor of TAMUS in 1986, overseeing the operations of eight universities and eight state agencies. At that time, TAMUS, with an annual budget exceeding $1 billion, some 64,000 students, and 28,000 employees, was, and still is, one of the largest university systems in the country. As Chancellor, Perry worked effectively with the Texas legislature and U.S. Congress to increase funding by almost 50 percent for the research, teaching, and extension programs of the system. He established several new research-teaching centers, including the Institute of Biosciences and Technology in Houston, and gained approval for the construction of several new buildings. He also successfully led the effort to bring Corpus Christi State University, Texas A&I University, Laredo State University, and West Texas State University into TAMUS.

Shortly after George H. W. Bush was elected President, Perry became part of an effort to persuade Bush to locate his presidential library on the TAMU campus. Perry formed a Presidential Library Committee and with TAMU President William Mobley developed a proposal for Bush. With the able assistance of Michel Halbouty and William McKenzie, they were successful in gaining the acceptance of their proposal by Bush and the U.S.

National Archives. Once Bush announced his choice, planning was initiated for the facility and for raising the required funds.

Figure 5: Perry meeting President George H. W. Bush in the White House in January, 1990 when he, Bill McKenzie and Michel Halbouty formally presented the proposal for the Bush Library to the President. (Photo taken by a White House photographer, presented to Perry and sent to Lynn M. Riddiford by Gloria Adkisson.)

In the summer of 1990 Perry asked the board of regents to allow him to leave the Chancellor's position to return to the faculty of the Department of Entomology. They honored his request, appointing him Regents Professor of Entomology. Perry returned to the faculty in January 1991. Shortly thereafter, TAMU President William Mobley asked Perry to take charge of the Bush Library effort. Perry agreed to serve on a temporary basis and was appointed the first executive director of the Bush Presidential Library Center (Figure 5). During this period, he also was appointed executive director of the newly formed George H. W. Bush Presidential Library Foundation. In these capacities, Perry assumed responsibilities for developing the architectural plans for the Library and allied facilities, the program of requirements for the facilities, and fund-raising for the Center. He served in these positions from 1991 till 1993, at which time he relinquished them to a permanent executive director.

In all these administrative positions, Perry was admired for his vision, leadership, and accomplishments. He also was respected for his honesty, integrity, and fairness and for simply being a good person. Perry continued to serve on the faculty of the Department of Entomology until he retired in 1994.

Family

In addition to his many professional achievements, Perry was a devoted family man. He met his wife Frances while he was studying for the Ph.D., and they married in December 1956, after Perry had joined the faculty of the University of Missouri. They enjoyed 39 years of marriage, producing a daughter, Amanda, who holds B. S., M. S., and Ph. D. degrees from TAMU. Frances passed away in October 1995, a victim of cancer.

Amanda sent the following recollection:

> *One day, during a family meal, my mother went to this refrigerator to get something and returned with a large white Styrofoam drink cup. She looked intently at my dad. Setting the cup on the table, she asked, "Perry, what is this?" My dad paused and looked up from his food. "What?" he asked. "What is this?" repeated my mother, pointing at the cup. My dad, in complete innocence, answered, "Grubs." The room was suddenly silent. All eyes turned to the cup of grubs, sitting in the middle of the food on the table. My dad picked up the cup and rotated it. "See," he said, "I labeled it! It says, 'grubs!'" Everyone began to laugh, including my mother, because we all understood that in my dad's mind, it was perfectly acceptable to store a cup of grubs in the refrigerator with the food, as long as it was properly labeled! After all, he was doing an experiment![22]*

In 1998, Perry married Gloria Ray of Pine Bluff, Arkansas. They built a new home in College Station where they were active with family, business, and community affairs until his death in 2020.[4]

Additional Biographical Notes by Lynn M. Riddiford

Perry was a creative agricultural scientist who combined a love of basic research with a keen sense of responsibility for solving the insect pest problems of the farmers in the fields of his states, first Missouri, then Texas. He set high standards for himself and for others, but he had an easy-going manner that allowed him to work well with both his scientific colleagues and the farmers.

Integrated Pest Management of Insects on Cotton and Other Crops

As seen above, Perry was focused on the sustainable control of cotton pests for the local farmer in Texas for most of his research career. Yet Perry was not content to control only cotton pests but felt that this integrated approach should be expanded to other crop systems.[20,21] Professor Ray Frisbie reminisced about this time.[23]

> *Perry and I spent many close years together designing and implementing IPM programs. I remember one episode very clearly in 1978 when Perry, Ray Smith and I were in the EPA Deputy Administrator's Office. We were there to gain funding for what would become the Consortium for Integrated Pest Management (CIPM). As I recall, things were not going well with the Assistant Administrator and EPA funding looked bleak. It was at*

this time, I decided the meeting needed a boost or all might be lost. I had been working with Ron Lacewell and an Extension Agricultural Economist, Dr. Mike Sprott, on designing a methodology for the economic and environmental evaluation of an operational pest management program.[24] *We had implemented a cotton IPM program through the Texas Agricultural Extension Service. We looked at years 1972-1974 comparing farmers who had implemented our IPM strategy with those who had not. Those implementing IPM showed a distinct economic advantage while significantly reducing insecticide use. Once we shared the results of this study, the EPA Administrator had a complete change in attitude and proceeded to fund CIPM project. He said that finally some data had been produced clearly showing the economic and environmental benefit of IPM. This was a turning point in IPM research and education.*

