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FIRST PERSON

First person – Anna Bajur

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping early-career researchers promote themselves alongside their papers. Anna Bajur is first author on 'Cytocortex-dependent dynamics of *Drosophila* Crumbs controls junctional stability and tension during germ band retraction', published in JCS. Anna conducted the research described in this article while a PhD student in Prof. Elisabeth Knust's lab at Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany. She is now a Research associate/Postdoc in the lab of Dr Katelyn Spillane at King's College London, Department of Physics, UK, investigating the interplay between mechanical forces and the plasma membrane, especially in the context of signalling and modulation of cellular behaviour.

Anna Bajur

How would you explain the main findings of your paper in lay terms?

Epithelial cells form a tight barrier separating the inner body from the outside environment, which serves to protect animals, for example, from pathogens or mechanical trauma. During embryonic development, epithelia undergo remodelling as they bend and fold to give rise to the structures of the various organs. A key feature of epithelial cells that allows them to develop into 3D-tissues is their polarisation, that is, their organization is asymmetric. This asymmetry is needed for junction formation, which allows cells to adhere to one another. In the context of development, this adhesion is important for mechanical force distribution that regulates the cellular rearrangements driving epithelial remodelling. The interplay between cell polarity and junctional remodelling is still poorly understood. That is why we wanted to test whether epithelial cells need to modulate their internal polarity in order to remodel junctions and to maintain proper force balance in the developing epithelium. Using *Drosophila melanogaster* embryos as a model, we found that proper junctional remodeling depends on the interaction between Crumbs, a transmembrane polarity regulator, and the cytoskeleton, the cellular structure that generates mechanical force. A mutation that abolishes interaction between those two components creates tension imbalance across the developing epithelium, which coincides with the formation of breaks in the junctions. In the context of development, this means that modulation of the interaction between the cytocortex and transmembrane polarity proteins is regulating the stability of the adhesion between epithelial cells, which in turn is required for proper propagation of the forces underlying epithelial remodelling.

Were there any specific challenges associated with this project? If so, how did you overcome them?

The first challenge was to photobleach and follow the cell–cell border, which deforms and moves quite a lot during imaging. It took a lot of optimisation; in the end, I decided to photobleach multiple cell–cell borders in one field of view and to increase the speed of imaging while simultaneously imaging multiple *z*-positions to account for movement in all dimensions. Together with our Bioimage Facility, we found a way to additionally employ a semi-manual trajectory analysis to make data analysis easier and more streamlined. Additionally, this project was challenging because in many cases we were encountering problems forcing us to change the direction of our research. One of the initial ideas was to test how the actomyosin network modulates Crb dynamics. We didn't expect that blocking it would have such a strong effect on Crb (leading to a decrease in Crb levels at the membrane even at low concentrations). This is why we decided to focus on structural components of the cytocortex as well as the role of the FERM domain of Crb, as it was unknown.

When doing the research, did you have a particular result or 'eureka' moment that has stuck with you?

One of the main questions that I wanted to investigate was whether the interaction of Crb through the FDB motif (linking it to the cytocortex) is important for the epidermis during development. We knew from previous studies in our lab led by David Flores-Benitez that this interaction is important in the amnioserosa for proper dorsal closure. I saw a difference in Crb dynamics in the epidermis in this particular mutant; however, there was no obvious phenotype in the epidermis, so it was assumed that the epidermis is fine. After deeper investigation, for which I had to both increase the resolution of our imaging and image many embryos (around 20) at once, I realised that the junctions break during germ band retraction. Fast imaging was crucial for this since the breaks would only last for maximum a minute on average. This was one of the eureka moments during this study.

Why did you choose Journal of Cell Science for your paper?

I like Journal of Cell Science. I think it offers a really excellent selection of cutting-edge research in cell biology and allows authors to reach a broad readership. In general, I think that the Company of Biologists is doing a fantastic job with the variety of research topics, workshops and efforts to improve the scientific community (e.g. preLights).

