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Clare Waterman-Storer

Clare Waterman-Storer notices things. “Clare is one of those rare scientists with a special knack for discovering new things where others have looked for years,” says Yale’s Tom Pollard, who first noticed Waterman-Storer as a University of Pennsylvania graduate student taking the MBL Physiology course at Woods Hole in 1993. For example, says Pollard, “Clare noticed that bits of membrane were carried along by the tips of microtubules as they oscillated in length in cell-free extracts.”

Waterman-Storer followed up this observation, producing what Pollard now calls, “a classic paper showing that this is an entirely new mechanism for microtubules to distribute cellular membranes, such as the ER, to their proper places in cells.”

Later, working as a post-doc in the University of North Carolina-Chapel Hill lab of Ted Salmon, Waterman-Storer noticed that she had seriously underestimated the quantity of fluorescent proteins needed to fully label the microtubules in cells she was microinjecting with fluorescent tubulin in order to study microtubule assembly dynamics. Instead of a uniform incorporation, her sample had only a light sprinkling or “speckling” of glowing fluorophores in the microtubules. But then Waterman-Storer noticed something else: the non-uniform speckles revealed far more detail about the assembly and movement of microtubules than was usually visible in “correctly” prepared samples.

It wasn’t the mistake, says Lehigh’s Lynne Cassimeris, a former colleague at Penn, that led Waterman-Storer to the “accidental” discovery that, with Salmon’s help, became fluorescent speckle microscopy or FSM. It was observing something new in the mistake, says Cassimeris. “FSM allows you to see movement that would be much more difficult to see by other methods. Clare just has a whole different way of looking at things. I think of all the times in the past that I’d mislabeled tubulin and ended up throwing away the sample, but Clare was smart enough to notice that here was something that might make a new tool.”

These days, it is Clare Waterman-Storer herself who is being noticed. An Assistant Professor since 1999 at the Scripps Research Institute in La Jolla, Waterman-Storer will receive the Women in Cell Biology (WICB) Junior Career Recognition Award at the ASCB’s Annual Meeting this December in San Francisco. Sandra Schmid, her chair in the Department of Cell Biology at Scripps, notes that in the two months it took to compile the Waterman-Storer WICB nomination, five new papers were appended to her CV. “She is clearly at an exponential phase of her career,” wrote Schmid.

From the beginning of her career, it was hard not to notice Waterman-Storer. She arrived, for instance, to do graduate work in Erika Holzbaur’s lab at the University of Pennsylvania with a drawing of a mitotic spindle tattooed on her bicep. At Penn, Waterman-Storer’s interests in muscle gradually shifted to anything in a cell that moves, and focused on functional characterization of the microtubule motor, cytoplasmic dynein. After finishing her thesis at Penn in 1995, Waterman-Storer headed to North Carolina for what she thought would be a year as a post-doc in Salmon’s mitosis lab. She stayed three years, working by herself on microtubules in migrating cells in a wound-healing epithelial model. Why Salmon let her pursue this when everyone else in the lab was working on mitosis, she can’t explain, but she gives him full credit. “I don’t know why, but Ted just let me do it. He gets excited about things when he sees the potential for new discovery. He’s the greatest mentor I’ve ever had. He’s awesome. Everyone who’s ever worked in the Salmon lab says the same thing.”

It was in that work, using fluorescent tubulin in high-resolution, time-lapse microscopy to look at migrating newt lung cells, that she stumbled on FSM. Without Salmon, she says, her “discovery” would have gone nowhere. “Ted taught me how to think about how the image was formed by the microscope and what this meant for the interpretation of the speckled microtubules, and how to do rigorous quantitative microscopy. Now I know enough that I can take this technology to different areas of cell biology and different levels, for example developing it into a quantitative technology that can be used to study all kinds of cell biological phenomena.” The string of “speckle” papers she published with Salmon, first proving that FSM was not an artifact, led to the launch of her independent career addressing how the two cytoskeletal systems, microtubules and actin, interact to promote directed cell motility. Shelley Halpain and Velia Fowler at Scripps noticed the work, which led to Waterman-Storer’s faculty appointment there.

Clare Waterman-Storer was born in Pittsburgh, Pennsylvania, in 1964, then moved, aged three, with her three older sisters to the suburbs of Baltimore. There her mother, a career research lab technician, took a new position at the Johns Hopkins medical school. From her mother, Clare took a passion for analytical, hyperlogical thinking, and the uncanny ability to follow complicated directions. In the fifth grade, Clare decided to remodel the basement into her own bedroom. Working alone and entirely from “how-to” books, she framed and sheetrocked the walls before hanging a dropped ceiling, framing a door, tiling the floor, and installing the wiring. In the years since, she has taught herself to cook, bake bread and fix bicycles and cars.

In school, Clare was strong in physics, math and chemistry, but oblivious to history and literature. She was a formidable athlete, playing three varsity sports at Woodlawn High School in sub- urban west Baltimore, and was captain of the softball and field hockey teams. But she dropped team sports when she went to Mt. Holyoke College in South Hadley, Massachusetts, where she took up serious weightlifting and bicycling and developed a taste for radical fashion. By senior year, her athletic and scientific interests were coalescing around the mystery of how muscles work. She enrolled in the Masters in Exercise Science program at the University of Massachusetts, Amherst, with the notion of becoming a strength trainer for professional athletes.

But it was in the Biology De- partment where Waterman-Storer found her curiosity about muscle dynamics being addressed. UMass has some “truly wonderful teachers,” she recalls, like Chris Woodcock, Peter Hepler and Patricia Wadsworth. It was Wadsworth who introduced her to the mysteries of the mitotic spindle and the idea of getting a doctorate at Penn, with its renowned muscle research program. Freshly tattooed, Waterman-Storer joined Holzbaur ’s lab in 1992, then Ted Salmon’s lab in 1995 before setting up her own lab at Scripps in 1999.

Today Waterman-Storer lives in Escondido with her longtime companion Lori Ward, a teacher of English as a Second Language in the local public schools. They share their house with two dogs, one cat, and 15 chickens. The poultry raising originated in North Carolina in a neighboring lab, run by Richard Cheney, where the need for chick brain myosin was exceeded by the number of chicks. Waterman-Storer took home the extra chicks and some instructional literature. Many feathery generations have intervened since, but Waterman-Storer says the chickens are useful in research science, albeit indirectly. “I bribe everyone at Scripps with fresh eggs,” she says proudly. In her research work, Waterman-Storer says she’s wrestling with the transition from bench experimenter to lab administrator, struggling to keep six post-docs funded, and a graduate student and a tech productive, while publishing, traveling, reviewing and speaking.

One relaxation is teaching herself automotive repair from manuals so she can rebuild (and hop-up) a ’69 Mustang fastback and a ’71 Ford pick-up that she calls, “Big Heavy.” Recently Cassimeris was treated to a ride through La Jolla in the pick-up. When they reached the Scripps parking lot, Cassimeris noted that Big Heavy stood out amongst the typical southern California BMWs and Lexuses, not unlike her owner and builder. “Clare is more flamboyant than the average cell biologist,” Cassimeris says, laughing. “I think it’s good for the field. I say, good for her.”