Ben Lehner, AXA and ICREA Professor and senior group leader at EMBL-CRG Systems Biology Unit, Center for Genomics Regulation, Barcelona, Spain

The Liliane Bettencourt Prize for Life Sciences, awarded annually by the Bettencourt Schueller Foundation, aims to honour the work of a European researcher aged 45 years and younger who is involved in promising or innovative research. The scientists are selected for the quality of their research and publications, their leadership skills, and their project work, which must focus on solving an ambitious scientific challenge. The price, which was launched in 1992, has been given to 22 recipients so far, and French researchers and researchers in the rest of Europe are eligible in alternate years. The 2016 prize, which is a European prize, will be awarded in Paris to Ben Lehner, AXA and ICREA Professor at EMBL-CRG Systems Biology in November 2016.

Q: What is your key area of research?
The main focus of my research is looking at what makes individuals different – for example, why identical twins do not always develop the same disorders throughout life. This is one of the oldest questions in genetics, and I find it fascinating.

We work with genetically-identical model organisms, such as brewer’s yeast (Saccharomyces cerevisiae) and the nematode Caenorhabditis elegans which enable us to perform both highly quantitative and large scale genetic analysis while controlling in their environments. “C. elegans” is naturally isogenic and we keep the populations inbred. The nematodes have a transparent embryo, which helps for imaging and allows us to quantify genes as they are turned on and off.

Our research projects look at how changes in the expression of certain genes occur in development and evolution, why different parts of a genome have different mutation rates, and how mutations and environmental factors interact and have impacts on phenotypic variations. This will allow us to gain a better understanding of how we can predict the development of these phenotypic differences from a combination of genetic and environmental sources of variation.

Q: Why is this important?
As well as being an interesting area of research, these findings have applications in personalized medicine, as they will help us to answer a number of questions. Why do certain individuals exposed to environmental factors, such as cigarette smoke, develop cancer whereas others remain healthy? Why are some people, with a certain genetic change, vulnerable to disease, while others don’t seem to be? Why do some people respond well to drugs and others don’t? If we can find the right biomarkers that link genome sequences with phenotypic variations, physicians will be able to identify those individuals who are more likely to develop specific diseases. They will be monitored, allowing early diagnosis and treatment. Using these biomarkers, drug companies could develop tailored drugs that target specific genetic and phenotypic variations.

Q: What makes your lab and team different?
Many groups focus on just bench work, or just data. Our group is evenly split, with half of the lab focused on data analysis. Our projects are ‘system-agnostic’ – we look at the question and then find the best system to answer it. For example, some projects may just involve data crunching, whereas other projects may start off virtually, and then move onto the lab bench.

Data analysis allows us to have a fast run up to some projects, so that we can make decisions rapidly, and discard potential dead-ends quickly. We may then use molecular biology to test to see which variations are the most important.

Q: What are the data challenges you face?
A lot of medical and scientific data isn’t easily accessible or widely shared. This may be because of patient confidentiality, because researchers are protecting their results, or because the data is held on paper or in incompatible digital formats.

Q: Why did you get the prize?
That’s a difficult question for me to answer! I think it’s because, while a lot of scientists have a single focus, my team and I work on a wide variety of different areas. This allows us to make contributions in a number of different fields.

Q: What difference will this make?
Two-thirds of this prize is earmarked to support the work in the lab. One of the advantages of this source of funding is that it is very flexible – the uses that we can put it to aren’t limited – so we can use it to support some areas of very innovative research.

Being awarded the Liliane Bettencourt Prize for Life Sciences provides the recognition that me and my team need to assist us with attracting talented researchers and new areas of funding.

Ben Lehner received his PhD from the University of Cambridge in 2004, and then carried out postdoctoral research as part of Andrew Fraser’s group at the Wellcome Trust Sanger Institute. In 2006, he moved to the Centre for Genomic Regulation (CRG) in Barcelona, where he became a group leader at the EMBL-CRG Systems Biology Research Unit. He was named ICREA Research Professor in 2009 and AXA Professor of risk prediction in age-related diseases in 2014. He has received, amongst others, the Eppendorf Prize for Young European Investigators (2013) and EMBO Gold Medal (2016) and was named EMBO Young Investigator in 2010.
BEN LEHNER MAKES TAILOR-MADE MEDICINE A REALITY

- From worms to databases of human DNA, he explores factors that turn genomes into individuals who respond uniquely to mutations, diseases and treatments.
- The Genetics Systems group he leads is based at the Center for Genomic Regulation in Barcelona, Spain.
- He is the 2016 laureate of the Liliane Bettencourt Prize for Life Sciences awarded each year to an exceptional scientist under 45 by the Bettencourt Schueller Foundation.

The Liliane Bettencourt Prize for Life Sciences rewards a European researcher under the age of 45.

It has been awarded every year since 1997 to scientists recognized within the community for the quality of their international publications, the promising prospects of their projects and the leadership demonstrated in mobilising an entire team.

Created by a family, the Foundation trusts in people and their capacities, emphasizing initiative, creativity, quality and openness. Its convictions define its spirit and ways of working – in the common interest, not for profit, and with social responsibility in mind.

Find out more about Ben Lehner, the Bettencourt Schueller Foundation’s purpose and this year’s awards at www.fondationbs.org