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Winslow Briggs

We are deeply saddened that our beloved and respected friend and colleague Professor and Director Emeritus Winslow Briggs passed away peacefully on February 11, 2019, at the age of 90. Winslow Briggs was a giant in the field of plant biology, an inspiring mentor, and a treasured colleague. He was also a beloved husband, father, and friend. We shall miss him dearly.

Winslow was born on April 29, 1928, in Saint Paul, Minnesota. He started his professional careers as a faculty member at Stanford University's Biology Department in1955. In 1967, he returned to his alma mater, Harvard University, as Professor of Biology. In 1973, he became the Director of the Department of Plant Biology at the Carnegie Institution for Science. He retired from that position in 1993. Subsequently, he continued to conduct ground-breaking research at Carnegie, including the discovery of the phototropin receptors, and remained active in research and extremely influential in science until the very last day of his life.

As a young researcher, Winslow set out on a quest to understand how light changes plant growth and development. In the early decades of his career, Winslow's research explored broad aspects of photomorphogenesis, including the red and far-red light photoreceptor, phytochrome; the roles of phytohormones in light-dependent development; and the mechanisms of phototropism. Among many seminal findings, his experiments confirmed that phototropic stem bending involves the transport of auxin from the lighted side of a stem to the shaded side. Many of the research programs initiated in his lab were continued later by his students and postdocs in their own labs, but phototropism remained a focus of his own work.

Although he searched arduously for the blue light receptor that mediates phototropic responses, he only found success after his retirement. Following years of biochemical pursuit, his group adopted a genetic approach and isolated the *Arabidopsis nonphototropic hypocotyl 1 (nph1)* mutant. This mutant led to the cloning of the gene for phototropin, the blue light receptor that mediates phototropism. This breakthrough was followed by studies that unraveled the biochemical mechanisms of blue light perception by LOV-domain-containing photoreceptors and uncovered phototropin functions in a wide range of plant light responses, including stomatal opening and chloroplast relocation. Along with colleagues, he made the surprising discovery that similar receptors are also found outside the plant kingdom, some of which are implicated in the light-dependent virulence of bacterial pathogens such as *Brucella* that cause infectious diseases in animals. At the age of 90, he discovered that light, acting through the LOV-domain proteins in *Rhizobium,* has a major effect on the symbiotic relationship between the nitrogen-fixing bacterium and legume plants. When he died, he was in the middle of conducting field tests and very excited about the potential impact this discovery could have in agriculture.

Over the course of his long career, he made many seminal contributions to our understanding of the physiological, biochemical, and molecular mechanisms underlying plant growth and responses to the environment. He was one of the most-admired plant scientists of modern times, known for his fearlessness, stamina, and love of a well-designed experiment. He re-invented himself several times during his long career, from physiologist, to biochemist, to geneticist, to molecular biologist, while he remained at the cutting edge until the end of his life. And, through it

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all, he was always respectful and generous to his colleagues.

As director, Winslow transformed Carnegie's Department of Plant Biology by doubling its research facilities, hiring several faculty members with new areas of expertise, and welcoming numerous graduate students and postdoctoral fellows from all over the world to conduct their research at Carnegie. Photosynthesis and ecophysiology were longstanding areas of excellence at Carnegie, which he continued to foster. In addition, he built bridges between the two by emphasizing a third branch of research, plant development. His vision for plant biology research at Carnegie was well articulated in his inaugural comments in the 1973 Carnegie Year Book: "Adaptation to a stressful environment … can only be understood through a study of mechanisms throughout the life history of a plant. … Physiological adaptations to stress have an evolutionary history. Photosynthetic mechanisms have an evolutionary history. Developmental patterns have an evolutionary history. An understanding of this history and the mechanisms underlying it is yet another parameter one must include for a reasonable comprehension of the ways in which plants grow, adapt, and photosynthesize." His vision continues to guide the department's scientific endeavors to this day.

Winslow inspired multiple generations of scientists as a mentor, a role model, and an enthusiastic proponent of biological research. He initiated a fellowship that enabled Stanford graduate students to conduct research at Carnegie. He was an extremely generous and open director, welcoming scientists and students from all over the world to visit and train at Carnegie, helping them to develop their own research careers. In addition to advising Ph.D. students in his lab, Winslow served on thesis committees for many others and always treated graduate students with respect. His optimistic approach was both inspiring and practical for many.

