Disease Models & Mechanisms 3, 136-137 (2010) doi:10.1242/dmm.005454

Embracing new ideas: an interview with Maria Leptin

Maria Leptin works simultaneously in the independent fields of immunology and development. She is the new director of the European Molecular Biology Organization (EMBO) and runs a laboratory in Heidelberg, as well as one in Cologne. Here, she describes how she moved between fields and some of the mechanisms that she believes foster creative science.

Maria Leptin is not afraid to accept new challenges. Her early postgraduate work was in immunology and her recent work uses the zebrafish as a model organism to understand host-pathogen interactions. During the time in between, she switched both her research focus and the model organism that she used. As a group leader at the Max Planck Institute in Tübingen, she uncovered some of the pathways that regulate tissue differentiation and morphology during Drosophila development. Recent work from her lab shows important similarities in pathogen-induced response mechanisms between zebrafish and more complex vertebrates. Maria's relationships with colleagues and fellow scientists facilitate her transitions between arenas and infuse her research with fresh ideas.

Many scientists settle into an area early in their career and make this the focus of their future work. You are very different, moving your work across fields, bringing in new, largely unrelated projects, and using different model organisms. Can you tell me a little bit about the path of topics that you have covered?

I originally trained as an immunologist in cell biology. As a PhD student, I worked on the antigen receptor on the B-cell surface, asking how it was involved in triggering the immune response. We developed monoclonal antibodies to determine how IgM reacts to extracellular signals to induce B-cell activation and maturation into plasma cells to help fight infection. After my PhD, I decided that I wanted to do something else.

Maria Leptin is the new Director of the European Molecular Biology Organization (EMBO) and head of the Developmental Genetics group at the Institute of Genetics at the University of Cologne (mleptin@uni-koeln.de, maria.leptin@embo.org)

At that time, developmental biology was beginning to use new molecular techniques such as chromosome walking, which allowed researchers to clone genes with known locations, and other tools to understand genetics that were just becoming established. I was interested in a number of things like transcription and gene regulation in general, as well as the field of Drosophila development. I ended up deciding spontaneously to join a lab working on fly development at the MRC Laboratory of Molecular Biology (LMB) in Cambridge, although I originally hadn't applied to this group. I liked the project, and it was a fun group to work with.

My work in Cambridge led me to become interested in cell shape, early cell movement and gastrulation. So, when I set up my own group, that's what I decided to work on. At that time, I was at the Max Planck Institute in Tübingen, Germany. That was a very fruitful period for my research, which laid the foundation for the work I did when I got my professorship here, in the Institute of Genetics at the University of Cologne. Our initial work here focused on gastrulation, but later I began also to look at the tracheal cells in the fly and the pathways that direct their branching morphogenesis to create the tracheal respiratory system. At some point, I became a bit bored with flies, development and cell shapes – maybe I had a little scientific midlife crisis. At the same time, I happened to hear about an interesting observation relating to disease resistance in zebrafish, so I started looking at the zebrafish as a model to understand pathogen resistance. It is ironic that the fly work we were doing then suddenly began to take off again, and now I have two research areas that I am really excited about.

Despite your significant experience using Drosophila as a model organism, you re-tooled your laboratory to introduce zebrafish. How did you choose which model you wanted to use to approach your scientific goals?

Serendipity played a major role in my choice to study the zebrafish. When Christiane Nüsslein-Volhard carried out her first big genetic screen in zebrafish she noticed that different families of fish reacted very differently to infections such as, for instance, tuberculosis. Nobody else ever decided to figure out why and I thought it was a really interesting question. The development of this area for me was not analyzed in agonizing detail and it did not involve soul-searching. It just seemed that there was a problem to be solved and nobody else was going to do it, so I thought 'why don't I work on it'.

From a functional standpoint, how did you re-tool your lab to make the shift from Drosophila to zebrafish?

I haven't given up Drosophila. The majority of the lab still works with Drosophila on issues of development. When I began working with zebrafish, I was very familiar with the genetics. I had been next door to

Nüsslein-Volhard's lab when I was at the Max Planck Institute. There, many of my colleagues were working with zebrafish. I had the opportunity to see, from close by, how it is used as a model organism and how the lab was set up. I might not have begun research with zebrafish all by myself. But, when I started the project, we had another group here – a very strong group working on zebrafish. I was able to learn from them and I could expand from their experience, so the transition was not a great achievement. It just happened to work.

