

FIRST PERSON

First person – Anne Rademacher

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. Anne Rademacher is the first author on 'Real-time observation of light-controlled transcription in living cells', published in Journal of Cell Science. Anne is a PhD student in the laboratory of Karsten Rippe at the German Cancer Research Center and the Bioquant institute, Heidelberg, Germany, investigating the transcriptional silencing and activation of heterochromatin by using optogenetic tools and other microscopy methods.

How would you explain the main findings of your paper to non-scientific family and friends?

The cells in our body read out different stretches of DNA – our genes – at different times. For example, they have to be able to react and adapt to certain environmental conditions or stimuli. Orchestrating this complex process of accessing genetic information in space and time is a fundamental cellular process that is difficult to investigate experimentally. In our paper, we have developed a tool that we call BLInCR to look at how cells 'switch on' a gene under the microscope. We use blue light as a switch, which is very fast and does not require any additional factors like treating cells with drugs. In addition, light can be switched on and off over and over again, so that genes can also be switched on and off repeatedly. The tool we developed here is universally applicable and can also be used to look at other processes in the cell nucleus.

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

Avoiding premature exposure to light was certainly a challenge. The optogenetic PHR/CIBN system is quite sensitive. Even the diffuse light from the computer screen next to the microscope could induce protein–protein interactions. Therefore, many steps like mounting the samples on the microscope or setting up control experiments had to be done in the dark using only red light. It turned out that my removable bike tail light was well suited for this purpose.

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

The relocalization experiments depicted in fig. 1B of the article were the most spectacular in terms of 'before and after' and therefore certainly count as 'eureka' moments. The relocalization of the PHR-tagged fluorophore to nucleoli, which were initially deprived of fluorescent signal, was particularly impressive (see image below). Another memorable moment was seeing RNA arriving at the reporter array (depicted in fig. 3A of the article). It was always tantalizing to see the images appear line by line when approaching the array region, and it was exciting to then see the first bright pixels at and around the array.

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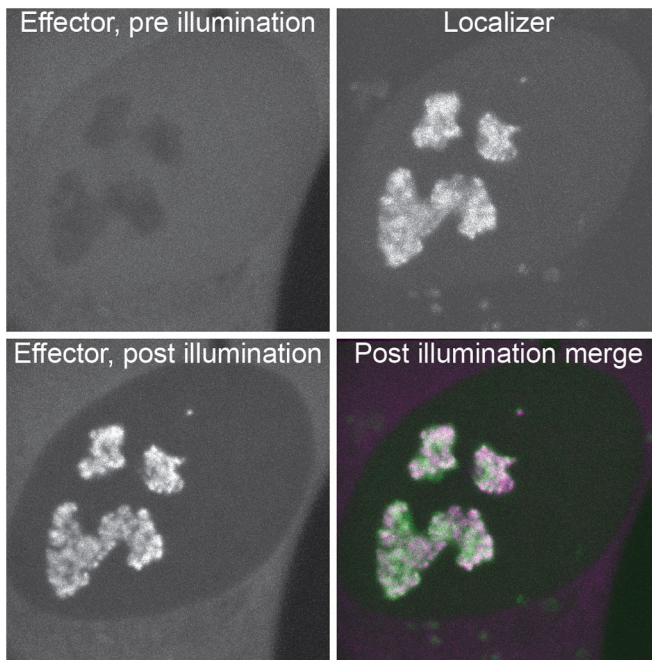
Have you had any significant mentors, and how have they helped you?

Apart from the mentoring that I received from two post docs, Katharina Müller-Ott and Fabian Erdel, in our lab and directly from my supervisor Karsten Rippe, I found motivated colleagues with diverse backgrounds in a discussion-friendly environment very helpful. They provided versatile feedback and ideas that I could then further develop, as well as a vast amount of experience that enabled efficient trouble shooting.

“I think PhD training is the perfect time to gather experience with as many different methods as possible.”

What's the most important piece of advice you would give first-year PhD students?

I think the PhD training is the perfect time to gather experience with as many different methods as possible. Some might seem



BLInCR of effectors (left column) to localizers tethered at nucleoli (top right). In the post-illumination merge image (bottom right), the effector is shown in magenta and the localizer in green.

far-fetched or unsuited to directly address the question in mind. Nevertheless, they broaden your horizon and make you think about different exciting questions although not answering any in the first place.

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

I have been playing handball for more than 20 years now and I am training a kids' team. Running around with them after work has always been a refreshing change to sitting at the microscope in the dark.

Reference

Rademacher, A., Erdel, F., Trojanowski, J., Schumacher, S. and Rippe, K. (2017). Real-time observation of light-controlled transcription in living cells. *J. Cell Sci.* **130**, 4213–4224.