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CELL SCIENTISTS TO WATCH

Cell scientist to watch – Megan King

Megan king received her BA in biochemistry from Brandeis University and then pursued a PhD degree in Biochemistry and Molecular Biophysics at the University of Pennsylvania working in the group of Mark Lemmon. For her postdoctoral training, Megan chose the laboratory of Günter Blobel at the Rockefeller University in New York. Since starting her own group at the Cell Biology Department at Yale School of Medicine in 2009, Megan was named a Searle Scholar and her work has been recognised with the NIH Director's New Innovator Award in 2011. She is now an Associate professor for Cell Biology and her research focuses on chromatin dynamics, nuclear mechanics and live-cell assay development.

What inspired you to become a scientist?

I grew up in an engineering family – both of my parents and most of my four older brothers are engineers. I think that because I was so immersed in engineering I rebelled against that and it's quite easy to imagine biology as being the reverse of engineering. Engineers can design things to work the way they want and we have to figure out how things are working. But that interest in how things work came from growing up in a family of people who ask those kinds of questions.

What motivates you now?

It's changed since I've become a group leader. I loved doing bench work and getting the data, and I was an impatient scientist; I always wanted to be doing things from which I could get the answer right away. What motivates me much more now is live-cell assay development. I love that microscopy is unbiased. It's a platform open for inquiry, because even though you set up an experiment to look at one thing, you can see almost anything if you're paying attention. And if you develop a new assay, you get to see things for the first time.

What are the questions that your lab is trying to answer just now?

We have two main focuses in the lab. One is thinking about how the cell biological context influences aspects of chromatin biology. We work a bit on DNA repair; we know a lot about the biochemical process of homologous recombination in the test tube, but we're interested in what the dynamics of DNA breaks are, where they are in the nucleus, or how their location influences how they're processed. Those questions require single-cell, rather than population-based, methods, so a lot of our motivation for building assays is to be able to look at individual cells and monitor the dynamics of a process. The other general question we're interested in is how cells modulate their mechanical properties. We want to be able to find out how cells modulate nuclear stiffness, which we know varies a lot in different tissues. So our big questions are about dynamics, spatial coordination and the mechanics of cells.

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What elements, inside or outside the lab, have been key to your success so far?

One element has been that I have a life outside of the lab. I have four kids now, and my oldest was five months old when I started graduate school. My kids don't care if a paper is rejected or the experiment doesn't work. They are a constant, and I think that's a strong balancing force, allowing me to take risks. If all I did was science, I would be terrified that it could fail. You have to set yourself up in a way where you can take risks, otherwise it's hard to make progress.

> "I love that microscopy is unbiased. It's a platform open for inquiry…"

How do you balance your family life with your work?

For most people the transition from before to after kids is very hard, because they're used to being able to work unlimited hours in the lab. For me the advantage is that I've never done science without kids. I had to acknowledge that I would not be able to work the hours that other people can work, but I also learnt to be efficient very early on. People often think that time with family means less time for the lab, when there's no reason why I can't be thinking about science when I'm giving my kid a bath. Being in the lab is good for executing tasks, but I often think of my best, most creative ideas when I'm elsewhere.

What challenges did you face when you started your lab that you didn't expect?

Attracting good people to your group is critical, because even if you have good ideas and work hard, you can't do everything. It's a

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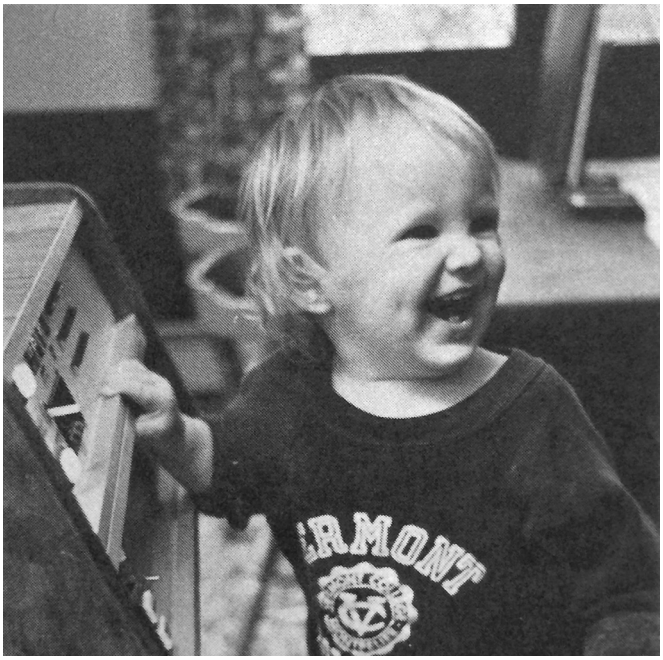