Ron Lacewell's recollections follow:[25]

Perry Adkisson was a dedicated entomologist with a much broader vision for addressing the issues facing production agriculture. As the Department Head at Texas A&M University in the early 1970's, he was reaching out to the other disciplines to get involved in an interdisciplinary approach. An example relates to [my] joining Texas A&M in the Department of Agriculture Economics in 1970. Early after [my] arrival on campus the Department Head of Agricultural Economics (Tye Timm) asked [me] to the head office where Dr. Timm indicated they were going to take a little walk. The walk was to Dr. Adkisson's office whereby Dr. Timm stated "Perry here is your economist." This highlights the efforts of Adkisson in attracting an interdisciplinary team to address needs and issues facing the food and fiber production systems.

With an aggressive broad vision, Perry used his talents and contacts to begin working with federal agencies on needs for the future as well as briefing Congress. Along with a team he developed from many disciplines and across the U.S., the message was clear and urgent. The reliance on pesticides and draconian impacts of indiscriminate broad applications on nature were being realized as increasing resistance of the target pest as well as serious externalities across the environment. The goal was to develop a science-based approach for control of pests (plants, insects

and other) in a more integrated process with less reliance on pesticides along with adequate funding to make a difference. With great effort and influence of the team Adkisson formed, there was a national project initially termed Integrated Pest Management (IPM) and evolved to CIPM. Adkisson saw cotton as a major crop to target for the research and extension effort but had the insight to broaden to a multitude of food and fiber crops across the nation.

Adkisson created a working environment across disciplines and regions with rapport and a common goal to develop science based integrated production systems taking advantage of biological and cultural practices to significantly reduce the reliance on pesticides. Not only did the production practices have to be scientifically solid but they had to be applicable for farming systems economically. He recognized the critical importance of the farmer having to make a profit. This meant an important role for Extension to take the developing systems to the decision makers at the production level.

Administration

As Department Head, Perry was loved and admired by his students and coworkers, Departmental faculty members, staff and colleagues alike. This was abundantly evident in the many tributes that he received on the occasion of his 89th birthday March 11, 2018 which his widow Gloria Adkisson shared with me. I excerpt portions below:

Marvin Harris, Professor of Entomology Emeritus, Texas A&M:[26]

I know just bringing up his political acumen to deliver his science to serve public needs in his presence would make the top of his head turn bright red. However, society is fortunate that his genius extended to this swampy environ. Many scientific and agricultural programs and policies that continue to benefit us all began with his science. They were then catalyzed into application through his political skill rather than simply gather dust on shelves where we keep our academic journals. He inspired and enabled others, including me, to both discover and apply such work.

Darrell Bay, Professor of Entomology Emeritus, Texas A&M University (1974-2012):

> *I vividly remember the first time that I met you when I came down to interview for my position and you took me out for dinner...I was very nervous at the time but your calming demeanor that evening put me at ease for the remainder of the interview process and helped me to bring that process to a favorable conclusion. And then there was my first faculty meeting at the end of which, you went around the room asking everyone if they had anything else to add. When you came to me, you stated, 'Say what you want to but no one is likely to pay much attention to it at this point.' That brought a round of laughter from everyone including myself; I knew my place on the totem pole....*

Tom Payne, recruited by Perry as an Assistant Professor in 1969 for forestry entomology. He moved up to Professor, then left TAMU in 1987, and is now Professor Emeritus, University of Missouri:[27]

> *...The fact that I got an interview for a forest entomology position surprised me since I wasn't a forest entomologist, and didn't have even any background in forestry. In fact, the colleagues I was to develop still say that I can't tell a pine from a eucalyptus! I recall telling Perry I could just as easily work on bark beetles as I had done with moths in my doctoral research. Whew, did I misjudge. Those tiny bark beetles were a challenge to all of this. In all of this, I learned a couple of things from Perry that have stuck with me. First, always invite the spouse of the candidate for the interview visit.... Too, I learned that it isn't always the subject of the research that is critical; it's the capability of the individual. A well-trained individual can adjust to the subject. I don't know if I was well-trained.... I think I got some 'authorization by association' that got me in the door, and Perry's willingness to take a chance.*

Max Summers, University Distinguished Professor Emeritus, Texas A&M (1977-2011), molecular virologist:[28]

> *In the mid-1970, a little after I received tenure at UT Austin, I heard a knock on my office door. I opened the door and a mild-mannered gentleman said howdy, I'm Perry L. Adkisson and I plan to hire you at Texas A&M University. At that time I did not know a Perry Adkisson and*

I certainly had no intention of moving from my prestigious and tenured position at UT. However, with time you convinced me otherwise.

