Laudation for Dr. Fena Ochs

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Finalist of the Eppendorf Award for Young European Investigators 2025

by Laura Machesky, Sir William Dunn Professor of Biochemistry,
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The 3-dimensional organisation of chromatin is crucial for protecting the genome in all phases of the cell cycle and ensuring faithful segregation of the sister chromatids during mitosis and meiosis. Studies mainly in yeast have revealed the importance of the protein cohesin, which forms a multimeric complex and organises the loops and contacts between sister chromatids. However, how cohesin actually contacts the two separate sister chromatids and holds them together and how this might work in mammalian cells was almost completely unknown. Tonight, we recognise Dr. Fena Ochs for her contribution to understanding this fundamental process in mammalian cells. Using quantitative super-resolution microscopy, where she pushed the boundaries of single molecule imaging to unpick the molecular stoichiometry of two different populations of cohesion. In a landmark study, she showed that cohesin acts as a monomer, bound to its partner sororin, to mediate sister chromatid cohesion, while another population of cohesin mediates chromatin loop extrusion.

In her undergraduate years, Fena Ochs studied in Germany in a biomolecular engineering programme. Although she found this course a bit lecture-heavy and not that exciting, it motivated her to do a masters and unconventionally, to do the thesis project first. She was fortunate to be able to go to the lab of Titia de Lange at the Rockefeller University in New York City and describes both the lab and the city as a very exciting place to be in her early 20's. This experience and Titia's mentorship inspired her to pursue studies of chromatin organisation and introduced her to advanced imaging methods.

Fena did her PhD at the Novo Nordisk Foundation Centre for Protein Research of the University of Copenhagen. She studied with Jiri Lukas, where she used super-resolution microscopy to discover how the genome surveillance machinery protects DNA against excessive resection and damage after double-strand breaks. She also proposed that the DNA protection machinery guarded the nearby epigenetic information during a breakage and repair event. This was a formative time, and she remembers the excitement in the lab that came from solving important scientific questions.

During her time in Copenhagen, Fena became fascinated by how chromatin architecture is regulated not only during DNA damage and repair, but also during the pairing and separation of the sister chromatids in meiosis. This inspired her to venture to Oxford to the lab of Kim Nasmyth where she says she had great training in how to design and do "the killer experiment." In Nasmyth's lab, she was the only one studying mammalian chromatin and therefore had to develop protocols and build her own microscope systems. This was a formative time, and she saw it as a real opportunity to literally build her own scientific niche. There was a synergy working with Nasmyth, as he asked different questions and constantly challenged everything. This helped to develop her rigorous and quantitative approach that is so unique and powerful now.

Now, at the Biotech Research and Innovation Centre (BRIC) at the University of Copenhagen, Fena runs her own group studying DNA repair and 3D chromatin organisation. She continues the principles of quantitative cutting-edge super-resolution microscopy in her own group and aims to inspire the future leaders in this area by continuing the traditions of rigorous quantification, excitement and discovery.