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Jean Schwarzbauer

Growing up in the heart of the Midwest, Jean Schwarzbauer describes her childhood as “idyllic.” The third of four daughters, Schwarzbauer’s parents were dairy farmers in the small town of Menasha, Wisconsin. The girls spent their days playing in cornfields and the barn, helping their parents with the daily duties of farm life, and tending to the many pets and other animals that the family owned aside from the Holsteins. Each girl received her own horse at age 10; Jean’s Palomino, Goldie, became her most constant companion.

As Schwarzbauer entered high school, it became apparent to her and her teachers at the small parochial school she attended that she had a knack for math and the sciences. Contrary to stereotype, Schwarzbauer’s parents never assumed that any of their offspring would take over the family farm as adults and all were encouraged to go to college.

Schwarzbauer credits her high school chemistry teacher, Mr. Grasse, for making chemistry interesting and fun, and for her choice of chemistry when she en- tered the University of Wisconsin–Milwaukee.

The early 1970s were intense for university students and for the nation, with the Viet- nam War and the college protests it inspired in full force. Although she demonstrated against the war, Schwarzbauer never considered herself to be a dedicated political activist by the standards of the day: her real passion was science. Her undergraduate research project on heavy metals and mitochondrial function in a bioinorganic chemistry lab turned her on to biology. From then on, her undergraduate education flowed seamlessly toward the pursuit of her Ph.D.

In the pathology department at the Uni- versity of Wisconsin–Madison, Schwarzbauer originally worked on aging research, but a seminar on ribosomes changed her future. This was the “heyday” of ribosome research, and the University of Wisconsin–Madison was an important center of it. Schwarzbauer joined the lab of Gary Craven in 1976 and switched her focus from biology to molecular biology. In Craven’s lab, Schwarzbauer studied protein–RNA interactions in the bacterial ribosome.

Ph.D. in hand, Schwarzbauer sought avenues other than ribosome research because “the ribosome field was huge and a lot of the very interesting research had been done already.” By perusing journals, she found researchers in Boston who were studying proteins in eukaryotic systems. Despite her ignorance of cell biology, Schwarzbauer sought out Richard Hynes at MIT, with whom she did her postdoc. Schwarzbauer spent six years in Hynes’ lab “because I was having so much fun running experiments and working at the bench,” which she still relishes today. During her postdoc years with Hynes, Schwarzbauer studied fibronectin, a major protein component of the extracellular matrix (ECM). She showed that multiple forms of fibronectin are generated by a novel alternative splicing mechanism. This surprise finding led her to apply molecular biology to a cell biological question and develop several cell culture–based systems to dissect the functions of the different fibronectin isoforms.

In 1986, Schwarzbauer joined the new molecular biology community at Princeton University during a time when the department’s growth was explosive. She has remained at Princeton ever since, receiving tenure in 1993 and promotion to full professorship last year. At Princeton, Schwarzbauer has continued her research with fibronectins and ECM where a primary goal is to determine the molecular mechanism of ECM assembly. Using recombinant proteins, she has demonstrated that multiple fibronectin domains are required for assembly of cell-associated fibrils and that these domains are involved in distinct steps of this complex and tightly regulated assembly process.

Fibronectin is also crucial in wound repair, where it is first assembled along with fibrin into the blood clot provisional matrix that forms at sites of injury. This matrix serves as the basis for the second of Schwarzbauer’s major goals, to understand how cells recognize and interpret information within the ECM. A synthetic fibronectin–fibrin clot matrix is being used as a three-dimensional substrate for analyses of matrix control of cell behavior. A recent important finding with this system shows that relatively modest changes in composition of the ECM have a major im- pact on Rho GTPase signal transduction cascades.

In addition to understanding the basic biology that underlies these processes, matrix studies have led Schwarzbauer into a new research direction: tissue engineering. In collaboration with chemical engineers at Princeton, she hopes to develop biomaterials with defined cell signaling properties.

Schwarzbauer is also involved in other aspects of research and academics. She helped establish a University Pilot Program for Teacher Preparation, which supports graduate students’ learning for the undergraduate classroom. She also serves as departmental advisor to undergraduates, teaches cell and developmental biology to undergraduates and cellular biochemistry to graduate students, serves as a thesis advisor to several graduate students, and oversees five postdoctoral fellows. Siobhan Corbett, a

former research fellow in Schwarzbauer's lab, who now has her own research lab at Robert Wood Johnson Medical School and is a sur- geon there, describes Jean in glowing terms.

"Jean is one of the smartest people I know, and I wouldn't be where I am today if it weren't for her. Her lab was one of the first to use recombinant fibronectin technology…she employs a lot of novel techniques in her research. She really taught me to critically think about my results, and that sort of attention to detail is why the research that comes out of her lab is all top-notch."

Schwarzbauer notes that the field is fac- ing a challenge in upcoming years: sorting through and interpreting the large amounts of data collected through mapping and sequencing of the human genome. Databases dedicated to specific areas of cell biology, such as extracellular matrix or cell adhesion, will be needed so that scientists can better understand how certain genes work together and genetic defects affect health and reproduction. Schwarzbauer adds that the future looks bright—funding levels are good, young researchers are entering the field, and new breakthroughs are on the horizon.

Schwarzbauer has been an active member of the ASCB since 1987. She serves on the Editorial Board of Molecular Biology of the Cell and was Program Chair for the Society's 40th Annual Meeting. Her husband, Donald Winkelmann, a molecular biochemist and cell biologist at Robert Wood Johnson, studies muscle structure and function. Schwarzbauer and Winkelmann met as undergraduates, eventually marrying in 1980. Winkelmann and Schwarzbauer enjoy golfing in their free time and, as scientists in similar fields, are never at a loss for consversation.