

## An interview with Jen Sheen



Jen Sheen grew up in a sugarcane plantation community in a rural area next to the city Pinton in southern Taiwan. The sweet scent in the air and the lush tropical plants in her parents' gardens were important childhood influences for her choice of studying botany as an undergraduate at National Taiwan University (NTU) and for her unconventional research path studying sugar sensing and signaling in plants. The complexity of plant growth and development revolving around sugar-based activities also led her to explore signaling networks connected to energy and metabolic regulation, plant hormones, environmental stresses and innate immunity. Although she is the only biologist by training in her family, planting, painting and photographing exotic plants and flowers has been a shared passion and hobby. She started her own research group in the Department of Molecular Biology at Massachusetts General Hospital in 1987 after her PhD at Harvard, and is currently Professor in Genetics at Harvard Medical School. It was under the free spirit 'anything is possible' that she started to exploit the plant protoplast system as cell biology, molecular genetic and genomic tools to study signaling networks focusing on areas and questions that are left unanswered by more conventional approaches.

### What influenced your path into plant biology?

Both my parents are schoolteachers in a sugarcane plantation community. Besides books and sports, they enriched our childhood life with gardens full of beautiful and exotic plants and diverse fruit trees that triggered my curiosity and interest in plants. Studying botany at NTU under many dedicated professors reinforced my dream to pursue graduate training and a research career exploring the beauty and secrets in plants, which in my mind are remarkably resilient, self-sufficient and generous.

### How did you decide on your current research topics?

When I developed the maize mesophyll protoplast system to study the regulation of genes involved in  $C_4$  photosynthesis in 1987, I serendipitously discovered the global transcriptional repression of photosynthesis genes by glucose, which overrides light regulation. Fascinated by this potent act of glucose as a signaling molecule that had never crossed my mind before and was not previously recognized by the mainstream of plant research, I followed my intuition to unravel the surprisingly central and multifaceted roles of glucose in plants. The research is challenging as innovative strategies are required to molecularly and genetically dissect the dual metabolic and signaling functions

of glucose. The research topics in my lab expanded naturally when our studies on glucose signaling led us to learn more about the signaling networks connected to nutrient and energy sensing and signaling, plant hormone regulation, as well as stress and defense responses. The development of versatile cell-based assays and functional genomic screens has made it possible to start building an integrated understanding of plant signaling networks with molecular, cellular, genetic and genomic details to interpret and predict whole plant growth and development modulated by complex intrinsic signals and environmental cues. What is stringing together the seemingly diverse research topics in the lab is our desire to understand how plants function as a photosynthetic organism and survive the daily challenges facing all lives.

### Is it an advantage or disadvantage to be the only plant biologist in your department?

The Department of Molecular Biology at Massachusetts General Hospital had three plant labs led by Howard Goodman, Fred Ausubel and Jen Sheen spanning from 1981 to 2005. Even though plant researchers are the minority in the hospital and Harvard Medical School, plenty of us share the same passion working on plants in an urban medical setting, ideal for molecular, cellular, genetic and genomic research. Communications and collaborations in the plant community in the Boston and New England area, in the US and worldwide are easily accessible. The unique advantage of working in a department and environment where scientists have very diverse interests in different biological systems is to remain humble and excited from learning new discoveries and technologies. We hope to promote the realization that plant, human and many valuable model systems all provide fertile ground for exciting discoveries in understanding the fundamental principles of biology among intertwined lives.

### What would you be if you were not a plant biologist?

Before I studied botany, I had seriously considered the path to be an artist. Choosing to study beautiful plants and do creative works in science is a pretty good alternative.

### Do you have a scientific hero?

I don't believe in heroes or heroines. I admire people doing certain 'heroic' things at a particular time or in a special situation to make extraordinary accomplishments. I appreciate many different kinds of people making contributions in ordinary or extraordinary life, and it is not necessary to label people as heroes.

**What paper influenced you most?**

I read many papers from all different fields. It is a process of continued learning. I believe a scientist would form independent ideas and understanding about the truth from evidence and experiments, but not be influenced by any particular paper.

**What is the best advice you have been given?**

Believe in yourself and the truth.

**And what advice would you give?**

Follow your heart, passion and learn about yourself first before pursuing any career path.

**Any issues in scientific funding you feel strongly about?**

I am uncomfortable with top-down and politically driven decisions in funding priorities. Independent young scientists with demonstrated accomplishments and creativity should be trusted to explore unproven concepts and new research directions.

**What is the biggest hindrance to science?**

People hold conservative minds and prejudices.

**In hindsight, what in your research career has given you the most pleasure?**

To pursue unconventional ideas and concepts, to develop new methods and tools to benefit many researchers, and to meet and work with creative and talented people.

**What big questions interest you in the long term?**

The possibility to prevent human wars and hunger.

**What is your opinion on the second green revolution?**

Important and innovative knowledge and technologies have been and will continue to be developed and advanced by visionary and compassionate plant biologists and agronomists. However, international policies, politics and wars may remain the main hurdles.

**What are the future challenges in plant science?**

Finding a balance between basic and applied research, and the resources to educate and support the next generation of talented and creative plant biologists.

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