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Yixian Zheng

Yixian Zheng is the first foreign national to receive the prestigious Junior Award from the ASCB Women in Cell Biology Committee. Zheng grew up in Chongqing, in the Province of Sichuan, China, and emigrated to the United States for her graduate education. Her childhood largely coincided with the Chinese Cultural Revolution, which for Zheng meant that she had "very little access to knowledge:" she was taught no geography, very little foreign language, modified history and little natural science; the curriculum through middle school consisted primarily of Chinese and mathematics. Despite or ironically perhaps because of the lack of a humanistic education, Zheng has very fond memories of her childhood. "We didn't have the burden of homework or the need to be successful," she recalls. The burden instead was on her parents, who lived in fear of the prospect of Zheng and her sister having to be "reeducated" -- which meant being sent to the country to work the fields.

But China's political evolution proved lucky for Zheng. In her last year of middle school, the Cultural Revolution ended with the ascension of Deng Xiaoping to the leadership of China. College entrance exams were initiated to select for academic promise rather than social status. Her parents, both university professors, understood the importance of attending university, so they sent her to a new high school with high academic expectations and no shortage of pressure on students. The relatively few universities combined with Zheng's membership in the Chinese baby boomer generation associated with the end of the Great Famine in 1960 made her chances of getting into college 1 in 100. She acknowledges, however, that she was at no disadvantage as a woman, noting regretfully that an unfortunate effect of China's struggle to modernize has been some regression of women's equality in opportunity and wages.

Zheng enrolled at Sichuan University in Chengdu, a twelve-hour train ride from her home. She remembers Chengdu as a beautiful and affluent city. But recently she returned there and after twelve years found it "a complete shock. I couldn't even find my home."

Zheng's mother's field was metallurgy and her father's was mechanical engineering; she remembers them studying all the time, but loving it. The predominant memory of her father was of him writing equation after equation --Zheng thought her parents' lives were "kind of boring." They tried to steer their daughter to a career in engineering, but her interests ran to astronomy and forestry. Describing a universal family dynamic, Zheng recalls that she and her parents "had a big fight, but in the end they let me do what I wanted." She chose biology hoping she would get a chance to go collect data in the wilderness. But she was disappointed to find the biology curriculum consisting almost exclusively of memorization. Zheng became distracted from biology, hoping to become a writer. Her parents liked this idea even less than biology, bluntly telling their daughter that she didn't have the talent to make a living as a writer. They also worried about the political censorship of writers in China.

After graduating from university, Zheng taught at the Southwestern Agricultural University, hoping that a teaching career would allow her time to write. Looking back she realizes that at 21 she thought she had a great deal to write about, but in reality "I didn't know anything about life at all."

After Zheng taught for three years, her father took a sabbatical at Akron University in Ohio, urging his daughter to come with him to "see the world." Zheng didn't have the money to join her father, so she applied to graduate schools in the U.S. Her exam performance compensated for her poor English and she was accepted in the Department of Molecular Genetics at Ohio State University in Columbus, where she worked in Berl Oakley's lab. Zheng suffered from significant culture shock when she first arrived, and seriously doubted that she would survive in the U.S. But she was determined to persevere, especially in English.

Zheng didn't have a strong background in molecular biology when she came to Oakley's lab, but her knowledge of genetics was solid, so she was drawn in quickly to the work on microtubule regulation. Zheng worked on cloning small fragments of the genome into plasmids to make a library. That library would be used to transform *Aspergillus nidulans* which could then be integrated by homologue recombination into the gene, allowing the discovery of mutants. Unfortunately, the material was very unstable, causing many of the mutations to be lost. In her third year, Zheng became fascinated with the function of gamma tubulin, in which she cloned the first higher eukaryotic version, which Oakley had originally discovered in *Aspergillus*.

Zheng put in her time as a teaching assistant, but still struggled with English, and was routinely paired with an American. In the beginning she would mostly do the typing, which was how she learned to type, gradually improving her language and teaching skills, even though she claims, "I still don't feel very comfortable in the classroom setting."

Bruce Alberts, with whom she later worked, rates Zheng's communication skills much more highly: "she

adapted amazingly quickly to the United States. Given her speaking skills, her outgoing personality, and her comfort and informality in social interactions, one might think that she is native-born."Tim Mitchison, another UCSF colleague, confirms Zheng's "outgoing nature. She was always the first onto the dance floor at parties, and more than once I was the one dragged out with her."

Upon completing her Ph.D., Zheng went to Alberts' lab at UCSF, where she could pursue her work on microtubules and centrosomes. She was drawn there for its focus on biochemistry in addition to the reputation of Alberts and other UCSF luminaries. "I felt that there wasn't as much action in genetics as there was in biochemistry," Zheng recalls.

Zheng got a surprise on her very first day in Alberts' lab when he announced his appointment as President of the National Academy of Sciences. Initially Alberts encouraged Zheng to find another lab to work in, but she prevailed upon him to stay. Mitchison became Zheng's mentor; he reflects, "I was always impressed by Yixian's 'stick-to-itiveness' and creativity. But I was more impressed by her ability to get her work done while raising a kid. Benny is one of the nicest and smartest kids I've met. He is a talented artist and musician, outstanding, friendly and communicative. Yixian always complained that he was getting too American -- liking TV and not doing what he was told -- but it seems to me that [he] captured the best of both cultures."

In the Alberts lab, Zheng studied centrosomes in *Drosophila* embryos. She wanted to make an assay to induce the centrosomes to assemble, but after half a year she declared defeat. With Mitchison's guidance, Zheng adopted a different approach, shifting from *Drosophila* to *Xenopus*, emphasizing antibody affinity chromatography. With this approach, Zheng was successful in purifying and identifying what is now called the gamma tubulin ring complex. "This discovery," says Alberts "[was] based entirely on Yixian's own efforts, [and] has solved a major problem in cytoskeletal research: the mechanism of microtubule nucleation at the centrosome. By chance, her work was beautifully complemented and supported by the electron microscopic studies of Michelle Moritz, another postdoctoral fellow in my laboratory. The two papers were published in *Nature*, with Yixian's paper being a lead article."

After her fourth year as a postdoc, Zheng took a position at the Carnegie Institution of Washington because she felt that it was "the place that really resembled the environment at UCSF." But the decision was complicated by the consideration of her husband, Qingbin Guo, who was still doing his postdoc in Mike Bishop's lab at UCSF. Their son, Benjamin, was then five years old, and they were determined to keep the family together. So Guo left the Bishop lab to take a postdoc at the National Cancer Institute, enabling his wife to pursue her opportunity at Carnegie in Baltimore and to not separate parents and son. "My husband has been very supportive of my career, I think maybe too supportive," says Zheng. Guo commutes to the NIH from Baltimore, but hopes to find a permanent position closer to home. Zheng and her husband share the care of Benjamin, with Zheng doing more during the week, including an hour of piano practice every day. Zheng concedes that the situation isn't ideal, but adds pragmatically, "I don't think one can have everything."

Zheng is happy at the Carnegie. Her teaching load is light, allowing her to focus on research. She is surrounded by scientists who are truly interested in their work and hers. She thinks the attitude of her colleagues is best described by a comment made by her senior colleague Joe Gall: when she told him she had been in the lab for much of the weekend, he enviously responded, "you're lucky."