Does your work in the field of development influence or inform your infectious disease work in zebrafish?

The two areas of my research focus developed independently of one another. It wasn't that I saw how something worked in one field and it led me to think about how something might happen in another area. In some respects, whatever you do in one area always informs other areas. But in immunity, I don't see that there is a direct benefit from understanding development. The projects in my lab are unrelated.

If those projects do not provide you with enough independent issues to contemplate, soon you will also become the Director for the European Molecular Biology Organization (EMBO) and start another research group at the European Molecular Biology Laboratory (EMBL) in Heidelberg. What motivated you take on this new role?

That's a very good question. EMBO fosters collaboration and communication between laboratories in Europe with a common interest in molecular biology. I have worked with the organization and I have been on EMBO committees to oversee membership and publications. I've been a member of the Council so I know the organization. I think it is a great organization with great people, otherwise I wouldn't have considered it in the first place.

I've been at the University of Cologne for 15 years now and the Directorship of EMBO seems like an interesting new challenge. Why not do it? Also, I will have a lab at EMBL and I think it is a very nice research environment. I've never had any trouble doing my research here in Cologne. This is a wonderful environment and I like it here. So, I wasn't looking for a job. But I know that EMBL is a good research community with a fantastic infrastructure. Many of my new colleagues there are people that I've known for a long time. So I thought, 'Why not go for it?'

What specific qualities about EMBO appeal to you?

Working with fellow scientists who are really good. Also the EMBO staff are great. EMBO includes very intelligent people full of good ideas. EMBO also plays an important role in supporting molecular biology in Europe, whether it's by organizing meetings and workshops, funding postdocs, or running new programs for junior groups. There is a large annual conference, The EMBO Meeting [formerly the ELSO (European Life Scientist Organization) meeting], that addresses scientists at all career stages with many opportunities for young graduate students. EMBO is run by scientists for scientists and extends its efforts throughout all of Europe. It's good to have a European forum to bring together people that think broadly about science.

EMBO is run by scientists for scientists and extends its efforts throughout all of Europe. It's good to have a European forum to bring together people that think broadly about science

This is clearly not your first move. You have the experience of working in many different types of environments, in three different countries. What elements of your previous work places do you think facilitated research and helped to foster your ability to perform good science?

One thing is very clear; the best institutes I know have a good, shared infrastructure. They also have flat hierarchies, which I believe are usually superior to organizations that divide their people up into hierarchical units. I have worked in two institutes, the Basel Institute for Immunology and the LMB in Cambridge, which have a relatively flat personnel structure. Their research groups are very small and they are also very highly funded. The monetary support keeps the structure functioning and allows the scientists to concentrate on their research. People don't have to think about moving up a ladder. The lack of hierarchy in an institute facilitates communication between independent people who want to talk about their own thoughts and ideas. They are interested in, and not threatened by, what goes on next door.

How can institutes without a hierarchy, which do not often give power to scientists based on seniority, keep established scientists?

I think there are times when people decide that the 12 people in their small lab aren't enough to explore all of the ideas they have. They may want to run their lab with 30 people. If that is what they want, then maybe they don't care so much about being surrounded by lots of independent people. I think there's a place for everything. My preference is a place that buzzes with lots of independent people sharing their ideas.

If you were going to start again as a postdoc, is there a different field that you would choose to go into?

If I said I wanted to go back to where I started 30 years ago that would be pretty stupid. I find the developments in some fields that are not related to mine very exciting, for example, the non-invasive and high-resolution methods for monitoring brain activity that allow completely new insights in neurobiology. And with the use of molecular biological approaches, and its importance for society, the field of ecology is having a renaissance. That is another area where great things are happening. There are many exciting avenues for future scientists.

We are grateful to Maria Leptin for sharing some of her experience and ideas. Kristin H. Kain, Associate Reviews Editor for DMM, interviewed Maria Leptin. This piece was edited and condensed with approval from the interviewee. The interview took place shortly before Dr Leptin took up her role as Director of EMBO.