Winslow was a leading figure in the plant science community and served it in many important ways. He was the President of the American Society of Plant Biologists (ASPB) in 1975-1976 and President of the American Institute of Biological Sciences in 1981. He was an active member of the Board of Directors of Annual Reviews, an editor of *Annual Reviews of Plant Biology* for more than four decades, and a founding Honorary Editor-in-Chief of *Molecular Plant.* Winslow's scientific contributions were widely recognized. He was a member of the U.S. National Academy of Sciences, the American Academy of Arts and Sciences, the Deutsche Akademie der Naturforscher Leopoldina, and the California Academy of Sciences. He won many awards for his scholarship and service including the Alexander von Humboldt U.S. Senior Scientist Award, the ASPB Stephen Hales Prize, the Sterling Hendricks Medal from the United States Department of Agriculture and the American Chemical Society, the Adolph E. Gude, Jr. Award from ASPB for his "outstanding service to the plant science community," and the International Prize for Biology from the Japan Society for the Promotion of Science for his "outstanding contributions to the advancement of basic research."

Winslow was also an exceptional naturalist and keen observer of natural phenomena. He and his wife, Ann, volunteered for nearly 40 years at the Henry W. Coe State Park, about which he published a book of trails. His license plate read "HIKE COE." Winslow and Ann also served on the board of the Pine Ridge Association and, in 1999, won the Dewitt award for "partnership" from the State of California. In 2013, Winslow was awarded the Philanthropist of the Year by the California State Assembly for his work in helping to save Coe Park from imminent closure. When fire ravaged the park in 2007, Winslow saw an opportunity to study how plant seeds germinate after vegetation has been destroyed. In order to fully document the phenomenon, he enlisted volunteers to map vegetation regrowth (https://coefire.com). He "cooked" closed Bishop pine cones in the oven to demonstrate that they pop open after high heat to release their seeds. This new research avenue, which Winslow initiated at age 80, ultimately led to the discovery that the slow release of cyanide from glyceryl nitrile in

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the smoke from a wildfire may play a role in accelerating post-fire sprouting and flowering of plants that usually remain dormant.

Winslow was a renaissance man with many talents. In his youth, he was an avid mountaineer who climbed some of the world's highest peaks, including Denali. He was an accomplished musician and trained as a concert pianist at Harvard at the same time as he pursued his biology degree. He was also an expert at Chinese cooking, including his specialty of Peking Duck. He always made time to host his lab members and colleagues at his home, serving us excellent homemade meals and treating us to piano recitals. Winslow shared his favorite dishes such as sesame noodles and sweet-sour cabbage at the department's Lunar New Year parties, including the one that occurred just a week before his death. Winslow also took beautiful landscape photographs and held several art exhibits in the lobby of the department's building on the Stanford Campus. Some of his recent photos from the Anza-Borrego Desert are part of the building's permanent art display. Winslow was a consummate scientist who was passionate about many other aspects of life including family, treks in the mountains, music, food, and art.

Winslow was a model citizen in the communities to which he belonged. He attended and presented posters at the ASPB meeting every year from 1953 through 2018. For decades, he spent his weekends volunteering at the Henry W. Coe State Park. He remained an active member of the department until the end of his life, attending faculty meetings and meeting with seminar speakers just a few days before his death. During the last hours of his life, Winslow checked his bean plants in the greenhouse, emailed a manuscript to his lab members, and responded to an email that requested a volunteer to meet with a local science reporter.

It has been a privilege for us to have our lives enriched by Winslow. While his passing is devastating for all of us, we take comfort in the knowledge that Winslow lived a full life—doing what he loved until the very end—and that his philosophy and spirit will continue to inspire us and live on through us.

Friends and colleagues of Winslow Briggs

Winslow's Colleagues Share Their Remembrances in the March/Apri8l 2019 issue of the *ASPB News* (https://aspb.org/newsletter/archive/2019/MarApr19.pdf#PAGE=23).