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Biography: Harold W. Keller

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Abstract: This is a short biography of Dr. Harold W. Keller, one of the most influential myxomycete researchers from North America. His scientific work, developed for more than 50 years, has impacted what is globally known about these organisms. In this note, Dr. Keller shares details of his life with the scientific community to develop awareness to the fact that hard work, focus and discipline are key elements to foster a scientific career.

Keywords: Kansas, myxomycetes, Texas, United States of America

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I was born December 10, 1937.

I grew up at a small farming and ranching community, Peabody, Marion County, in the state of Kansas, located on the edge of the Flint Hills —some of the finest cattle grazing tall grass prairie country in the United States of America (USA).

As a teenager, I clerked in Keller's Clothing Store in Peabody, participated in a Boy Scouts Explorer Troop, and operated farm trucks and field equipment (tractors, combines, and one-way plows). I was also in 4H and had a Hampshire swine fat-pig project. Although my family lived in town, I spent more time in the countryside with our farm equipment, working farmland that my grandfather Keller owned in western Kansas (1,280 acres) and feeding and caring for our swine and cattle.

I served as an acolyte at Saint Paul's Lutheran Church in Peabody and sang solos and first tenor in our high school quartette and octette.

My father died when I was 19 years old which prompted me to change from a business administration major to a biology (especially botany) major at Kansas Wesleyan University (KWU). We had planned to open a chain of clothing stores but my father's death changed my life ambitions and even resulted in lower grades at KWU and academic probation.

The summers of 1957 and 1958 were spent at the Powell Ranger District, in Idaho. I was a firefighter, trail crew worker in the Bitterroot Mountains, and a lookout observer located at Diablo Mountain Lookout, spotting fires in the Selway-Bitterroot Primitive area in Idaho. I also was a telephone lineman climbing trees, repairing and re-hanging telephone line in the Powell Ranger District, in the Lolo National Forest (Fig. 1). These experiences were highlighted with scenic photographs published in the Lookout Network magazine and posted on their website as a featured article.

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Figure 1. Harold W. Keller as a telephone lineman in 1957 resplicing and rehanging telephone line in Powell Ranger District in the Lolo National Forest in the state of Idaho, USA. Note the silver hardhat, double bitted axe, and lineman saddle gear around my waist. Not shown are my climbing spurs attached to my legs. This is when and where I got interested in trees that led to my interest in botany at Kansas Wesleyan University. I spent two summers working for the United States Forest Service at Powell Ranger District while at Kansas Wesleyan University working on my undergraduate degree in biology.

My firefighter U.S. Forest Service experience in Idaho changed my life, especially being mentored by my foreman Lennie Smith who taught me how to use fire equipment, especially the crosscut saw. His confidence in me to climb trees and rehang telephone line was the reason I got interested in trees and eventually botany. I improved academically at KWU (I took courses over with Ds and Cs and got As and Bs), and thus my research interest in trees today.

This Idaho forest service experience triggered my interest in plants with Professor Dr. Albert Robinson Jr. who was my botany professor at KWU. He supported my application for a teaching assistantship and graduate study at The University of Kansas. At this point in my life I did not have much confidence in myself for any future endeavor therefore Dr. Robinson's support made a big positive difference.

I graduated with a biology degree in 1960 from KWU located at Salina, Kansas, and a Master's Degree in botany from the University of Kansas (KU), at Lawerence, Kansas. My Master's thesis was titled "A comparative anatomical study of the genus *Echinacea*", under the direction of Professor Dr. Ronald L. McGregor who was head of the Botany Department.

I became interested in the myxomycetes in the early 1960s while at KU, collecting in the Lawrence and Manhattan, Kansas areas. This time was the beginning of the USA-Vietnam War Era and I volunteered as a Second Lieutenant and served in the United States Army Medical Service Corps for 3 ½ years, honorably discharged as a Captain. I received my officers training at Fort Sam Houston at San Antonio,

Texas and was later stationed at Fort McPherson headquarters for Third Army in Atlanta, Geogia (1964-1967).

In Atlanta I collected my earliest mushroom fungi and myxomycetes, including *Perichaena brevifila* Keller, which was published in Mycologia as a new myxomycete species while I was a doctoral graduate student at the University of Iowa in Iowa City (1967-1971). I found this myxomycete species *Perichaena brevifila* Keller in deep leaf litter behind a shopping center near where we lived in Atlanta, Georgia. I remember my wife Brenda J. Griffith Keller, now a Ph.D., scolding me for screening leaf litter on the kitchen table where we ate, even though I had newspapers covering the table top. After all, myxomycete collections were also a priority and some species had beautiful iridescent colors. This was a wet summertime and mushroom and myxomycetes were everywhere. Since then, I have actively pursued myxomycete collections and study ever since.

It was during my military service that I got interested in collecting and identifying fungi and myxomycetes and started sending myxomycete specimens and corresponding with Professor Dr. George W. Martin at the University of Iowa. He was the world authority on Myxomycetes at that time. I must confess I misidentified some of these early myxomycete collections but I learned a lot with Dr. Martin's help.