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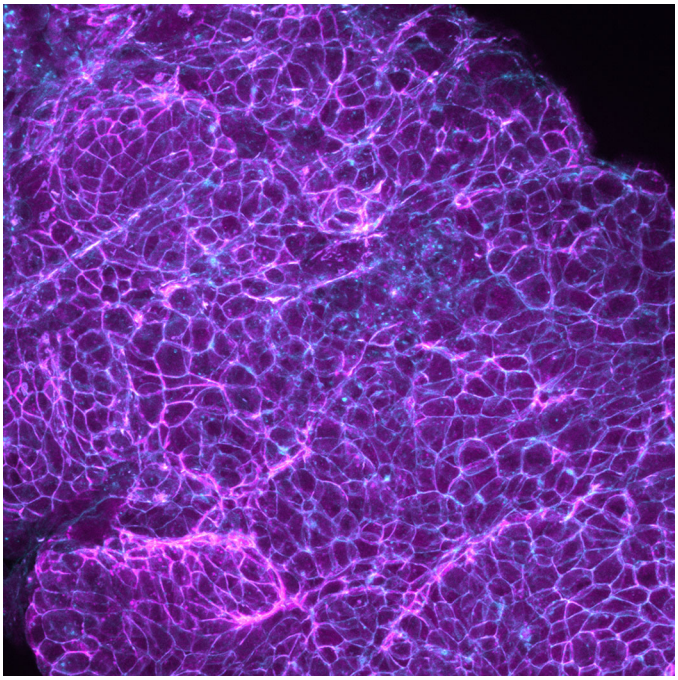

Aberrant distribution of E-cadherin (magenta) and F-actin (cyan) in the epidermis of Crb_{Y10A} mutant fly embryos. Both proteins show uneven distribution and discontinuity along cell–cell borders.

Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?

Here I think my supervisor, Prof. Elisabeth Knust, especially played a crucial role. One of the special things in our lab was that she really encouraged us to come up with our own projects and ideas. This allowed me to build up the confidence in my abilities and taught me how to push forward my own hypotheses. Except from my lab mates to whom I am extremely grateful for everything, it was mostly the group of Prof. Suzanne Eaton, also working on epithelial morphogenesis, who helped me both with technical issues but also gave me a lot of insightful carrier advice.

What motivated you to pursue a career in science, and what have been the most interesting moments on the path that led you to where you are now?

I spent a lot of time in hospitals when I was a child. That was when I started being interested in biology and medicine, mostly in the context of human health. However, I also enjoyed drawing and designing and I knew that I was good at that; thus, for quite some time during my high school years, I was considering architecture as my future direction. What made me change my mind was a workshop for high school pupils that I attended at the International Institute of Molecular and Cell Biology in Warsaw. I enjoyed being in the lab and doing experiments myself so much that I decided: "I want to come back to this place one day!" And I did: 5 years later I was pursuing my MSc project in the lab of Prof. Jacek Jaworski in molecular neurobiology. I have met so many inspiring scientists during my training so far and I hope that I can share my passion with others as well. I think the scientific community is very special and in some sense addictive. Once you are there it is hard to live without it.

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Who are your role models in science? Why?

To me, a role model is not only someone who is very successful but also someone who inspires and motivates people. Being from Warsaw, my biggest role model is also Warsaw-born Maria Sklodowska-Curie as she symbolises something very special to me. She was an exceptional scientist, a woman who received two Nobel prizes and was pursuing her dream of becoming a scientist against all odds. One of the most inspiring scientists that I had the pleasure to listen to in Dresden was Prof. Manu Prakash. To my mind, he is a scientist who does what every scientist should do: he tries to make science more accessible to non-scientists, focusing on poor people as well, for example, providing microscopy for everyone (foldscope). We had the pleasure of listening to his talk on frugal science. I believe that science needs people with such an attitude, since they can really have a huge impact on the scientific community and the perception of scientists and their work by the public.

What's next for you?

I enjoy research and I would like to continue following my biggest interest, which is understanding how cells make sense of all the information they receive. I've got a great chance to do that at King's College London expanding my skillset in biophysics. I will focus on how immune cells discriminate antigens and investigate the role of mechanical forces in this process.

Tell us something interesting about yourself that wouldn't be on your CV

Apart from science, I really enjoy drawing and painting – I like the process of creating something. My third great passion is running; I think it's a perfect sport for scientists. Training for a race teaches you that progress is slow and that one has to be really dedicated to improve; additionally, it forces you to go outside.

Reference

Bajur, A. T., Iyer, K. V. and Knust, E. (2019). Cytocortex-dependent dynamics of *Drosophila* Crumbs controls junctional stability and tension during germ band retraction. *J. Cell Sci.* **132**, 228338. doi:10.1242/jcs.228338