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An interview with Thomas Lecuit

Thomas Lecuit heads up a multidisciplinary team of 10 scientists at the Developmental Biology Institute of Marseilles (IBDML) in France. He is deeply interested in how the tissues that form our organs acquire and maintain their proper architecture, and has special expertise in the physics and modelling of embryonic development. He has been an editor of *Development* since 2008.

Thomas kindly agreed to an interview to tell us about how he got started in science, and about his passion for work, music and sleep…

When did you first realize you were interested in science?

For as long as I can remember, I have always been trying to understand the world around me. I firmly believe that detailed observation and abstraction are essential for understanding. I have a strong memory from when I was 11 or 12 of reading a book about plate tectonics and of being fascinated in how the oceans and continents form. It opened my eyes to the work of scientists and their ability to explain phenomena that are far removed from everyday experience. As a kid, I spent a lot of my spare time looking for butterflies and plants, trying to recognize closely related species. I didn't know that I wanted to be a scientist then, but I realized much later that I was already behaving like one.

Who inspired you to follow a scientific career?

My greatest early mentor was my grandfather. He was a true naturalist, and when I was about 10, he began to educate my sense of observation, teaching me Linnaean classification, focusing on my interest in butterflies. I was lucky that he took my childhood hobby very seriously and helped me rationalize it. I remember him giving me scientific articles about natural butterfly hybrids from the southern Alps, which he had characterized. He also told me about his accidental discovery of a new butterfly phenotype that bred true and that he had shown this to be due to a dominant mutation. This was extraordinary to me and had a major influence – I think my later career in science owes much to these early experiences.

What prompted you to spend time in the USA and Germany?

A combination of scientific interest, instinct and chance...When I had the opportunity to go to Rockefeller University for a summer rotation in Claude Desplan's lab in 1992, I discovered the excitement of experimental research on embryos for the first time. I read *A Genetic Switch* by Mark Ptaschne (Ptaschne, 2004) and *The Making of a Fly: The Genetics of Animal Design* by Peter Lawrence (Lawrence, 1992), both with great passion, and attended many wonderful seminars. I began to see how abstract models such as Lewis Wolpert's view of morphogenesis could be explored using experimental observations and it was at that stage that I decided to embark on what most excited me: developmental biology.

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I moved to Heidelberg for my PhD to work with Steve Cohen because I wanted to focus on morphogenesis and patterning. Steve's lab was an ideal place to study this. EMBL has since been my reference point for sheer enthusiasm for science. After completing my PhD, I wanted to get into the cell biology of development and decided that meant looking at early embryogenesis. I went back to the USA to work with Eric Wieschaus with whom I learned so much. Interaction with physicist Stan Leibler and his colleagues in Princeton also had an important impact on my growth as a scientist, forcing me to question my scientific assumptions much more critically.

If you could solve one developmental biology question tomorrow, what would it be?

It would be to understand how growth and tissue shape changes are integrated and orchestrated during morphogenesis. This is a very complex but fascinating problem that occurs at the crossroads of different areas of biology.

What made you return to France?

I had been abroad for 8 years and my wife and I then had two small children, both born in Princeton; we just decided we would rather bring up the family in France. Professionally, it was also a good move; I have found Marseille to be a place where there is good scientific diversity and plenty of smart people to learn from. It also offers a relaxed environment for research, which I need to pursue original avenues and my own interests.

What kind of team do you lead and what is your current research focus?

I am a research director at the Developmental Biology Institute of Marseilles (IBDML), an institute overseen by the CNRS and the University of the Mediterranea. This is a world-class centre in developmental biology, which spans embryology, organogenesis and neurobiology, and has a multidisciplinary team of geneticists, cell biologists and physicists. My group consists of 10 people with different backgrounds in science, biology and physics. I plan to slightly expand the group to get more of the complementary expertise that we need to properly study morphogenesis. We already collaborate with the physicist P. F. Lenne and his group and find that the diversity of backgrounds enhances discussions and improves the quality of our research.

Interview by Kathryn Senior*
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What are the potential medical applications of your work?

We try to understand the mechanisms that ensure robustness and cohesion of tissues while allowing the plasticity associated with remodelling and growth. This balance is normally tightly controlled in vivo but when this balance is lost, solid cancers can develop and progress. As we learn more about the control of tissue homeostasis and its regulation by signalling and mechanics, we hope to provide new information that could be useful to oncology.

I would love to be a musician because music transcends everything

Has your scientific work produced any big surprises?

Realising that macroscopic changes in tissue shape, such as elongation, are the result of very simple and highly organised spatial-temporal patterns of cell contact powered by interfacial tension is something I had not anticipated or imagined. In retrospect, it is very simple and I find it elegant – but it was a surprise. This enhanced my certainty that, although hypothesis-driven science is essential, a significant part of our research should continue to involve unbiased detailed observation that tries not to overlook the unexpected. This paradox is at the heart of science for me.

What is your greatest scientific ambition for the next 20 years?

I would like to understand how different cell and tissue behaviours derive from core self-organizing modules operating at different scales, such as at the subcellular and tissue levels, for example. It is true that specific gene pathways may be responsible for regulating the system but they cannot explain per se the organization and dynamics of developmental processes.

How did you become involved with *Development*?

I was contacted by the Editor in Chief and Executive Editor of the journal, who wanted to discuss with me ways to publish more papers that encompass new areas of developmental biology. There was a particular need for publications in cell biology, quantitative biology and biophysics. I became involved in the discussions and was delighted when the suggestion was made that I join the team as an editor myself.

What does *Development* bring to this field of science?

Development is read by many people and covers a wide range of concepts and approaches. It is a highly conscientious publication with high integrity, and supports excellent basic research in many areas. It can be difficult for major journals to achieve this owing to the pressure from private interests and the need to search frenetically for the latest ‘scoop’.

What would be your first choice of an alternative career and why?

I would love to be a musician, even a mediocre one, because music transcends everything.

If you had an extra hour in each day, how would you spend it?

We now have four children, two still small, so the most likely thing I would do is sleep. Beyond that, practising the piano and reading would be major priorities for my spare time.

References

Lawrence, P. A. (1992). *The Making of a Fly: The Genetics of Animal Design*. Chichester, UK: Wiley-Blackwell.

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