Immediately after my military service I went to the University of Iowa as a doctoral student to work with Dr. Martin as his last student. He had been in retirement for many years and had had several heart-attacks but he agreed to take me on as a graduate student and we mutually agreed I would do a monograph of the myxomycete genus *Perichaena*. During this time Dr. Martin published his world monograph with Professor Dr. C. J. Alexopoulos a world-famous mycologist. I had the good fortune to read drafts of the myxomycete book narrative as a graduate student. Dr. Martin lived to see me graduate with my Ph.D. in 1971. Shortly thereafter, I was selected as a one-year postdoctoral fellow in a nationwide competition by The University of Florida Graduate School to study the myxomycetes of Florida.

In 1971 I was selected as one of 25 recent Ph.D.'s nationwide to participate as a National Science Foundation Fellow in the "Summer Institute in Systematics V, Origin and Measurement of Diversity" held at the Smithsonian Institute. I was the recipient of numerous grants, including National Science Foundation grants to support my research entitled "Monographic and Floristic Studies of the Corticolous Myxomycetes" and more recently "Tree Canopy Biodiversity (Myxomycetes, Macrofungi, Mosses, Liverworts, and Lichens) in the Great Smoky Mountains National Park". My research interests are focused on the systematics, floristics and ecology of the corticolous myxomycetes as well as on fungi.

My academic experience included several teaching and research activities at different universities. While during my military service in Atlanta, Georgia. I taught a General Botany course in downtown Atlanta at Georgia State University (at night). I was an Assistant Professor of Biological Sciences at Wright State University (1971-1978) where I taught biology courses such as Principles of Biology, Ecology and Organismic Biology, Honors Recitation, Biology of Lower Plants, Medical Mycology, Microbiology (for nurses), Plant Biology, Biology of Economic Plants, and Biology of Slime Molds. I was Associate Professor, Department of Biological Sciences, University of North Carolina at Wilmington. 1982-1983, and Associate Professor, Department of Biology, University of Texas at Arlington 1983-1990.

I was a full time Administrative Officer but in addition I taught a grant writing course for students and faculty. Visiting Professor, University of Central Missouri, Warrensburg, 2006-2008. I was a full-time administrative officer and taught a regular grant writing course for students and faculty.

Myxomycete workshops that highlight the collection and identification of colorful and fascinating myxomycetes were given at national and international meetings. In 1996 I delivered the invited Plenary

Address entitled "Biosystematics of Myxomycetes: A Futuristic View" at the Second International Congress on the Systematics and Ecology of Myxomycetes in Madrid, Spain. I delivered the keynote address at the International Congress on the Systematics and Ecology of Myxomycetes 7 held at Recife, Brazil (see Fig. 2) and ICSEM 8 in China (read in absentia).

Figure 2. Dr. Harold W. Keller (Dr. Myxo) in Recife, Brazil, during the 2011 myxomycete workshop given to both local and international students. Note the cap with Dr. Myxo in black letters which was worn at professional myxomycete meetings and in the field collecting myxomycetes. The red shirt with Tree Canopy Biodiversity was worn by the tree climbing team at the University of Central Missouri. The iridescent stalked sporangium of a new myxomycete species *Diachea arboricola* only known from the tree canopy discovered in the Great Smoky Mountains Nation Park is highlighted on the front of the shirt.

As a volunteer at the River Legacy Living Science Center in Arlington, Texas, I served as an interpretive trail guide for children and adults and as an instructor for outdoor education programs. In 1991 I received the Alumni Achievement Award from my alma mater, KWU, for outstanding accomplishment in a chosen field of research and administration. I also served from 1992 to 2001 on the KWU Board of Trustees. I served as a Resident Research Associate, Botanical Research Institute of Texas, Fort Worth, Texas, from 1990 to the present.

My current and past professional memberships have included the Mycological Society of America, the North American Mycological Society, the Association of Southeastern Biologists, Southern Appalachian Botanical Society, Sigma Xi, The Scientific Research Society, The Mycological Society of Mexico, and International Canopy Network. I have a special interest in the development and use of K through 12 teaching materials usings myxomycetes represented by laboratory exercises, videos, and books. I have taught different botany courses at several universities, including “Organismic Biology (Honors Sections)”; the "Biology of Lower Plants", "Plant Biology", “Biology of Economic Plants”; "Microbiology", and "Biology of Slime Molds".

I take great pride in the visiting scientists who studied and published with me including Jean D. Schoknecht, Ph.D., Associate Professor, Indiana State University, Department of Life Sciences and Department of Botany and Plant Pathology, Illinois Natural History Survey, spent her sabbatical leave

during 1987 working with me, Uno H. Eliasson, Ph.D., Professor and Director, The Botanical Museum, University of Gothenburg, Sweden, supported by the Swedish National Science Research Council to study Myxomycetes in my laboratory from September to October, 1987, June, 1991, and August, 1993. Takami Hatano, Ph.D., Professor of Biology, Department of Biology, Faculty of Education, Mie University, Japan, supported by a grant from the Japan Ministry of Education, September 1, 1993 to June 29, 1994, to study myxomycetes using scanning electron microscopy as a Visiting Professor at the University of Texas Health Science Center in Fort Worth and the University of Texas at Arlington. Thomas W. Gaither, Ph.D., Professor, Biology Department, Slippery Rock University, Slippery Rock, Pennsylvania, for his sabbatical leave of absence.