Well, the move to A&M [in 1977] really altered my career and quality-of-life elevating both to levels I had not considered possible. And, with the resources and quality environment provided for me at TAMU in teaching and research, I and my students and research team were able to develop major scientific discoveries with significant impacts throughout the world in biology, medicine and biomedical research that likely would not have happened otherwise.

Charles Cole, Columbus, TX (graduate student, 1st year advisee):

I remember the day we first met... At the end of our meeting, you gave me the most important information of my educational experience. You told me 'Charles what you want to do in life is to do something you would want to do every day, whether you got paid for it or not, then you never have to go to work a day in your life. That was true in my life.'

Higher Administration

Vicki Bienski (worked with Perry as his Executive Assistant in the Department of Entomology and the higher TAMUS administration from March, 1977 to January, 2007):[29]

I have so many memories of the years that we worked together...I learned from you:
Family comes first

Never forget where you came from (dance with the one that brought you)
The workplace requires Fairness, Integrity, Substance and Honesty
Come prepared... Do your homework before engaging in meetings/projects
Surround yourself with colleagues who share your values, as they are seen as an extension of yourself
Treat ALL people with respect...Remember it's the little things that count in life
Always dot your "i's" and cross your "t's"
Most importantly, I value your friendship, kindness, and advice....

Shirley Joiner (Assistant to Perry as Chancellor):

> *I remember when we would drive to Austin for a meeting, you liked to stop at a certain gas station/country store to buy a bag of fried pork rinds....*
>
> *Then that memorable day at 3:00 p.m. on Friday, May 3, 1991, President Bush '41 announced that he had chosen TAMU for his presidential library and museum. We all celebrated .... I still have the scribbles we made creating flow charts to create the Bush Presidential Library Foundation.*

Anna Kjolen (undergraduate who worked in Perry's office when he was Chancellor):

> *...what I remember most was the kindness you showed to me and my brother...You helped me get back into Texas A&M, gave me advice and a stern talking to when I needed it. I can't thank you enough for all you have done for me ...*

Honors

Perry was a prolific researcher. He published more than 200 scholarly articles and presented numerous invitational lectures to universities and research institutions around the world. As the result of his scholarly work Perry received many honors. He was the first member of the TAMU faculty to be elected to the National Academy of Sciences (1979), for work done at the university; the first member of the Southwestern Branch of the Entomological Society of America to be elected president of the national organization (1974); the first entomologist to serve as president of both national entomological societies; and the first person to receive the three top international prizes available to an agricultural scientist—the Alexander von Humboldt Award (1980), the Wolf Prize in Agriculture (1995), and the World Food Prize (1997). He also was recognized by *Progressive Farmer* magazine in 1999 as one of 24 scientists who had the greatest impact on agriculture during the 20th Century.

For his work in IPM, Perry became the first person to be honored with all three of the world's major prizes in agriculture—the Alexander von Humboldt Award (1980), the Wolf Prize in Agriculture (1995), and the World Food Prize (1997). The Humboldt Award was for the most outstanding contribution to agriculture during the past five years for his research and developmental work on IPM for cotton pests.

The Wolf Prize was awarded jointly to Perry and Carl Huffaker from UC-Berkeley for "contributions to the development and implementation of environmentally beneficial integrated pest management systems for the protection of agricultural crops."[30] After describing their IPM projects, the Prize committee went on to say: "...The new IPM systems were widely implemented by U.S. farmers providing satisfactory pest suppression and greatly reducing the amounts of pesticides applied to U.S. croplands. These projects reshaped the philosophies of crop protection specialists across the world...IPM now is accepted internationally as the best approach for protecting crops from insect pests. "

In 1997, Perry and Ray Smith of UC-Berkeley won the World Food Prize (said to be the agricultural equivalent to the Nobel Prize) for being "among the first to note the harmful environmental and economic effects of indiscriminate synthetic chemical pesticide use. Dedicated to finding practical alternative approaches to pest control, they worked both independently and in tandem to demonstrate and popularize Integrated Pest Management (IPM) programs."[31] The citation went on to describe their IPM work in both the USA and overseas:

> *Drs. Adkisson and Smith worked just as diligently to develop IPM programs for use overseas, especially in developing countries, where the introduction of higher-yielding food crop varieties [was] creating unfamiliar pathogen and pest situations for farmers who often lacked the training or means to effectively or safely protect their harvests. In 1967, Dr. Smith was the founding chairman of the Food and Agriculture Organization's Panel of Experts on Integrated Pest Control, of which Perry was a member, then later was chair from 1992-1996.*
>
> *Under both men's tenures, a key priority for the panel was developing IPM programs for rice, maize, sorghum, peanuts, cassava, and major fruits and vegetables grown in Africa, Asia, Latin America, and the Middle East. To this end, they worked to train scientists, technicians, and farmers from the developing world and to increase the effectiveness and sustainability of IPM methods by incorporating research from the fields of plant pathology, weed sciences, and mycology. Most recently, under Dr. Adkisson's leadership, a permanent IPM facility has been established in Rome to identify, develop, and promote pest control programs for major food crops throughout the world.*[31]

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