A 15-month-old Megan King plays with a computer that was built at home by her engineer parents with help from her older brothers (1976).

lot more about people than I anticipated, and being able to find and motivate them is something that you're not trained to do. You come out of your postdoc feeling empowered and you immediately get thrown back to trying to get your first rotation student. It's humbling to realise that you have to get people to believe in your research program and in you as a mentor. In a way, you have to convince good people that they want to throw in their lot with you. The first students that join your lab also train you as a PI.

What are the challenges that you are going to face now, as you become more established?

One of the key challenges is to promote the best environment for success, such that everyone feels they have their time with me – that I don't play favourites or that there are projects that are more important to me. What I learnt early on is that the same ways of interacting don't work for everyone. I had to build in structure, so I have a dedicated meeting with everyone every two weeks. Another thing is that I can't be the person who answers all the questions. At the phase that I'm at now, the group has to be able to be its own resource when I'm travelling or not available, and to let that happen I have to step back a bit. Sometimes I have to work hard to keep my mouth shut in group meetings [laughs].

How do you balance going to meetings with being in the lab?

I love the chance to catch up with people – it's one of the great things about science and personally knowing the people in your field is important. Meetings are always worth it for me, but it's tough – you want to go to meetings from your core community, because these are the people whom you know well and have great discussions with. On the other hand, more tangential meetings are where you'll make new connections with fields and people that you don't know. Until you have tenure, however, you have to say 'yes' to any invitation to speak.

"…it's worth it to take a bit of time to think about the big unanswered questions that people thought about 40 years ago. The literature is full of forgotten things."

What is your advice on establishing successful collaborations?

The best piece of advice I have with regard to collaboration is that you need to have transparency. You can't have a system where the two PIs have conversations but the people actually doing the work in the two groups are not present. I find that then people in the different groups don't trust each other, don't know what the other people are doing or they fear they're not getting credit. In our collaborations, everyone meets together in the same room or is involved in the same Skype conversation, so that everyone knows what everyone else is doing and what the goals for going forward are. Otherwise it just doesn't work well.

What is the best science-related advice you have ever received?

It's from Günter Blobel, who always pushed me to ask the big questions; that's where the fun and the big discoveries are. The experiments are still incremental, but that's how all science gets done. It's just thinking of the context that matters. You can have two groups doing the same experiments and one group will get a high flying publication, and a lot of the time it's because they know how to put it in context and to see how this mechanism can be broadly applicable. It's about keeping the big picture in mind all the time.

What is the most important advice you would give to someone about to start their own lab?

When we're junior scientists we tend to read the literature and think that everything has been figured out, or that someone would have tried it already. And it's not true! Some of those big-picture questions have been forgotten. There are new technologies and sometimes you can revisit questions with a new lens. When deciding what your group is going to focus on, it's worth it to take a bit of time to think about the big unanswered questions that people thought about 40 years ago. The literature is full of forgotten things.

Could you share with us an interesting fact about yourself that people wouldn't know from looking at your CV?

I love to dance! I've been dancing my whole life and I still dance every week that I can. You know how at scientific meetings you always have these parties at the end, with the dance? If you were to go to a meeting of the nuclear envelope field, my husband and I actually have a reputation for being the dancers at these parties.

Megan King was interviewed by Anna Bobrowska, Editorial Intern at Journal of Cell Science. This piece has been edited and condensed with approval from the interviewee.