My undergraduate students (UG) and graduate students (G) who published with me include: Mary J. Buben-Zurey, UG Honors Project, Commander, U.S. Navy; David M. Smith, UG Honors Project, WSU-SOM, M.D; Justin G. Mills, Independent Study Project, WSU-SOM, M.D., Laura L. Anderson; (UG) Independent Study Project, The Ohio State University, M.D.; Angela R. Scarborough (UG) special awards for poster and oral standup presentations at Association of Southeastern Biology annual meeting and University of Central Missouri; Erica E. Parker (UG), first place award paper published in the Journal of the McNair Central Achievers Program, McNair Scholar, UCM; Melissa Skrabal (UG) coauthor on many published tree canopy papers; Kenneth L. Snell, (G), received two first place University-wide Central Missouri awards, based on his scholarship, research, Master's Thesis and citizenship. He was our research project leader for our tree canopy research in Great Smoky Mountains National Park. Sydney E. Everhart (G) received the Association of Southeastern Biologist (ASB) Research Award in Microbiology first place for her oral and poster presentation at the annual meeting. Christopher D. Crabtree, a Native American Cherokee, who graduated with His Master's Degree from UCMO based on macrofungi and myxomycetes at Ha Ha Tonka State Park near Camdenton, Missouri. Chris was presented with the Best Graduate Student Poster Award at the Central Scholars Symposium, April 2-4, 2007, and the Most Outstanding Graduate Student Award for the UCMO, Department of Biology. The Missouri Department of Natural Resources Annual Meeting held at Tan-Tar-A, Osage Beach, Missouri with a poster (30 entries) and Chris was judged the winner. Chris received the University of Central Missouri College of Science and Technology William L. Vacek Graduate Student Research Award. Chris was recognized as the outstanding graduate student at the annual University of Central Missouri Department of Biology and Earth Science Annual Banquet April, 2008. This is the second year in a row Chris has received this honor. The UCM Sigma Xi Chapter honored Chris at their Spring Banquet April, 2008 for the best graduate research project. Chris was the second-place recipient of the Outstanding Graduate Student Thesis awarded by the UCM University Research Council.

Courtney M. Kilgore was part of our student tree climbing team in the GSMNP and Daniel Boone National Forest in Kentucky. Her Master's Thesis research received the Nahm Award for the Outstanding Graduate Student from the University of Central Missouri College of Science and Technology. The Mycological Society of America (MSA) held their annual meeting at Pennsylvania State University (PSU), August 10-13, 2008. Each year there is a t-shirt design contest open to all MSA members. The winner has their design featured on the official conference t-shirt and posted on the MSA website, and included in the next issue of the national newsletter, Inoculum. Courtney submitted a pencil sketch design in black and white that was selected as the contest winner. Four edible mushroom cultivars were included in the winning design, Shiitake (*Lentinula edodes*), Hen of the Woods (*Grifola frondosa*), button mushroom and Portabella white and brown variety (*Agaricus bisporus*), and the velvet foot mushroom

(*Flammulina velutipes*), the latter three are native to the United States of America. Molds adorn the outer edge represented by *Penicillium*, *Trichoderma*, *Alternaria*, *Fusarium* and *Aspergillus*.

My publications include books, chapters, journal papers, newsletter articles (130+) presented at symposia, congress proceedings, and national meetings as published abstracts (147), as oral standup slide and poster presentations, and invited lectures. The two areas of myxomycete research study that I consider the most important are the 26 new taxa of Myxomycetes I described, including mostly tiny species of *Echinostelium* and *Licea*, and one genus *Kelleromyxa* and two-member myxomycete type cultures deposited with the American Type Culture Collection in Rockville, Maryland, during 1987: *Didymium saturnus* Keller, ATCC #64178; *Badhamia spinispora* (Eliasson & Lundq.) Keller & Schoknecht, ATCC #64201; *Didymium annulisporum* Keller & Schoknecht, ATCC #64200; and *Badhamia rhytidosperma* Keller & Schoknecht, ATCC #64199.

I am grateful for the office, research space, and fellowship of friendships at the recently merged Fort Worth Botanic Garden and Botanical Research Institute of Texas and the opportunity to serve on the Editorial Board of the Journal of the Botanical Research Institute of Texas.

My life recreational activities include ranching, raising cattle and swine, fishing, hunting, collecting fungi, playing racquet ball, water aerobics, swimming and teaching swimming lessons as a Water Safety Instructor, and listening to choir music. All of these activities are now limited because of my advanced age.

A selected list of my publications, from the 130+ articles I have published is listed below:

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