Suzanne Eaton: 1959–2019

Our mentor, Suzanne Eaton, tragically fell victim to homicide on 2 July 2019. The circumstances of her disappearance and death have shocked scientists and the public alike, worldwide. From the moment she went missing, the members of her family, laboratory and colleagues have received admirable and touching support from the scientific community. This outpouring stands testament to the inspiration that Suzanne—a world-leader scientist, creative pioneer and beloved mentor—is to all of us.

Suzanne sought diverse training from early on in her career, first by tackling the regulation of gene expression as a graduate student with Kathryn Calame, then by investigating tissue patterning at the developmental and molecular levels as a postdoc with Tom Kornberg and Kai Simons. She continued to leverage her curiosity and large breadth of knowledge to answer fundamental biological questions by integrating concepts from disparate disciplines.

As Suzanne started her first independent position at the European Molecular Biology Laboratory (EMBL) in 1997, we had the privilege to observe the principles that guided her research. In our view, these define the ultimate scientific approach, one that enables the most meaningful discoveries:

Follow observations wherever they take you. Suzanne had the unique ability to turn any result, even the least expected ones, into new directions for her work. An initial interest of the lab was uncovering the molecular and cellular basis of polarity. Tools that had been first established in Madin–Darby canine kidney cells, such as glycophosphatidylinositol (gpi)-linked GFP, were used to investigate epithelial polarity within fly tissues.When examining fly wing imaginal discs, Suzanne was jumping with joy as vesicles containing the GFP-gpi marker spread to regions where it was not initially expressed. This discovery was the seed for her work that tackled principles of morphogen dispersal, wherein the initial work on 'argosomes' delved into membrane dynamics using live imaging. Suzanne, intuitively turning to biochemical approaches, provided another major turn in the field, discovering that "argosomes are exogenously derived lipoprotein particles that facilitate the movement of morphogens through the epithelium." Suzanne went on to highlight the systemic role of morphogen signalling via the lipoprotein particles in both flies and mammals.

Nurture endless determination and childlike curiosity. "Oh, it moves, it moves! Let's do another one," recalls former graduate student Jens Roeper, as they worked side by side doing laser ablations for hours; she would tirelessly supply him with dissected wing discs. Her enthusiasm resulted in highly prolific collaborations with physicists from the Max Planck Institute for the Physics of Complex Systems, producing several seminal publications on the biophysical principles underlying growth and tissue formation. Additionally, her innovative approaches, in which cell and developmental biology merged via imaging, fueled a parallel research direction into the interplay between molecular regulators and cellular geometry that orchestrates tissue organization in the plane. Suzanne was one of the first to explain phenomena in developmental biology using physical principles (forces, geometry) and at the same time couple it to large-scale image analysis and predictive modelling. Just like her biking trips, she loved to tread on uncharted and unimagined territories in her research.

Credit: Max Planck Institute of Molecular Cell Biology and Genetics

Take fundamental and global approaches to complex biological problems. In Suzanne's own words, "The biological mechanisms that allow animals to coordinate biological processes at different temperatures, and what sets the limits of the viable temperature range, are fascinating unsolved questions." She was awestruck by nature and its grandeur. Her views towards biology were deeply informed and shaped by her regular exercise in philosophy. She wanted to understand biological processes on a grand scale, hence her fascination in something so fundamental as the effects of temperature. Leading a large group of scientists from various disciplines—a 'Forschergruppe' (a german word she used frequently to refer to this group)—she took on the mammoth task of asking how temperature coordinates biological processes at multiple levels: cell, tissue and organism. In 2018, she published an article on the effects of temperature on feeding choices in flies, a scale in biology that was new to her career.

Suzanne was never domineering and always practiced an inclusive approach with her colleagues' contributions. As her longtime friend and colleague Pierre Leopold reflects, "Suzanne was serene, moving in science with grace. She did not seem much concerned by competition. Suzanne was over all interested in solving scientific questions, not promoting her own ego. She would simply love discussing science and would contribute with all her soul to your own ideas."

Suzanne's scientific achievements have repeatedly changed the course of many fields, including developmental biology, cellular biology and organismal growth control. The same dedication and observationally acute spirit that she applied to understanding nature she also applied to her interactions with the people around her. Her art of listening to people gave anyone who was lucky enough to bump into her an opportunity to grow. She took a chance on improbable circumstances and scientists: she welcomed me, Valentina, into her lab in 1998 even though I didn't speak English, and me, Suhrid, in 2016, even though I specialized in ecology and had no knowledge of cell biology.

Her intentional investment in people created a home for a large multitude of scientists and a sense of belonging for the scientific arena. We will all continue to practice her teaching for generations to

come. Suzanne set a model of parenthood, both of her scientific and biological children, that paves the paths for new ways to think about our place as mentors, scientists and parents in this world. ❐

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