PRESS RELEASE

Looking into the retina—Philipp Berens receives Bernstein Award 2015

For his research, computational biologist Dr. Philipp Berens has been awarded one of the most attractive junior research prizes worldwide. Using computer models, Berens investigates the role and structure of the different cell types in the retina. The Bernstein Award will be presented by Dr. Matthias Kölbel from the Federal Ministry of Education and Research (BMBF) on September 15, 2015 during the Bernstein Conference in Heidelberg. The award is endowed with up to € 1.25 million and enables outstanding young researchers to build up an independent research group at a German research institution. Berens plans to establish his research group at the Bernstein Center for Computational Neuroscience at Eberhard Karls University Tübingen.

In our retina, there are numerous types of a certain cell class, the so-called bipolar cells. To date, 14 different types have been identified in the mouse. How does this diversity emerge—do the cells have different roles in visual processing? These are the questions Philipp Berens deals with. "By means of computer models, I try to understand the functional and biophysical properties of these cells," Berens explains. "The models build on physiological and anatomical data from experimental research." Computational modelling allows him to observe the cell types in different settings and to draw conclusions from their behavior.

In previous collaborations with experimental researchers, Berens has studied another cell type in the retina: the ganglion cells. These neurons receive their inputs from bipolar cells and send the output of the retina as nerve impulses to the brain. Using statistical methods, Berens has identified many different types of ganglion cells. "Until recently, the existence of only a handful of ganglion cell types had been assumed—however, we found 30 to 40 distinct types. They all fulfill a different function and project their own image version to the brain," Berens says.

Analyzing bipolar cells will enable the neuroscientist to understand how the wide variety of ganglion cells is created. At the same time, Berens pursues medical applications with his research. In a second step, he plans to investigate the impact of degenerative retinal diseases on various cell types. "Do all bipolar cell types fail simultaneously or do some survive longer than others? And may the results from these findings serve as a diagnostic marker, which allows us to analyze the progress of the disease in a patient?" Berens asks.

By means of the Bernstein Award, Berens plans to establish a research group at the University of Tübingen. Here, Berens is already heading a project at the Bernstein Center and the Werner Reichardt Center for Integrative Neuroscience – CIN (Cluster of Excellence at the university) and has several collaborations. He is looking forward to the forthcoming research projects: "The challenge in trying to understand the nervous system is to find a part that is sufficiently complex to facilitate exciting things to happen—and that is at the same time simple enough to allow its understanding. The retina is an ideal example of this."

Dr. Philipp Berens is born in 1981 and has studied bioinformatics (diploma) and philosophy (BA) at the University of Tübingen. From 2008 to 2013, he pursued his PhD in the labs of Professor Dr. Matthias Bethge at the Max Planck Institute for Biological Cybernetics in Tübingen and Professor Dr. Andreas Tolias at Baylor College of Medicine in Houston (USA). For his doctoral thesis on visual population coding, he received the highest possible grade *summa cum laude*. From mid 2012 to the end of 2014, he was a postdoctoral research associate in the group of Professor Dr. Matthias Bethge at the Bernstein Center Tübingen. Since November 2014, Berens is heading a project in the labs of Professor Dr. Matthias Bethge and Professor Dr. Thomas Euler at the Bernstein Center Tübingen and the University Hospital of Tübingen. He continuous to be a visiting scholar in the lab of Professor Dr. Andreas Tolias at Baylor College of Medicine in Houston (USA). For the clear description of his research, Berens won the *Klaus Tschira Preis für verständliche Wissenschaft* in 2013. He has twice been presented with a teaching award for his lectures at the Tübingen Graduate Training Centre of Neuroscience.

The Bernstein Award has been conferred for the tenth time this year and is part of the National Bernstein Network for Computational Neuroscience, a funding initiative launched by the Federal Ministry of Education and Research (BMBF) in 2004. The initiative's aim was to sustainably establish the new and promising research discipline of Computational Neuroscience in Germany. With this support, the network meanwhile has developed into one of the largest research networks in the field of computational neuroscience worldwide. The network is named after the German physiologist Julius Bernstein (1835-1917).

Contact:
Dr. Philipp Berens
Bernstein Center for Computational Neuroscience Tübingen
University of Tübingen
Otfried-Müller-Str. 25 · 72076 Tübingen
Phone: +49 (0)7071 29 88910
         +49 (0)7071 29 89018 (Secretary – only mornings)
Email: philipp.berens[at]uni-tuebingen.de

More information:
https://philippberens.wordpress.com website Philipp Berens
http://www.bernstein-conference.de Bernstein Conference
http://www.bccn-tuebingen.de Bernstein Center Tübingen
http://www.nncn.de National Bernstein Network Computational Neuroscience

Philipp Berens, laureate of the Bernstein Award 2015

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